

Module Catalog

M.Sc. Management and Technology

TUM School of Management

Technische Universität München

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Module Catalog: General Information and Notes to the Reader

What is the module catalog?

One of the central components of the Bologna Process consists in the modularization of university curricula, that is, the transition of universities away from earlier seminar/lecture systems to a modular system in which thematically-related courses are bundled together into blocks, or modules.

This module catalog contains descriptions of all modules offered in the course of study.

Serving the goal of transparency in higher education, it provides students, potential students and other internal and external parties with information on the content of individual modules, the goals of academic qualification targeted in each module, as well as their qualitative and quantitative requirements.

Notes to the reader:

Updated Information

An updated module catalog reflecting the current status of module contents and requirements is published every semester. The date on which the module catalog was generated in TUMonline is printed in the footer.

Non-binding Information

Module descriptions serve to increase transparency and improve student orientation with respect to course offerings. They are not legally-binding. Individual modifications of described contents may occur in praxis.

Legally-binding information on all questions concerning the study program and examinations can be found in the subject-specific academic and examination regulations (FPSO) of individual programs, as well as in the general academic and examination regulations of TUM (APSO).

Elective modules

Please note that generally not all elective modules offered within the study program are listed in the module catalog.

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[MGT001376] Digital Marketing & Text Analytics Digital Marketing & Text Analytics	451 - 452
[WI000997] Marketing Entrepreneurship Lab Marketing Entrepreneurship Lab	453 - 454
[WI001179] Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption	455 - 456
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	457 - 459
[WahlKat-OSCM] Catalogue of Elective Modules: Operations & Supply Chain Management Wahlkatalog: Operations & Supply Chain Management	460
[MGT001350] Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management	460 - 462
[MGT001370] Designing Manufacturing Systems Designing Manufacturing Systems	463 - 464
[MGT001371] Scheduling Manufacturing Systems Scheduling Manufacturing Systems	465 - 466

[WI001088] Advanced Modeling, Optimization, and Simulation in Operations Management Advanced Modeling, Optimization, and Simulation in Operations Management [AMOS]	467 - 469
[WI001135] Stochastic Optimization Stochastische Optimierung	470 - 472
Specialization in Technology Technik-Schwerpunkt	473
Specialization in Technology: Mechanical Engineering (minor) Technik-Schwerpunkt: Maschinenwesen Basismodule (minor)	474
[BV350007] Materials in Mechanical Engineering Werkstoffe im Maschinenwesen [Materials in mechanical engineering]	474 - 475
[ED150010] Sustainable Mobile Drivetrains Nachhaltige Mobile Antriebssysteme	476 - 478
[ED160007] Lithium-Ion Battery Production Lithium-Ionen-Batterieproduktion [VLBP]	479 - 481
[ED160017] Sustainable Manufacturing Nachhaltige Produktion [SuM]	482 - 484
[MW0066] Piston Engines 1 Kolbenmotoren 1 [Piston Engines I]	485 - 487
[MW1108] Engineering Mechanics for Technology Management Technische Mechanik für TUM-BWL	488 - 489
[MW1694] Machine Elements - Basics, Manufacturing, Application Maschinenelemente - Grundlagen, Fertigung, Anwendung [ME-BMA]	490 - 491
[MW1903] Bioprocess Engineering Bioverfahrenstechnik	492 - 493
Specialization in Technology: Mechanical Engineering (major) Technik-Schwerpunkt: Maschinenwesen Vertiefungsmodule (major)	494
[ED150011] Hydrogen Mobility Wasserstoffmobilität [H2Mobil]	494 - 496
[MW0036] Factory Planning Fabrikplanung	497 - 498
[MW0101] Product Ergonomics Produktergonomie	499 - 500
[MW1909] Sustainable Energy Systems Nachhaltige Energiesysteme	501 - 502
[MW2277] Energy Carriers for mobile Applications Energieträger für mobile Anwendungen	503 - 504
Specialization in Technology: Informatics (minor) Technik-Schwerpunkt: Informatik Basismodule (minor)	505
[CIT3230000] Advanced Concepts of Programming Languages Advanced Concepts of Programming Languages	505 - 507
[IN0001] Introduction to Informatics Einführung in die Informatik	508 - 509
[IN0008] Fundamentals of Databases Grundlagen: Datenbanken	510 - 511
[IN0042] IT Security IT-Sicherheit	512 - 513
Specialization in Technology: Informatics (major) Technik-Schwerpunkt: Informatik Vertiefungsmodule (major)	514
[CIT4230000] Strategic IT Management Strategic IT Management	514 - 516
[IN0010] Introduction to Computer Networking and Distributed Systems Grundlagen: Rechnernetze und Verteilte Systeme	517 - 519
[IN2040] Virtual Machines Virtuelle Maschinen	520 - 521

[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	522 - 524
Specialization in Technology: Chemistry (minor) Technik-Schwerpunkt: Chemie Basismodule (minor)	525
Required Modules Pflichtbereich	525
[CH1090] Introduction to Organic Chemistry Einführung in die Organische Chemie	525 - 527
[CH1091] Basic Principles of Physical Chemistry 1 Grundlagen der Physikalischen Chemie 1	528 - 530
[CH6202] General and Inorganic Chemistry Allgemeine und Anorganische Chemie	531 - 532
Electives Wahlbereich	533
[CH4117] Biochemistry Biochemie	533 - 535
[CH0106] Biology for Chemists Biologie für Chemiker	536 - 537
[CH0107] Analytical Chemistry Analytische Chemie	538 - 539
Specialization in Technology: Chemistry (major) Technik-Schwerpunkt: Chemie Vertiefungsmodule (major)	540
[CH4117] Biochemistry Biochemie	540 - 542
[CH0226] Molecular Medicine Molekulare Medizin	543 - 545
[CH3153] Construction Chemistry 1 Bauchemie 1	546 - 548
Specialization in Technology: Electrical Engineering and Information Technology (minor) Technik-Schwerpunkt: Elektro-/ Informationstechnik Basismodule (minor)	549
Elective area 1 Wahlbereich 1	549
[EI10002] Principles of Electrotechnology Principles of Electrotechnology [PiET]	549 - 550
[EI1289] Electrical Engineering Elektrotechnik	551 - 553
Elective area 2 Wahlbereich 2	554
[EI05551] Internet Communication Internetkommunikation [INT]	554 - 555
[EI0625] Communication Networks Kommunikationsnetze	556 - 557
[EI10003] Analog Electronics Analog Electronics [AE]	558 - 559
Specialization in Technology: Information Technology and Electronics (major) Technik-Schwerpunkt: Informationstechnik und Elektronik Vertiefungsmodule (major)	560
[EI0631] Media Technology Medientechnik	560 - 562
[EI7331] Design of Integrated Circuits Entwicklung von Integrierten Schaltungen	563 - 564
Specialization in Technology: Power Engineering (major) Technik-Schwerpunkt: Energietechnik Vertiefungsmodule (major)	565
[EI0610] Electrical Drives - Fundamentals and Applications Elektrische Antriebe - Grundlagen und Anwendungen	565 - 566

[EI0611] Basics of Electrical Energy Storage Grundlagen Elektrischer Energiespeicher	567 - 568
[EI0612] Electrical Small Power Machines Elektrische Kleinmaschinen	569 - 570
[EI0620] Fundamentals of Electrical Machines Grundlagen elektrischer Maschinen	571 - 572
[EI0628] Power Electronics - Fundamentals and Applications Leistungselektronik - Grundlagen und Standardanwendungen	573 - 574
[EI0709] Fundamentals of Energy Economy Grundlagen der Energiewirtschaft [GDE]	575 - 576
[EI1287] Laboratory Course Power Transmission and High Voltage Technology Praktikum Energieübertragungs- und Hochspannungstechnik für Lehramt und TUM-BWL	577 - 578
[EI4585] Project: Economic Aspects of Nanotechnology Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie	579 - 580
[EI70330] Data Networking Data Networking [DNET]	581 - 583
[EI70810] Battery Storage Batteriespeicher	584 - 586
[EI70870] Modeling of Energy Systems Modellierung von Energiesystemen	587 - 588
[EI7135] Industrial Energy Economy Industrielle Energiewirtschaft	589 - 590
[EI7328] Electromagnetic Compatibility in the Field of Power Engineering Elektromagnetische Verträglichkeit in der Energietechnik	591 - 592
[EI7329] Energy Application Technology Energieanwendungstechnik	593 - 594
[EI7330] Energy Supply in Liberalised Markets Energieversorgung im liberalisierten Markt	595 - 597
[EI7467] Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country [ProRESDC]	598 - 600
[EI74831] Project Lab Renewable and Sustainable Energy Systems Project Lab Renewable and Sustainable Energy Systems [PropENS]	601 - 603
[EI7486] Mechanism of Power and Gas Markets in Europe Energiewirtschaftliche Mechanismen der europäischen Strom- und Gasmärkte	604 - 605
[EI74871] Applied Simulation and Optimisation in Energy Economics - Operation Research Angewandte Simulation und Optimierung in der Energiewirtschaft - Operation Research	606 - 607
[EI7513] Ecomanagement and Life Cycle Analysis Umweltmanagement - Ökoauditierung	608 - 609
[EI7624] Techno-Economic Analysis of Telecommunication Networks Techno-Economic Analysis of Telecommunication Networks	610 - 612
[EI80004] Sustainable Mobility Sustainable Mobility [SuMo]	613 - 615

[MW1475] Renewable Energy Technology 1 Regenerative Energiesysteme 1 [RET I]	616 - 618
[MW1476] Renewable Energy Technology 2 Regenerative Energiesysteme 2 [RET II]	619 - 621
[MW2076] Design of Electric Vehicles Auslegung von Elektrofahrzeugen	622 - 624
[WI001255] Lecture Series Renewable Energy Systems in the Global South Ringvorlesung Erneuerbare Energiesysteme im Globalen Süden	625 - 627
Specialization in Technology: Computer Engineering (minor) Technik-Schwerpunkt: Computer Engineering Basismodule (minor)	628
[CIT3230000] Advanced Concepts of Programming Languages Advanced Concepts of Programming Languages	628 - 630
[CIT5230000] Introduction to Programming Introduction to Programming	631 - 633
[EI10002] Principles of Electrotechnology Principles of Electrotechnology [PiET]	634 - 635
[IN8029] Informatics Bachelor Practical Courses for Management Informatik Bachelor-Praktika für Management	636 - 638
Specialization in Technology: Computer Engineering (major) Technik-Schwerpunkt: Computer Engineering Vertiefungsmodule (major)	639
[EI0697] Mobile Communications Mobile Communications	639 - 640
[IN2040] Virtual Machines Virtuelle Maschinen	641 - 642
[IN2067] Robotics Robotik	643 - 644
[IN2101] Network Security Netzsicherheit	645 - 646
[IN2105] Business Process Technologies and Management Geschäftsprozesstechnologien und -management	647 - 649
[IN2359] Blockchain-based Systems Engineering Blockchain-based Systems Engineering	650 - 651
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	652 - 654
Specialization in Technology: Industrial Engineering (minor) Technik-Schwerpunkt: Industrial Engineering Basissmodule (minor)	655
[BGU56058] Travel Behavior and Environmental Impacts Verkehrsverhalten und Umweltauswirkungen [TBEI]	655 - 657
[BGU68007] Applied Transport Modeling Angewandte Verkehrsmodellierung [Applied transport modeling]	658 - 660
[BGU68011] Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]	661 - 663
[BGU70004] Discrete Choice Methods for Transportation Systems Analysis Diskrete Wahlmethoden für Verkehrssystemanalyse	664 - 666

[BGU70006] Statistical Learning and Data Analytics for Transportation Systems Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]	667 - 669
[BGU70008] Urban Transportation Systems: Operations Research and Emerging Mobility Technologies Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]	670 - 672
[IN2211] Auction Theory and Market Design Auktionstheorie und Marktdesign	673 - 674
[IN8005] Introduction into Computer Science (for non informatics studies) Einführung in die Informatik für andere Fachrichtungen	675 - 677
[MA4800] Foundations of Data Analysis Foundations of Data Analysis	678 - 680
Electives in Management and/or Technology Wirtschaftswissenschaftlich-technische Wahlmodule	681
Catalogue of Elective Modules: Mechanical Engineering Wahlkatalog: Maschinenwesen	682
[ED150010] Sustainable Mobile Drivetrains Nachhaltige Mobile Antriebssysteme	682 - 684
[ED160007] Lithium-Ion Battery Production Lithium-Ionen-Batterieproduktion [VLBP]	685 - 687
[ED160017] Sustainable Manufacturing Nachhaltige Produktion [SuM]	688 - 690
[MW0066] Piston Engines 1 Kolbenmotoren 1 [Piston Engines I]	691 - 693
[MW1903] Bioprocess Engineering Bioverfahrenstechnik	694 - 695
Catalogue of Elective Modules: Mechanical Engineering (advanced) Wahlkatalog: Maschinenwesen (advanced)	696
[ED150011] Hydrogen Mobility Wasserstoffmobilität [H2Mobil]	696 - 698
[MW0628] Energy and Economy Energie und Wirtschaft	699 - 700
[MW1909] Sustainable Energy Systems Nachhaltige Energiesysteme	701 - 702
[MW2277] Energy Carriers for mobile Applications Energieträger für mobile Anwendungen	703 - 704
Catalogue of Elective Modules: Informatics Wahlkatalog: Informatik	705
[CIT3230000] Advanced Concepts of Programming Languages Advanced Concepts of Programming Languages	705 - 706
[IN0042] IT Security IT-Sicherheit	707 - 708
[IN2339] Data Analysis and Visualization in R Data Analysis and Visualization in R	709 - 711
Catalogue of Elective Modules: Informatics (advanced) Wahlkatalog: Informatik (advanced)	712
[CIT4230000] Strategic IT Management Strategic IT Management	712 - 714
[IN2073] Cloud Computing Cloud Computing	715 - 716
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	717 - 719

Catalogue of Elective Modules: Chemistry Wahlkatalog: Chemie	720
[CH0107] Analytical Chemistry Analytische Chemie	720 - 721
Electives from Chemistry (advanced) Wahlfächer aus Chemie (advanced)	722
[CH0226] Molecular Medicine Molekulare Medizin	722 - 724
[CH4107] Inorganic Solid State and Organometallic Chemistry Anorganische Festkörperchemie und Organometallchemie	725 - 726
Electives from Electrical Engineering and Information Technology Wahlfächer aus Elektro-/ Informationstechnik	727
[EI05551] Internet Communication Internetkommunikation [INT]	727 - 729
[EI10003] Analog Electronics Analog Electronics [AE]	730 - 731
Electives from Information Technology and Electronics (advanced) Wahlfächer aus Informationstechnik und Elektronik (advanced)	732
[EI73141] Brain, Mind and Cognition (Seminar) Brain, Mind and Cognition (Seminar) [BMCSem]	732 - 733
Electives from Power Engineering (advanced) Wahlfächer aus Energietechnik (advanced)	734
[EI7329] Energy Application Technology Energieanwendungstechnik	734 - 735
Electives from Computer Engineering Wahlfächer aus Computer Engineering	736
[CIT3230000] Advanced Concepts of Programming Languages Advanced Concepts of Programming Languages	736 - 738
[CIT5230000] Introduction to Programming Introduction to Programming	739 - 741
[EI04024] Python for Engineering Data Analysis - From Machine Learning to Visualization Python for Engineering Data Analysis - From Machine Learning to Visualization [PyEDA]	742 - 744
[IN8029] Informatics Bachelor Practical Courses for Management Informatik Bachelor-Praktika für Management	745 - 747
Electives from Computer Engineering (advanced) Wahlfächer aus Computer Engineering (advanced)	748
[EI0636] Nanoelectronics Nanoelectronics [NEL]	748 - 750
[IN2040] Virtual Machines Virtuelle Maschinen	751 - 752
[IN2101] Network Security Netzsicherheit	753 - 754
[IN2105] Business Process Technologies and Management Geschäftsprozessestechnologien und -management	755 - 757
[IN2359] Blockchain-based Systems Engineering Blockchain-based Systems Engineering	758 - 759
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	760 - 762
Electives from Industrial Engineering Wahlfächer aus Industrial Engineering	763
[BGU56058] Travel Behavior and Environmental Impacts Verkehrsverhalten und Umweltauswirkungen [TBEI]	763 - 765

[BGU68007] Applied Transport Modeling Angewandte Verkehrsmodellierung [Applied transport modeling]	766 - 768
[BGU68011] Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]	769 - 771
[BGU70004] Discrete Choice Methods for Transportation Systems Analysis Diskrete Wahlmethoden für Verkehrssystemanalyse	772 - 774
[BGU70006] Statistical Learning and Data Analytics for Transportation Systems Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]	775 - 777
[BGU70008] Urban Transportation Systems: Operations Research and Emerging Mobility Technologies Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]	778 - 780
[IN8005] Introduction into Computer Science (for non informatics studies) Einführung in die Informatik für andere Fachrichtungen	781 - 783
Other Electives in Management and/or Technology Sonstige wirtschaftswissenschaftlich-technische Wahlmodule	784
[AR30372] Core Topic: Publics & Participation Core Topic: Publics & Participation	784 - 785
[BGU52021] European Mobility Venture - euMOVE. Mobility Benchmark across Europe European Mobility Venture - euMOVE. Mobilitätsbenchmark in Europa [euMOVE]	786 - 788
[ED120053] AND Foundation Seminar AND Foundation Seminar	789 - 791
[POL64100] Game Theory for Political Scientists Game Theory for Political Scientists [GT]	792 - 794
[WI001148] Technology, Society and International Security Technology, Society and International Security [Technology, Society and International Security]	795 - 797
[WI001181] Advanced International Experience Advanced International Experience	798 - 800
Ethics (max. 2 exam in 2 different modules can be counted) Ethik (max. 2 Leistungen aus 2 verschiedenen Modulen können eingebracht werden)	801
[POL70044] Business Ethics Unternehmensethik	801 - 802
Project Studies Projektstudium	803
[WI900685] Project Studies (Master in Management and Technology) Project Studies (Master in Management and Technology)	803 - 805
[WahlKat-EE] Catalogue of Elective Modules: Economics & Econometrics Wahlkatalog: Economics & Econometrics	806

[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	806 - 807
[MGT001338] The replication revolution The replication revolution	808 - 809
[MGT001344] Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills	810 - 812
[MGT001345] Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods	813 - 815
[MGT001353] Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken	816 - 817
[MGT001368] Models in the study of human behavior Models in the study of human behavior	818 - 820
[POL62200] Energy Transformation Energy Transformation	821 - 823
[WI000258] Empirical Research in Economics and Management Empirical Research in Economics and Management	824 - 826
[WI001145] Energy Economics Energy Economics	827 - 828
[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	829 - 831
[WahlKat-EM] Catalogue of Elective Modules: Modules Energy Markets Wahlkatalog: Energy Markets	832
[MGT001365] Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective	832 - 834
[WI001145] Energy Economics Energy Economics	835 - 836
[WahlKat-FA] Catalogue of Elective Modules: Finance and Accounting Wahlkatalog: Finance & Accounting	837
[MGT001352] Applied Sustainability Reporting Angewandte Nachhaltigkeitsberichterstattung	837 - 839
[MGT001356] Managing Challenges in the BioTech Industry Managing Challenges in the BioTech Industry	840 - 841
[MGT001358] Advanced Seminar Finance & Accounting: Data Science in Finance Advanced Seminar Finance & Accounting: Data Science in Finance	842 - 843

[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	844 - 846
[WahlKat-IE] Catalogue of Elective Modules: Innovation & Entrepreneurship Wahlkatalog: Innovation & Entrepreneurship	847
[SOT10028] Social Entrepreneurship Education at Vocational Schools Social Entrepreneurship Education an und mit beruflichen Schulen	847 - 848
[MGT001341] Prototyping Entrepreneurial Ideas in New Technology Prototyping Entrepreneurial Ideas in New Technology	849 - 850
[MGT001346] Impact School Impact School	851 - 853
[MGT001347] Innovation Facilitator Innovation Facilitator	854 - 856
[MGT001349] How Digital Platforms Compete – Building and Sustaining Competitive Advantage How Digital Platforms Compete – Building and Sustaining Competitive Advantage	857 - 859
[MGT001351] Yes we can! - Empowerment as composition Yes we can! - Befähigung als Komposition	860 - 862
[MGT001354] Artificial Intelligence for Innovation and Entrepreneurship Artificial Intelligence for Innovation and Entrepreneurship	863 - 864
[MGT001355] Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship	865 - 867
[MGT001360] Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law	868 - 870
[MGT001362] Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations	871 - 873
[MGT001364] Family Businesses Family Businesses	874 - 875
[WIB14002] Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations	876 - 878
[WIB26995] Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design	879 - 881
[WI001126] Designrecht Designrecht	882 - 883
[WI001141] Principled Entrepreneurial Decisions Principled Entrepreneurial Decisions [PED]	884 - 885
[WI001194] Who is responsible for food and health? Social and cultural perspective on food, health, and technology Who is responsible for food and health? Social and cultural perspective on food, health, and technology	886 - 888

[WI001211] Understanding Regional Innovation Cultures 	889 - 891
Understanding Regional Innovation Cultures [InnoCultures]	
[WI001222] Commercial Criminal Law and Compliance 	892 - 894
Wirtschaftsstrafrecht und Compliance	
[WahlKat-LSMP] Catalogue of Elective Modules: Life Sciences	895
Management & Policy Wahlkatalog: Life Sciences Management & Policy	
[MGT001337] Process tracing: Methods and applications Process	895 - 896
tracing: Methods and applications	
[MGT001338] The replication revolution The replication revolution	897 - 898
[MGT001344] Advanced Seminar Life Sciences, Management & Policy:	899 - 901
Economics of Food Systems in Transition (Governance, Fairness and	
Sustainability): Literature Review and Presentation Skills Advanced	
Seminar Life Sciences, Management & Policy: Economics of Food Systems	
in Transition (Governance, Fairness and Sustainability): Literature Review	
and Presentation Skills	
[MGT001345] Advanced Seminar Life Sciences, Management & Policy:	902 - 904
Economics of Food Systems in Transition (Governance, Fairness and	
Sustainability): Scientific Writing and Exploratory Research Methods	
Advanced Seminar Life Sciences, Management & Policy: Economics of	
Food Systems in Transition (Governance, Fairness and Sustainability):	
Scientific Writing and Exploratory Research Methods	
[WZ1700] Agribusiness Governance Agribusiness Governance	905 - 907
[WahlKat-MM] Catalogue of Elective Modules: Management & Marketing 	908
Wahlkatalog: Management & Marketing	
[MGT001302] Customer Insights Customer Insights	908 - 909
[MGT001310] Advanced Seminar in Marketing, Strategy, Leadership	910 - 911
& Management: International Marketing Strategy Advanced Seminar	
in Marketing, Strategy, Leadership & Management: International Marketing	
Strategy	
[MGT001335] Advanced Seminar Marketing, Strategy, Leadership	912 - 915
& Management: CSR and Sustainability of Family Firms Advanced	
Seminar Marketing, Strategy, Leadership & Management: CSR and	
Sustainability of Family Firms	
[MGT001339] Advanced Seminar Marketing, Strategy, Leadership &	916 - 917
Management: HR Management Advanced Seminar Marketing, Strategy,	
Leadership & Management: HR Management	
[MGT001340] Advanced Seminar Marketing, Strategy, Leadership &	918 - 919
Management: Reputation Management Advanced Seminar Marketing,	
Strategy, Leadership & Management: Reputation Management	

[MGT001342] Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI	920 - 921
[MGT001343] Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process	922 - 923
[MGT001360] Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law	924 - 926
[MGT001362] Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations	927 - 929
[MGT001367] Introduction to R for Data Science Introduction to R for Data Science	930 - 931
[MGT001368] Models in the study of human behavior Models in the study of human behavior	932 - 934
[MGT001376] Digital Marketing & Text Analytics Digital Marketing & Text Analytics	935 - 936
[WI000997] Marketing Entrepreneurship Lab Marketing Entrepreneurship Lab	937 - 938
[WI001179] Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption	939 - 940
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	941 - 943
[WahlKat-OSCM] Catalogue of Elective Modules: Operations & Supply Chain Management Wahlkatalog: Operations & Supply Chain Management	944
[MGT001306] Planning and Scheduling in the Automotive Industry Planning and Scheduling in the Automotive Industry	944 - 946
[MGT001350] Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management	947 - 949
[MGT001370] Designing Manufacturing Systems Designing Manufacturing Systems	950 - 951
[MGT001371] Scheduling Manufacturing Systems Scheduling Manufacturing Systems	952 - 953

[WI001088] Advanced Modeling, Optimization, and Simulation in Operations Management Advanced Modeling, Optimization, and Simulation in Operations Management [AMOS]	954 - 956
[WI001135] Stochastic Optimization Stochastische Optimierung	957 - 959
Double Degree Program HEC Paris Double Degree Program HEC Paris	960
[WI700006] Modules from HEC Paris Modules from HEC Paris	960 - 961
Master's Thesis Master's Thesis	962
[WI900249] Master's Thesis (Master in Management and Technology) Master's Thesis (Master in Management and Technology)	962 - 963

Specialization in Management | Management-Schwerpunkt

One of the following seven specialisations in economics can be chosen. If no specialisation is chosen, elective modules from the following exemplary module catalogues of the specialisations in economics are to be of 24 credits from the following exemplary module catalogues of the specialisations in economics. In addition, a seminar within the framework of all Advanced Seminars of the TUM School of Management must be successfully completed. of at least 6 credits must be successfully completed.

Specialization in Management: Innovation and Entrepreneurship | Management-Schwerpunkt: Innovation and Entrepreneurship

AdvSem-IE: Advanced Seminar Innovation & Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship

Module Description

MGT001355: Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for this seminar is based on a final written seminar paper (65%), the final presentation of the seminar paper (20%), and feedback on a peer's seminar paper (15%). Please note that dropping the course after topics have been chosen and announced leads to grade 5.0 (failed). While the grade for your final seminar paper (10 / 15 pages +/- 10%) will be determined purely on the last version you hand in before the final submission deadline (see "course outline"), you will also have to iterate on this throughout the class, by writing a draft paper earlier in the semester and giving a 10-15 minutes presentation on this earlier version (worth 15% of your grade).

Please note that we will require you not only to submit your paper to us via Moodle, but also to TurnItIn, for an automated citation check.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

The module consists of an introduction to problematization methods for academic research/ process of scientific writing. Early on in the course, the topics for each student's seminar paper will be decided. Based on their topic students prepare their term paper which they will present at the end of the module.

The module also involves multiple (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Intended Learning Outcomes:

After the successful completion of this module, students are able to:

1. Understand the scientific research process
2. Understanding the steps in writing a scientific seminar paper, including how to evaluate academic literature, engage in an academic debate, and prepare and defend academic arguments.
3. Develop critical thinking and several soft-skills, including but not limited to: analytical skills, presentation, argumentation, storytelling, and synthesis.

Teaching and Learning Methods:

The goal of this module is for students to understand key concepts relevant to academic research on environmental entrepreneurship. This body of research focuses on market-based mechanisms to address environmental problems (e.g. entrepreneurship in the context of sectors such as renewable energy). Through the course they will develop specialist knowledge on their selected topic of interest.

More broadly the seminar work also prepares students for academic work (e.g. Masters Thesis, preview into PhD work). Students will write a seminar paper on a specific topic, present this topic to the class, discuss papers, and be involved in scientific discussions on a variety of topics in class. Students are provided with an overview of important readings and literature. Over the course, students will develop their own research questions and identify relevant readings in advancing their seminar paper.

Media:

Presentations, videos, interactive team-work templates

Reading List:

York, Jeffrey G., and Sankaran Venkataraman. "The entrepreneur–environment nexus: Uncertainty, innovation, and allocation." *Journal of business Venturing* 25.5 (2010): 449-463.

Vedula, Siddharth, et al. "Entrepreneurship for the public good: a review, critique, and path forward for social and environmental entrepreneurship research." *Academy of Management Annals* 16.1 (2022): 391-425.

*A full list of readings will be provided at the course introduction

Responsible for Module:

Vedula, Siddharth; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship (MGT001355)
(Seminar, 4 SWS)

Vedula S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law | Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations | Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship
(WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB18812_1: Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation | Advanced Seminar Innovation & Entrepreneurship: Ideation & Venture Creation

Version of module description: Gültig ab summerterm 2012

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (10-15 pages, 75% of grade) and a presentation (15 min + 15 min interaction with the audience, 25% of grade). The research paper and the presentation will be conducted in groups formed in the introductory session. An assessment sheet filled in by the students and handed in with the research paper clarifies students' individual contribution to the research paper. As every student will present in the final presentation, every students' contribution is clearly identifiable and appraisable, thus, students can be graded individually. Based on the research paper it is examined to which extent students are able to elaborate complex topics in the field of entrepreneurship research. The research paper is a means to measure how students were able to understand previous academic literature in the field of entrepreneurship, how they achieved to define their own research question, collect and analyze data, and provide a relevant, novel, and interesting contribution to entrepreneurship research. A final presentation measures students' communicative competencies and proves if students are able to present their findings in a comprehensible, precise and demonstrative way as well as whether they are able to perform powerfully and professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

none

Content:

The module deals with different topics within entrepreneurship research such as

- discovering entrepreneurial role models,
- psychology of entrepreneurship,
- entrepreneurial leadership,
- ideation and venture creation,
- venture growth and
- internationalization and strategic entrepreneurship.

The module prepares students for the scientific work in their master theses and provides them with deepening insights into scientific literature on entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand scientific literature on the topic of entrepreneurship. Furthermore, students are able (3) to create their own research paper, i. e., identifying a relevant, interesting, and new research topic in the field of entrepreneurship, crafting a strong title, writing a compelling and strong introduction (and abstract), execute an extensive literature review and applying theory, structure the research paper meaningful, writing a strong discussion and conclusion, and complying with the ethics of writing. Additionally, they will be able (4) to present their research paper and (5) summarize their findings. Moreover, students learn how (6) to lead a scientific discussion. Finally, they (7) understand the process of scientific publication. Moreover, working in groups will provide students with communication and cooperation skills.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing where the topics for each student's research paper will be decided. Topics vary and cover entrepreneurship on an individual (e.g., entrepreneurial decision making, entrepreneurial intentions), team (e.g., entrepreneurial team formation, entrepreneurial exits), or organizational level (e.g., interplay of form, structure, and embeddedness in corporate entrepreneurship). Based on their topic students prepare their research paper which they will present at the end of the module. Upon prior discussion on different research methods and how to use them, the students will identify and apply a research methodology that best addresses their identified research question, i.e., they can apply empirical research methods (qualitative or quantitative), a literature review, or conduct a conceptual paper. Furthermore, the module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

Hisrich, R. D./Peters, M. P./Shepherd, D. A.: Entrepreneurship, 8th edition, McGraw-Hill, 2010

Further readings will be announced at the course introduction.

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB26995: Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design | Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a seminar paper (65% of grade) and a set of presentations (35% of grade). Drawing on the seminar paper, we will examine the degree to which students are able to engage in an academic discussion in the field of innovation, organization design, or strategic entrepreneurship; define and structure a complex problem from that field, and describe and analyze it academically. Two presentations will further highlight whether students are able to present their findings comprehensively and precise (seminar paper presentation: 15 minutes; 25% of total grade) and whether they are capable of applying and connecting their insights in the form of feedback on another seminar paper (discussion of another paper: 8 minutes; 10% of total grade). Across both presentations, we will further evaluate if students are available to communicate clearly and to perform professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

Introductory courses on research methods (for example, "Empirical Research in Management and Economics").

Content:

The module prepares students for the scientific work in their master theses and provides them with deepening insights into academic literature on innovation, organization design, or strategic entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Accordingly, students in this seminar may choose from a broad range of topics around the development of new and established businesses, the strategies managers devise and execute

including questions of positioning, and the organizational design choices they have to deal with. Potential areas questions of study may include:

- Venture creation: How are new businesses created and how do they evolve?
- Organization design: How do their structures develop and change?
- Growth strategies: Are there different paths to consistent configurations and if yes, how do they differ from each other?
- New forms of organizing: What role do supposedly more novel approaches to conducting business (ecosystems, crowdsourcing, open innovation...) or funding companies (incubators, crowdfunding...) play, when should be used, by whom, and how?
- Role of environmental conditions: How does the business environment influence the decision-making of new or established ventures, such as through membership in categories?

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand academic literature on the topic of innovation, organization design, or strategic entrepreneurship. Furthermore, students are able (3) to create their own academic paper. Additionally, they will be able (4) to present their paper and (5) summarize their findings. Moreover, students learn how (6) to lead a academic discussion. Finally, they (7) understand the process of scientific publication.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing and several sessions about academic problem definition and solving, based on which students may select and continuously refine their topic. The topic choice will further be discussed in individual feedback meetings with the seminar instructors.

Based on their topic, students will prepare their term paper which they will present at the end of the module. The students are continuously supervised by the instructors of the module. The module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The seminar topics may also be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

- Davis, M. S. 1971. That's interesting. *Philosophy of the Social Sciences*, 1(2): 309-344. (Note: the first and last sections are particularly "interesting")
- Sutton, R. I. & Staw, B. M. 1995. What theory is not. *Administrative Science Quarterly*, 40(3): 371-384.(Note: this article has several responses in the same issue of the journal which you may also find helpful.)

Further readings will be detailed in the respective course syllabi before the first session of class.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation and Organization Design (WIB26995) (Limited places) (Seminar, 4 SWS)

Alexy O [L], Reetz D (Huber D)

For further information in this module, please click campus.tum.de or [here](#).

Elective Modules Innovation and Entrepreneurship | Wahlfächer Innovation and Entrepreneurship

WahlKat-IE: Catalogue of Elective Modules: Innovation & Entrepreneurship | Wahlkatalog: Innovation & Entrepreneurship

Module Description

WI000116: Lead User Project | Lead User Projekt

Version of module description: Gültig ab winterterm 2015/16

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The progress of the project is verified several times during the different project phases.

- Midterm presentation (voluntary): Students have to show that they developed critical knowledge and competencies with the industry of the project partner and that they identified trends and needs in the respective industry.
- Final presentation (30 minutes): Students propose different workshop combinations of lead users and assess constellations of expert panels based on their industry insights they developed over the course of the project.
- Project report (25 pages): Students document their key learnings along the entire project process as well as how the project contributes to their personal development into a successful career in management.

Students learn to present results in front of our cooperation partner. Furthermore, they document the results in a project report including the scientific theory of the lead user method.

Consistently, grading of the module is based on a project work (project report 25 pages and presentation 30 minutes). The progress of the project is verified several times during the different project phases.

Students have the possibility of a midterm presentation in which they have to show that they dealt with the industry of the project partner. They show their ability to identify and consider trends and needs in the respective industry. This midterm presentation is highly recommended because students can gain further knowledge for their final presentation. With this presentation the final grade can be improved by 0,3.

With the final presentation students show on the one hand the project progress and propose different workshop combinations of lead users. On the other hand they show their ability to conduct interviews with experts and to communicate and present on a high business level. They are able to judge the branch-specific challenges and identify experts who complete each other perfectly in workshops.

In the project report the students show their ability to document their project process and their findings in a clear and comprehensible manner. Furthermore they show their ability to analyze and evaluate the challenges in this industry.

With this project work students show that they can present results in front of our cooperation partner. Furthermore they show that they can compose a project report in which they formulate their practical results and combine them with the scientific theory of the lead user method.

The project work is conducted by teams of 4 students. Students demonstrate their ability within a team to manage resources, and deadlines through timely submission of the enumerated tasks. The project work is set up in a way which enables the identification and evaluation of each student's individual contribution to the project's success.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fundamentals of Technology and Innovation Management

Content:

The lead user project is a practical module. Participants in teams of 4 perform a lead user project in cooperation with an industry partner.

- We apply the lead user method developed by Eric von Hippel at MIT
- Starting point is the industry of our cooperation partner

The participants learn to understand the target industry:

- Search for trends and needs in the industry
- Identification of lead users

Students get to know the cooperation partner as well as its industry. The students are working independently and are coached regularly. In addition two professional presentation coachings are offered. Dr. Christian Hackl from TUMtech gives Feedback how to improve presentation content and style.

A successful participation encourages students to be creative, proactive, and work in teams.

Intended Learning Outcomes:

After successful completion of this module students will be able to describe the lead user method and understand its advantages. Students will know different methods to identify trends and needs. They will be able to deal intensively with a targeted industry and can evaluate the challenges in this industry. They will be able to identify experts and to develop a workshop for these experts. The

students will be able to present their results in front of company representatives. Furthermore, they will be able to document their results in a clear and comprehensible manner.

Students can contribute an own part to a team's work output. Students are able to exchange in a professional and academic manner within a team. They show that they are able to integrate involved persons into the various tasks considering the group situation. Furthermore the students conduct solution processes through their constructive and conceptual acting in a team.

Teaching and Learning Methods:

During a real life innovation project students learn the theory of the lead user method and apply it during the module. The module is a practical project and the students get to know the different stages of a lead user project and work together with our industry partner. The students deal intensively with the target industry.

- During the kick-off the lead user method is explained
- The students work independently and are coached regularly during the project
- Students present their results after the first phase (need identification) and at the end of the project (lead user identified)
- Before the presentations a professional presentation coaching with Dr. Christian Hackl (TUMtech) will take place

Media:

Participants receive all presented slides and research papers about the lead user method.

Reading List:

- Glen L. Urban / Eric von Hippel (1988). Lead User Analyses for the Development of New Industrial Products, Management Science, Vol. 34, No. 5, pp. 569-582.
- Herstatt, C., Lüthje, C., & Lettl, C. (2003). Fortschrittliche Kunden zu Breakthrough-Innovationen stimulieren. In Management der frühen Innovationsphasen (pp. 57-71). Gabler Verlag.
- Henkel, J., Jung, S. (2009) The Technology-Push Lead User Concept: A New Tool for Application Identification, http://www.researchgate.net/publication/228820209_The_Technology-Push_Lead_User_Concept_A_New_Tool_for_Application_Identification/links/00b7d521ce2d489500000000
- Lüthje, C. (2000), Kundenorientierung im Innovationsprozess, S. 130-152.
- v. Hippel, E. / Thomke, S. / Sonnack, M. (1999), Creating Breakthroughs at 3M, Harvard Business Review, September-October, S. 47-57.
- v. Hippel, Eric. Democratizing innovation. MIT press, 2005.

Responsible for Module:

Henkel, Joachim; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Lead-User Projekt (WI000116) (Limited places) (Seminar, 4 SWS)

Henkel J, Göttfried A, Hackl C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

SOT10028: Social Entrepreneurship Education at Vocational Schools | Social Entrepreneurship Education an und mit beruflichen Schulen

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Auf Basis der Inhalte der Seminarsitzungen, erstellen die interdisziplinären Studierendengruppen (Projekt-)Unterricht für eine berufliche Schulart zum Themenbereich "Social Entrepreneurship Education". Die konzeptionierten Unterrichtssequenzen werden die Studierenden in ihren Gruppen nach Rücksprache mit den betreuenden Lehrkräften sowie den Dozierenden an der jeweiligen Schule durchführen sowie die Schülergruppen bei ihren eigenen Umsetzungsideen unterstützen. Die Studierenden organisieren gemeinsam mit den jeweiligen Lehrkräften der Schule ein geeignetes Präsentationsformat, um die Schülerergebnisse gekonnt in Szene zu setzen. Weiter wird die Umsetzung an der Schule durch die Schülerinnen und Schüler sowie die Lehrkräfte evaluiert. Die Studierenden weisen in einer (unbewerteten) Zwischenpräsentation den zwischenzeitlichen Arbeitsstand nach und erhalten von ihren Mitstudierenden und den Dozenten Rückmeldung. In einer (Projekt-)Abschlusspräsentation diskutieren die einzelnen Studierendengruppen den Umsetzungsverlauf und gehen reflektiert auf die eigenen Erfahrungen sowie die Ergebnisse an den beruflichen Schulen ein. Im Projektbericht bereiten die Studierenden gemeinsam die einzelnen Phasen der Lehrveranstaltungen nach. Der Projektbericht wird in der jeweiligen Gruppe verfasst und umfasst pro Person 4-6 Seiten. Gemeinsam mit der Abschlusspräsentation wird dann die Endnote des Moduls gebildet.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Die Lehrveranstaltung wird in vier Phasen unterteilt. Die erste Phase befähigt die Studierenden inhaltlich, damit diese nach dem Grundgedanken des Social Entrepreneurship-Ansatzes

Unterricht bzw. Veranstaltungen planen, durchführen und evaluieren können. In Phase zwei wird (Projekt-)Unterricht für eine berufliche Schule nach Vorgaben der Schule (Challenge) entwickelt. In diesem Zeitraum werden die Studierenden von den Lehrkräften sowie Dozent*innen betreut und beraten. Die Phase drei ermöglicht es den Studierenden, den selbst entwickelten (Projekt-)Unterricht ein- und umzusetzen sowie Schülerinnen und Schülern bei deren Konzepterstellung als Antwort auf die gestellten schulischen Challenges zu unterstützen und zu beraten. Am Ende dieser Phase präsentieren die Schülerinnen und Schüler im Rahmen einer Konferenz ihre Konzepte und Ergebnisse. In einer Abschlusspräsentation (Phase 4) diskutieren die Studierenden die Umsetzung in der Schule sowie die Evaluationsergebnisse und reflektieren ihre Erfahrungen und die Lernergebnisse der Schülerinnen und Schüler.

Intended Learning Outcomes:

Nach dem erfolgreichen Absolvieren des Moduls sind die Teilnehmer in der Lage, eigenständig im Kontext der Social Entrepreneurship Education Unterricht zu planen, gestalten, durchzuführen und zu evaluieren. Sie können adressatenbezogen die entsprechenden Methoden sowie Sozial- und Aktionsformen auswählen und mit Bezug auf theoretische Hintergründe Handlungsalternativen darstellen. Überdies können sie alleine und im Team sowie unter Einbezug externer Vorgaben Unterricht sowie Curricula qualitativ weiterentwickeln. Sie erkennen die vielfältigen Anforderungen, um den Social Entrepreneurship Education Ansatz an der beruflichen Schule zu implementieren, umzusetzen sowie passende Evaluationen zu entwickeln und anzuwenden. Zuletzt entwickeln die Studierenden ihre Projektmanagementkompetenzen.

Teaching and Learning Methods:

Dozentenvortrag, Seminar, Train-the-Trainer, Präsentation, Challenge-Based-Learning, Methoden- und Medientraining, etc.

Media:

Dozentenvortrag, Skript, Powerpoint, Eigenlektüre, Tafelanschrieb / Whiteboard, Online-Plattformen (z.B. Moodle, Kollaborations-Tools, ...); Lernvideos; Train-The-Trainer-Seminar

Reading List:

wird zu Beginn der Lehrveranstaltung bekannt gegeben

Responsible for Module:

Förster, Manuel; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Social Entrepreneurship Education an und mit beruflichen Schulen (Seminar, 2 SWS)

Förster M, Kiefer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001308: Young Entrepreneurs in Science | Young Entrepreneurs in Science

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: irregularly
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final examination consists of two components, each carrying 50% of the final course grade: (a) a final report of ca. 22,200 characters due exactly four weeks after the presentation day and (b) a 15 minute presentation in the final course meeting.

On (a): Each team of students will be required to document its constant collaboration with its case-giver, to update the course about the progress in several blocked meetings, and to discuss the progress with an assigned coach. The focus of the evaluation will lie on whether and how participants work to develop creative solutions to the ventures' problems, and make progress in implementing those successfully. All information gathered by the participants should be collected and presented in a systematic fashion to be able to pass it on to the partnering firms after the course, such as in a business plan. In doing so, students will showcase their ability to structure and prioritize information, and communicate this information clearly and effectively so that it is actionable. If no separate final report is handed in, any intermittently produced documents will be treated as such. Any report should not exceed 22,200 characters. It is to be handed in by precisely four weeks after the final presentation. Any changes to this will be announced at least three weeks prior to the date of final presentation.

On (b): The final presentation is expected to last 15 minutes, any changes to this will be announced at least three weeks prior to date of the final presentation. Its key contents are the purpose and explanation of the problem-solutions created by the teams (irrespective of whether the ventures chose to implement them), which are to be communicated understandably to all course participants. As such, the presentation should focus on the outputs achieved (how should the problem be solved?), not the process through which it was generated. Of particular interest is students' understanding of interdependencies between the aspects of their problem-solutions, and their creating of an internally consistent problem-solution that takes those interdependencies into

account, which would be a testimony to students' ability to develop their own strategy to found a start-up.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Recommended (but not mandatory): Basic understanding of the entrepreneurial process, acquired e.g., through an introductory lecture on entrepreneurship
- Recommended (but not mandatory): Basic understanding systematic firm and market analysis tools, acquired e.g., through an introductory lecture on strategy
- Recommended (but not mandatory): Initial experience in science industries, for example through a major or minor in a science discipline in a B.Sc. degree, or work experience

Content:

Young Entrepreneurs in Science' (YEiS) will enable students at the intersection of management and technology - and in particular those interested in entrepreneurship, intrapreneurship, business development, or R&D in science-based industries - to take an essential part during the early stage of a science-based entrepreneurial initiative from a company in the Munich area (such as from a TUM start-up or an established firm from the Munich Metropolitan area) and beyond (such as globally active science-based firms in industries like chemistry, electronics, or pharma), to consult them, and to take an active part in their establishment and growth. Specifically, as a team of up to five students, participants in YEiS will be tasked to support one science-based entrepreneurial initiative in one crucial problem it is currently facing and to design and possibly implement at least one solution alternatives for that issue. To be able to do that, all YEiS participants will receive a solid introduction into the topic of science-based entrepreneurship, as well as to proven methods and tools for designing and evaluation entrepreneurial initiatives in this context.

Intended Learning Outcomes:

Having completed the module, students will be capable of understanding crucial elements of the entrepreneurial journey and apply them to the context of entrepreneurship & intrapreneurship in science-based industries. In addition, students will be able to evaluate information and alternative pathways for action in science-based entrepreneurship/intrapreneurship. Furthermore, students will be able to analyze existing opportunities, projects, and initiatives for science-based entrepreneurship/intrapreneurship and develop preliminary alternative designs. Finally, students will be able to hone their social skills, team-working skills, and consulting skills.

Teaching and Learning Methods:

Presentations, discussion, project work, feedback. Each methods will be chosen in accordance with the content to be communicated. For example, new material may be introduced in short presentations by subject matter experts or through videos, then discussed in teams or by the entire course, and then applied in the project work. The group-level feedback meetings ('coachings') help to ensure that all materials have been understood and applied correctly (including potential

adaptations). Required skills will further be showcased through the final presentation (with feedback) and report (feedback upon request).

Media:

Presentations, videos, handywork, flipcharts, whiteboards, etc.

Reading List:

Garette, B./ Phelps, C./ Sibony, O. Cracked it!: How to solve big problems and sell solutions like top strategy consultants. Palgrave MacMillan, 2018

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Young Entrepreneurs in Science (MGT001308) (Seminar, 3 SWS)

Alexy O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001341: Prototyping Entrepreneurial Ideas in New Technology | Prototyping Entrepreneurial Ideas in New Technology

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a group project (60%) and a presentation (40%) . Please note that dropping the course after topics of group projects have been chosen and announced will have consequences.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

The module consists of lectures, class discussions, groupwork, group project and individual feedback sessions where students share their progress and receive feedback. The students are supervised by the instructors in different stages of the class.

Intended Learning Outcomes:

After completing this module, students should be able to:

- understand the connection between technological features, entrepreneurial opportunities and business ventures in new technologies
- identify and evaluate entrepreneurial ideas in new technologies
- apply concepts and tools to discover customer problems and formulate a solution-based approach using new technologies
- demonstrate a set of skills including, but not limited to analytical skills, critical thinking, planning, building, and presenting a pitch deck
- develop abilities to work in an entrepreneurial team: communication, coordination, continuous improvement, goal management, rapid prototyping

Teaching and Learning Methods:

Action-oriented learning, interactive teaching, group project, group discussions

Media:

PowerPoint, journal articles, videos

Reading List:

Gruber, M., & Tal, S. (2017). Where to Play: 3 steps for discovering your most valuable market opportunities. FT Publishing International

Christensen, C. M., Hall, T., Dillon, K., & Duncan, D. S. (2016). Know your customers' "jobs to be done": is innovation inherently a hit-or-miss endeavor? Not if you understand why customers make the choices they do. Harvard Business Review, 94(9), 54–62.

Mullins, J., & Komisar, R. (2010). A business plan? Or a journey to plan B? MIT Sloan Management Review, 51(3), 1–5.

Responsible for Module:

Zhao, Ding; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Prototyping Entrepreneurial Ideas in New Technologies: Blockchain (MGT001341) (Limited places) (Seminar, 4 SWS)

Shetty S, Zhao D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001346: Impact School | Impact School

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final examination of the project consists of two components. The first is the presentation prepared by the students at the end of the intensive phase. The second is a final report that must be submitted at the end of the semester. Both count for 50% of the grade.

At the end of the intensive phase, the teams present the approaches that they developed for solving the challenges set beforehand. This includes the presentation of a simple prototype, for example a mock-up or a document. The presentation is approximately 10 minutes in length. The students thus show that they are able to translate the information they have received into developing independently a solution and to present it in an appropriate manner. During the intensive phase, they are accompanied and supported by their coaches and the accompanying instructors.

The second part of the grade consists in the report to be submitted at the end of the semester. The report covers the preliminary sessions, the intensive phase as well as the follow-up session. It documents in a structured way how the information received was used to develop the solution. Furthermore, feedback received from the partner who provided the challenge should be considered and incorporated. The report ensures that instead of simply documenting their findings students structure and reflect on them. The final report should not exceed 27,000 characters and must be submitted by the end of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Basic understanding of entrepreneurship and its principles, such as from attending an introductory lecture on the topic, founding experience, or closely following the media on the topic

- Interest in the creation of societal and ecological impact by developing technology-based solutions

Content:

The seminar is divided into several phases. In the course of two preliminary sessions, the students gain basic knowledge about the focused technology and its opportunities and risks based on existing approaches in the field of climate protection, ecology or society. Ethical implications are also discussed at this point. Furthermore, they get to know the concept of impact as well as the first basics for creating an impact logic. With the help of self-learning materials, they deepen this knowledge until the beginning of the intensive phase.

The core of the Impact School is the five-day intensive phase, during which students work in teams on challenges that are provided by cooperation partners. The challenges focus on social and/or ecological problems that are to be solved using technology-based approaches. During the week, the participants learn the practical application of innovation methods as well as the basic principles of business modelling and develop a simple prototype of their solution. They also receive input from experts in the field. Companies, public administration, non-governmental organizations, student organizations and other partner universities and organizations can be involved as cooperation partners. They also contribute by offering thematic inputs, excursions or similar. The participants form teams at the beginning of the intensive phase and each team is accompanied by a coach. The coaches support the application of the tools and methods learned and ensure a healthy feedback and discussion culture within the teams. The intensive phase ends with an event in which the teams present the solutions they have developed.

There will be a follow-up session, which will introduce participants to the opportunities and resources for pursuing start-up projects within TUM. The first part is a short presentation followed by a Q&A session with start-up consultants. Furthermore, an exchange with a tech start-up that focuses on solving a social or ecological problem is planned.

Intended Learning Outcomes:

The goal of the impact school is to enable students to develop practice-oriented solutions to reach the UN Sustainable Development Goals by using technologies of the future. The students will gain knowledge regarding these technologies from an interdisciplinary perspective. They will learn:

- to assess the benefits and risks of technologies with regard to the generation of social and ecological impact
- to understand and apply the concept of impact and its implications
- to implement the entrepreneurial innovation process in interdisciplinary teams in order to generate concrete solutions.

By developing solutions in teams, students improve soft skills such as creativity, perseverance and communication skills. In addition, they get to know the Munich ecosystem for impact/social entrepreneurship as well as TUM's resources and opportunities for implementing their own start-up projects.

Teaching and Learning Methods:

Lectures, discussions, development of challenge-based solutions, excursion, team coaching sessions, feedback discussions, presentations, Q&A session. The variety of methods ensures that the right method is chosen for each learning content to be taught. For example, new material is presented by experts in the field in keynote speeches and then discussed in large or small groups before it is incorporated into the development of solutions. Feedback discussions and team coaching sessions ensure that the tools and methods presented are correctly understood and applied. Furthermore, the teams are supported in working together in a respectful and effective manner and to develop an appreciative feedback culture. The final presentation at the closing event gives the participants the opportunity to practice their communication skills. Through the final report students consolidate the knowledge gained during the seminar and reflect on it. The exchange with start-up consultants and start-ups provides the participants with an impression of how social and ecological impact can be generated in practice through the implementation of their own start-up projects.

Media:

Videos, presentations, online materials, quiz, exercise sheets, Power Point, flip charts, mural boards

Reading List:

Garette, B./ Phelps, C./ Sibony, O. Cracked it!: How to solve big problems and sell solutions like top strategy consultants. Palgrave MacMillan, 2018

Martin, L. Design of Business: Why Design Thinking is the Next Competitive Advantage. Harvard Business Press, 2009

Kurz, B./ Kubek, D.: Social Impact Navigator, Phineo, 2017, verfügbar auf <https://www.social-impact-navigator.org/>

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Impact School (MGT001346) (Seminar, 4 SWS)

Alexy O [L], Alexy O (Krauss J, Vogel C)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001347: Innovation Facilitator | Innovation Facilitator

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 130	Contact Hours: 50

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Combination of group and individual project assignment - the assignment consists of two components: (1) Instructors will observe students' efforts of preparing, executing and postprocessing Innovation Sprints as well as the support of innovation teams through moderating workshops and team sessions, carrying 80% of the final course grade and (2) an individual reflection paper of up to 1,200 words describing the personal learning journey as innovation facilitator, carrying 20% of the final course grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Practical experience in applying Design Thinking and Business Design as well as distinct ability to work in a team and great interest in working with individuals and teams

Content:

In this train-the-trainer format experienced students learn to design and lead innovation sprints and workshops for student participants. As part of their education students will design Innovation Sprints as well as additional workshops and thereby become Innovation Facilitators who provide other students with an innovative mindset and tools that help them to create innovation and shape a sustainable future. Students will cover all aspects of conducting an innovation sprint, from preparing the content, acquiring participants, communicating with partners, creating a fun workshop atmosphere to conducting the workshop sessions and evaluating them. Next to Innovation Sprints, students will also design and facilitate sessions for other student innovation teams who need support, inspiration and methods on their journey. These sessions revolve around synthesis of insights from qualitative research, ideation and prototyping as well as individual consultations with the teams.

The Innovation Facilitators are part of a self-organized, self-responsible team with clear roles and responsibilities. They have a lot of free space to design and organize the workshops and sprints in a way that makes them successful and valuable for the participants.

Throughout the course they themselves participate in workshops and receive intensive support by experienced facilitators who provide input, feedback, impulses and retrospectives. The facilitators start with a train-the-trainer and team building workshop at the beginning of the semester where they learn how to conceptualize trainings and stimulate different motivational types. In weekly roundtables they get impulses and support from experienced facilitators as well as direct feedback during the sprints. After the first sprint they have a retrospective to derive learnings for the next sprint. They also attend a storytelling workshop to improve their training skills. After the second sprint they will get a workshop on how to facilitate sustainability in innovation when working with teams. At the end of the semester they will have a final retrospective to reflect on their individual strengths and team learnings for future projects.

Intended Learning Outcomes:

By the end of the semester students will have gained hands-on experience as a trainer and facilitator and the ability to design and conduct workshops and trainings with the best possible learning outcome for the participants. They will have deepened their methodological knowledge in Design Thinking and sustainable business design and have the ability to apply it in following founding projects or a lead role in an innovation team. At the same time, they will have experienced working in a diverse, self-organized team and they will have learned to actively create a setting in which teams can work together effectively by giving and receiving feedback, moderating discussions, defining project goals and reacting to changes. Students will be able to actively prioritize and delegate tasks and manage the expectations of different stakeholders.

Teaching and Learning Methods:

This module relies on a combination of input sessions, workshops, teamwork, reflection and individual feedback and support. While input sessions will stimulate students' engagement with relevant tools and topics and prepare them to carry out workshops themselves, team discussions and regular reflection sessions will support the implementation of the knowledge with student innovation teams. Live feedback and support during innovation sprints will allow students to directly improve their training skills.

Media:

Presentations, Canvas, handywork

Reading List:

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation Facilitator (MGT001347) (Seminar, 4 SWS)

Alexy O [L], Schuster J (Guttler S)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001349: How Digital Platforms Compete – Building and Sustaining Competitive Advantage | How Digital Platforms Compete – Building and Sustaining Competitive Advantage

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module is examined via exercises (“Übungsleistung & Testate”), using two elements to assess the different learning goals of this course.

- Oral, individual: 50%. For each session of class, you will be given in advance a set of Assignment Question to prepare for case study discussion. We will assess your contributions to solving these question in class when we discuss the case study to see whether you can define, explain, and apply key elements of the subject matter; describe, compare, and appraise platform business models for a given situation; and build and sustain competitive advantage. Students do not have to be present in every session to achieve full marks; given to-be-defined, legitimate circumstances, such as health matters, and instructor permission, students may also submit written solutions prior to class as a basis of grading. Each student should attend a feedback session around the middle of the term to be informed about their current performance
- Written, individual: 50%. in the last session of class, students will be provided an exercise sheet, in which students will individually highlight in written, condensed form that they understood the key learnings emerging from a synthesis of the class discussions from the entire course

Repeat Examination:

Next semester

(Recommended) Prerequisites:

English proficiency for case preparation and class discussion is critical. Adapting the case specific terminology is necessary for meaningful class discussions. Weekly time budget no less than 5 hours per case (depending on language skills). No specific prior courses necessary. Cases will be provided.

Content:

With the advent of the internet in the early 1990s, digital platforms have become the fastest growing and most valuable businesses of the economy. Based on new high-speed (mobile) telecommunication networks, access to digital platforms has become universal and facilitated opportunities for innovative services, from online searches to social networks, online auctions to music streaming, real-time news distribution to ubiquitous video entertainment, and so on. All corporate entities, or firms, engaged in this market are fairly young and indeed created a different type of 'competitiveness' compared to traditional industries. So 'how digital platforms compete', i.e. how they are building and sustaining competitive advantages, is what we are discussing in this seminar.

Using the Case Study Method, developed by Harvard Business School (HBS) to educate graduate students, we look at one case at a time in the form of a fact-based case description paper, provided to all participants one week prior to class. Each (weekly) class focuses on one digital platform providers' competitive performance and discusses its competitive options at the time of the case, covering three broad topic areas: 1) How successful firms build and sustain competitive advantages; 2) Digital platforms' specific 'network effects' and resulting business models and their economic results; 3) Dependence of digital platforms on facilitating network infrastructures. With about 12 different cases, e.g. on Amazon, Google, Spotify and WhatsApp, the variety/multitude of competitive actions for digital platform firms will become apparent during of the seminar. This shall enable students, when later in life confronted with real-life competitive issues, to apply their judgement based on the experience of the variety/multitude of cases discussed in the classroom. That is how close a classroom discussion can come to the 'real world'. In addition, the active case discussions provide a good exercise of 'disagreeing in an agreeable manner', which is good practice.

Intended Learning Outcomes:

Knowledge-related outcomes

Upon completion of this module, students will be able to:

- Define, explain, and apply in practice key theories related to platforms and platform business models
- Interpret, classify, and assess the conduct and performance of firms trying to establish, actively deploying, or fighting against platform business models
- Describe, compare, and appraise different platform designs for a given situation
- Distinguish the newly learned theories of platforms, platform business models from previously learned perspectives
- Evaluate how environmental change may affect existing platforms and theories around platform (business models)

Skill-related outcomes

- Improve diagnostic and analytical skills (i.e., structured problem-solving)
- Build up critical thinking and interpretation skills
- Enhance verbal and argumentation skills via presentations and group discussions

Teaching and Learning Methods:

The course will mainly draw on the Case Method, most famously used at Harvard Business School. Since the selected cases were not specifically written for this seminar (Strategy, General Management), 'assignment questions' are added to the case preparation in order to provide the specific focus on the seminar theme of competitiveness. There is no objective to 'solve' a case and the aim is to show various options from which to choose a preferred way of action. A 'vote' on the best 'strategy' at the end of a class discussion usually presents the principal options, not 'right' versus 'wrong', rather a 'competition' of the strong against the weak argument presented by the participants.

Media:

The largest share of this course will be co-developed by all of us through discussions of course materials. In each session, we will help facilitate and guide the course discussion by taking notes on whiteboards. We strongly encourage you to take notes yourselves, and to consider not bringing laptops (they are not as bad as phones [NO PHONES!], but will still inhibit your learning). Specific topics and definitions may be introduced using PowerPoint slides. Finally, note how a large share of learning will occur through you preparing individually and in groups for the in-class session. Techniques to do so will be introduced in the first session of class.

Reading List:

An up to date reading list will be distributed around the first session of class each semester.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

How Digital Platforms Compete – Building and Sustaining Competitive Advantage (MGT001349)
(Limited places) (Seminar, 4 SWS)

Alexy O [L], Melcher H

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001351: Yes we can! - Empowerment as composition | Yes we can! - Befähigung als Komposition

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination performance falls into the category of exercises and consists of two parts.

- Written and oral homework (70% of the grade): Students demonstrate their theoretical understanding of the concepts and ideas covered by regularly preparing short written reports and discussing them with the group.
- oral test (30% of the grade) The ability to contextually apply the concepts learned, as well as demonstrating the social skills acquired, such as stress resilience, leadership and analytical skills, will be evidenced by a prepared oral presentation in front of an audience (15 min.)

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- curiosity
- motivation
- (Interest in) thinking out of the box
- Music/instrumental playing not required, but enjoyable

Content:

How many times have we heard this: As future value-driven managers and social entrepreneurs, as servant leaders and social role models, etc., we prudently ensure sustainable innovation and invention, foster meaningful creativity, communicate constructively, work efficiently in balance, negotiate wisely, design clearly, practically and aesthetically,...
yes, we can(could) be those charismatic changemakers, IF!!!!...

To fathom the conditionality behind this auspicious IF, we will make use of the most intense teaching language mankind has used since the beginning: Music. Music like that of J. S Bach

lets us hear the vision of a society striving for perfection and its equivalent economy in its contrapunctus - and at the same time it gives us an idea of how and by what this becomes possible: Why the music by Bach, Mozart, Schubert, etc. is able to do this is revealed in this course, by a look at a wide variety of disciplines - from neurobiology, to quantum mechanics, to philosophy. Here we find amazing answers to questions about how sustainable learning and (re)thinking become possible, why Design Thinking is an important tool for human development, why and how we need to decelerate in order to have more time and power, how relationship and connection/connectedness work in all areas, why without comprehensive (heart) education as the single most important empowerment ever, prosperity as well as political and economic peace will never be possible.

We reflect together, supported by discussion and music, where good leadership begins and what forms it could take. Topics discussed thus include:

- Neural processes and their usefulness/control by a person (embodiment and priming) to maximize efficiency in daily and professional life
- Music composition processes
- Philosophy and ethics of responsible action
- Effective transmission of messages, supported by stage presence and body posture

Can we? Yes we can!

Intended Learning Outcomes:

At the end of the course, students will be able to:

- understand socially competent (self-)leadership and apply it in various situations
- to analyze in a networked manner and to develop sustainable approaches to problem solving for personal, concrete and general economic issues
- to combine economic and ethical aspects
- to use the acquired soft skills (e.g. self-awareness, presentation skills, negotiation skills, personal initiative) for negotiation situations
- apply practical exercises to create a calm and stable work environment and thereby increase performance/efficiency
- deal with stress (resilience)
- to evaluate their entire thinking, perception and actions from different ethical points of view

Teaching and Learning Methods:

The content of the course is designed interactively with the students in groups as well as in individual exercises, e.g. through discussions, piano recitals, presentations. New material and subject areas are also taught through various techniques such as lecture, self-study or flipped classroom. The course usually takes place on two days in units of max. 3h in presence. The location of the course will be announced in time, but will probably be one of the rooms at TUM where a grand piano is available (e.g. at TranslaTUM at Rechts der Isar).

Media:

Presentations, movies and concerts

Reading List:

Stone, Zander: The art of possibility 2002;

Hofstadter: Gödel, Escher, Bach - ein endloses geflochtenes Band 2016;

Muhammad Yunus: Creating a world without poverty 2009;

additional literature when course starts

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Yes we can! - Befähigung als Komposition (MGT001351) (Seminar, 6 SWS)

Alexy O [L], Sonnek (Zeis) C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001354: Artificial Intelligence for Innovation and Entrepreneurship | Artificial Intelligence for Innovation and Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module grade is based on a group presentation. During the seminar, students will ideate their own AI use cases, and assess them in terms of value and ease of implementation. In a group they will prioritize one use case and work on the implementation along the machine learning lifecycle taking into account ethical considerations. The group work has to be presented in the seminar and ends with a written report.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Artificial intelligence (AI) holds tremendous promise to benefit nearly all aspects of our society, including the economy, healthcare, security, the law, transportation, even technology itself. For organizations as well as for entrepreneurs there is no way around this technology, if they want to be and stay competitive. This module covers:

- Introduction to AI, algorithms, and machine learning
- The technology behind AI
- AI for innovation and entrepreneurship
- Ideating, assessing, prioritizing AI use cases
- Introduction to MLOps and building AI along the machine learning lifecycle
- Ethics and human centric design

Intended Learning Outcomes:

Students gain understanding of the state of the art in artificial intelligence and how it is and can be applied in organizations and startups. Students will develop a solid and jargon free understanding of the technology and concepts such as AI, machine learning and which opportunities and challenges it brings to organisations and society. Students gain the ability to ideate and assess their own AI use cases and learn what it takes to implement them bring them into production

Teaching and Learning Methods:

The module is taught as a 2 SWS seminar. New concepts will be presented as lecture and then applied in group work in exercises which prepare students for the group presentation. To build bridges between course work and self-studying blended learning is applied.

Media:

Whiteboard, Slides, Code-Examples, Textbook, journal articles and papers

Reading List:

Agrawal, A., Gans, J., & Goldfarb, A. (2018). Prediction machines: The simple economics of artificial intelligence.

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Artificial Intelligence for Innovation and Entrepreneurship (MGT001354) (Seminar, 2 SWS)

Post T

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001355: Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for this seminar is based on a final written seminar paper (65%), the final presentation of the seminar paper (20%), and feedback on a peer's seminar paper (15%). Please note that dropping the course after topics have been chosen and announced leads to grade 5.0 (failed). While the grade for your final seminar paper (10 / 15 pages +/- 10%) will be determined purely on the last version you hand in before the final submission deadline (see "course outline"), you will also have to iterate on this throughout the class, by writing a draft paper earlier in the semester and giving a 10-15 minutes presentation on this earlier version (worth 15% of your grade).

Please note that we will require you not only to submit your paper to us via Moodle, but also to TurnItIn, for an automated citation check.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

The module consists of an introduction to problematization methods for academic research/ process of scientific writing. Early on in the course, the topics for each student's seminar paper will be decided. Based on their topic students prepare their term paper which they will present at the end of the module.

The module also involves multiple (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Intended Learning Outcomes:

After the successful completion of this module, students are able to:

1. Understand the scientific research process
2. Understanding the steps in writing a scientific seminar paper, including how to evaluate academic literature, engage in an academic debate, and prepare and defend academic arguments.
3. Develop critical thinking and several soft-skills, including but not limited to: analytical skills, presentation, argumentation, storytelling, and synthesis.

Teaching and Learning Methods:

The goal of this module is for students to understand key concepts relevant to academic research on environmental entrepreneurship. This body of research focuses on market-based mechanisms to address environmental problems (e.g. entrepreneurship in the context of sectors such as renewable energy). Through the course they will develop specialist knowledge on their selected topic of interest.

More broadly the seminar work also prepares students for academic work (e.g. Masters Thesis, preview into PhD work). Students will write a seminar paper on a specific topic, present this topic to the class, discuss papers, and be involved in scientific discussions on a variety of topics in class. Students are provided with an overview of important readings and literature. Over the course, students will develop their own research questions and identify relevant readings in advancing their seminar paper.

Media:

Presentations, videos, interactive team-work templates

Reading List:

York, Jeffrey G., and Sankaran Venkataraman. "The entrepreneur–environment nexus: Uncertainty, innovation, and allocation." *Journal of business Venturing* 25.5 (2010): 449-463.

Vedula, Siddharth, et al. "Entrepreneurship for the public good: a review, critique, and path forward for social and environmental entrepreneurship research." *Academy of Management Annals* 16.1 (2022): 391-425.

*A full list of readings will be provided at the course introduction

Responsible for Module:

Vedula, Siddharth; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship (MGT001355)
(Seminar, 4 SWS)

Vedula S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law | Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations | Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001364: Family Businesses | Family Businesses

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module will rely on an exam (100% of the overall mark), asking students questions on the core topics discussed in class. Each question requires a reflective and elaborate response from the students drawing on the course content and showing critical thinking skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This foundation course “Family Businesses” deals with the particularities of family businesses and includes the core topics of succession, finance, governance, entrepreneurship, innovation, and corporate social responsibility.

Students will explore the advantages and disadvantages of family owned enterprises compared to non-family firms. The module will also discuss the definition and prevalence of family firms around the world and help students understand the heterogeneity of family businesses.

The module will draw from theory and practice, as we will rely on both, academic literature and practical insights through case studies and guest lectures.

Intended Learning Outcomes:

After completing the module students will be able to:

- Understand and critically reflect on the role of family firms in Germany and worldwide
- Understand family owners’ non-financial and financial goals that drive decision making in family firms
- Reflect on possible advantages and disadvantages of family firms
- Compare theoretical insights on family firms with practical insights through guest lectures

- Apply the learning of the module on real world case studies
- Evaluate specific family firms' actions to address contemporary and emerging opportunities and challenges

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Berrone P, Cruz C, Gomez-Mejia LR. Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family business review*. 2012;25(3):258-279.
Gomez-Mejia LR, Cruz C, Berrone P, De Castro J. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*. 2011;5(1):653-708.
Kellermanns FW, Eddleston KA, Zellweger TM. Article Commentary: Extending the Socioemotional Wealth Perspective: A Look at the Dark Side. *Entrepreneurship theory and practice*. 2012;36(6):1175-1182.
Richards M, Kammerlander N, Zellweger T. Listening to the Heart or the Head? Exploring the "Willingness Versus Ability" Succession Dilemma. *Family business review*. 2019;32(4):330-353.
Zellweger T. Managing the Family Business#: Theory and Practice.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship
(WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB26995: Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design | Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a seminar paper (65% of grade) and a set of presentations (35% of grade). Drawing on the seminar paper, we will examine the degree to which students are able to engage in an academic discussion in the field of innovation, organization design, or strategic entrepreneurship; define and structure a complex problem from that field, and describe and analyze it academically. Two presentations will further highlight whether students are able to present their findings comprehensively and precise (seminar paper presentation: 15 minutes; 25% of total grade) and whether they are capable of applying and connecting their insights in the form of feedback on another seminar paper (discussion of another paper: 8 minutes; 10% of total grade). Across both presentations, we will further evaluate if students are available to communicate clearly and to perform professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

Introductory courses on research methods (for example, "Empirical Research in Management and Economics").

Content:

The module prepares students for the scientific work in their master theses and provides them with deepening insights into academic literature on innovation, organization design, or strategic entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Accordingly, students in this seminar may choose from a broad range of topics around the development of new and established businesses, the strategies managers devise and execute

including questions of positioning, and the organizational design choices they have to deal with. Potential areas questions of study may include:

- Venture creation: How are new businesses created and how do they evolve?
- Organization design: How do their structures develop and change?
- Growth strategies: Are there different paths to consistent configurations and if yes, how do they differ from each other?
- New forms of organizing: What role do supposedly more novel approaches to conducting business (ecosystems, crowdsourcing, open innovation...) or funding companies (incubators, crowdfunding...) play, when should be used, by whom, and how?
- Role of environmental conditions: How does the business environment influence the decision-making of new or established ventures, such as through membership in categories?

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand academic literature on the topic of innovation, organization design, or strategic entrepreneurship. Furthermore, students are able (3) to create their own academic paper. Additionally, they will be able (4) to present their paper and (5) summarize their findings. Moreover, students learn how (6) to lead a academic discussion. Finally, they (7) understand the process of scientific publication.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing and several sessions about academic problem definition and solving, based on which students may select and continuously refine their topic. The topic choice will further be discussed in individual feedback meetings with the seminar instructors.

Based on their topic, students will prepare their term paper which they will present at the end of the module. The students are continuously supervised by the instructors of the module. The module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The seminar topics may also be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

- Davis, M. S. 1971. That's interesting. *Philosophy of the Social Sciences*, 1(2): 309-344. (Note: the first and last sections are particularly "interesting")
- Sutton, R. I. & Staw, B. M. 1995. What theory is not. *Administrative Science Quarterly*, 40(3): 371-384. (Note: this article has several responses in the same issue of the journal which you may also find helpful.)

Further readings will be detailed in the respective course syllabi before the first session of class.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation and Organization Design (WIB26995) (Limited places) (Seminar, 4 SWS)

Alexy O [L], Reetz D (Huber D)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001141: Principled Entrepreneurial Decisions | Principled Entrepreneurial Decisions [PED]

How to make game-changing decisions

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

(1) presentation of their team values and principles for their company/project (focus in SS) and/or presentation of their principles to empower formal instruments of company/project culture, craft strategy and scale with metrics (focus in WS)
and

(2) written reflection on those principles or role-play exercises

As individuals hand in an exercise on personal values and principles and written reflection on principles or role-play exercises

The seminar is on application

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Application & willingness for active participation

being or becoming part of a Startup or project team

Students who are interested in Venture Capital and decision-making of founders are also welcome

Content:

This course will challenge the next generation of leaders and entrepreneurs to think critically about how their personal values and principles inform the difficult decisions they will have to make as they grow their business. The course will first equip students with frameworks to crystalize their own values and principles. Students will learn to apply their own core values. A selection of readings and case studies will provide students with tangible examples of the challenges other entrepreneurs have faced. Each class will be highly immersive, featuring conversations with entrepreneurial guest speakers and break-out sessions. Through conversations with case

protagonists and each other, students will leave the class more prepared to navigate the ethical dilemmas that they may encounter during their professional lives.

Intended Learning Outcomes:

- 1_ students are able to brave difficult situations in the startup context
- 2_ Enable students to begin to craft their own framework – personal and company
- 3_ Discuss case examples (i.e. Flixbus, Konux, ProGlove, ...) and conduct exercises to help them on their journey

Teaching and Learning Methods:

lectures
group works
role plays
real Start-up cases with the founders in class
discussions

Media:

presentations
founders in class
video

Reading List:

Dalio, R. (2017). Principles: Life and work. New York, NY
Horowitz, B., & Kenerly, K. (2014). The hard thing about hard things: building a business when there are no easy answers. New York, NY: Harper Business.
More literature will be provided in class

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001166: Entrepreneurial Prototyping | Entrepreneurial Prototyping

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (10-15 pages, 75% of grade) and a presentation (15 min + 15 min interaction with the audience, 25% of grade). The research paper and the presentation will be conducted in groups formed in the introductory session. An assessment sheet filled in by the students and handed in with the research paper clarifies students' individual contribution to the research paper. As every student will present in the final presentation, every students' contribution is clearly identifiable and appraisable, thus, students can be graded individually. Based on the research paper it is examined to which extent students are able to elaborate complex topics in the field of entrepreneurship research. The research paper is a means to measure how students were able to understand previous academic literature in the field of entrepreneurship, how they achieved to define their own research question, collect and analyze data, and provide a relevant, novel, and interesting contribution to entrepreneurship research. A final presentation measures students' communicative competencies proves if students are able to present their findings in a comprehensible, precise and demonstrative way as well as whether they are able to perform powerfully and professionally.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The module deals with different topics within entrepreneurship research such as

- discovering entrepreneurial role models, this might include to explore
 - o links between role models and entrepreneurial intentions
 - o reasons for the choice of the entrepreneurial career

- psychology of entrepreneurship, this might include to explore
 - o personality dimensions of entrepreneurs
 - o entrepreneurial cognition
 - entrepreneurial leadership, this might include to explore
 - o behavioral forms of leadership
 - o creating and managing innovative organizations
 - ideation and venture creation, this might include to explore
 - o the process of obtaining creative ideas
 - o the process model of entrepreneurial venture creation
 - venture growth, this might include to explore
 - o how new ventures grow and where growth occurs
 - o different impact factors on new venture growth
 - internationalization and strategic entrepreneurship, this might include to explore
 - o the speed of entrepreneurial internationalization
 - o enabling forces of technology, competition, perceptions, knowledge and networks
- The module provides students with deepening insights into entrepreneurship literature. Besides writing a seminar paper, this involves presenting their final results.

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to read and understand related literature on the topic of entrepreneurship. Furthermore, students are able to create their own research paper. Additionally, they will be able to present their paper and summarize their findings. Moreover, students learn how to lead a discussion on their topic. Finally, they understand entrepreneurial processes.

At the end of the module, students will be able to:

- explain entrepreneurship concepts related to a specific topic.
- discuss current topics within the field of entrepreneurship.
- apply previously discussed approaches to topic specific issues within the field of entrepreneurship.
- evaluate these approaches and their outcomes.
- develop suitable approaches for specific entrepreneurship issues.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing where the topics for each student's research paper will be decided. Topics vary and cover entrepreneurship on an individual (e.g., entrepreneurial decision making, entrepreneurial intentions), team (e.g., entrepreneurial team formation, entrepreneurial exits), or organizational level (e.g., interplay of form, structure, and embeddedness in corporate entrepreneurship). Based on their topic students prepare their research paper which they will present at the end of the module. Upon prior discussion on different research methods and how to use them, the students will identify and apply a research methodology that best addresses their identified research question, i.e., they can apply empirical research methods (qualitative or quantitative), a literature review, or conduct a conceptual paper. Furthermore, the module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the

module who are members the chair. Within the module the topics will be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

Hisrich, R. D. / Peters, M. P. / Shepherd, D. A.: Entrepreneurship, 8th edition, McGraw-Hill, 2010
(optional)

Obligatory readings will be announced at the course introduction.

Responsible for Module:

Breugst, Nicola; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Entrepreneurial Prototyping (WI001166) (Seminar, 4 SWS)

Breugst N [L], Steeghs L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001194: Who is responsible for food and health? Social and cultural perspective on food, health, and technology | Who is responsible for food and health? Social and cultural perspective on food, health, and technology

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading will be based on a presentation (~20 minutes) and a final paper consisting of a 2-page outline and the paper at the end of the term itself. Additionally, students get the opportunity to write comments/responses on the readings as a voluntary midterm assessment. Students will be assessed on their understanding of the course material, their application of relevant social science concepts to real-life events, and discussion of controversies raised by the readings. The topic of the final paper should relate to food and health and questions of responsibility. Students will receive feedback on their outline of their final paper in due time. This will assure students find a feasible topic, and use an appropriate key concept (or concepts) and literature from class. The final paper will be assessed on the incorporation of this key concept(s) and knowledge from the module (3000-4000 words).

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

How to eat and live healthily are important topics and central values within contemporary societies, particularly in industrialized countries. Here, being healthy has become an important goal and source of personal as well as shared identity for many, which people often also define through the types of food that they eat. Health and food are also important governance issues as governments across the world face challenges like rising obesity rates, environmental pollution or the climate crisis. At the same time, techno-scientific reconfigurations of food, such as the

example of genetically modified food, are often very contentious and the source of heavily debated controversies as purported healthier and/or more sustainable solutions. Along the way, different actors, collectives and institutions claim responsibility for themselves or others over who gets to, and should decide on health and (healthy) food. This module explores social and cultural perspectives on food, health and related technologies and innovations to inquire what role the practice, normative approach, and policy of 'responsibility' takes on. We will ask: who is responsible for food and health? Is it the individual, the family, the state, medicine, the market, or all of these actors to different degrees? What is good food and health, anyways? And what role do scientific knowledge and technological innovations play in settling these types of questions? The module foregrounds critical discussions on the ways in which scientific knowledge and technological innovations play a role in how we perceive (healthy) food and our own (healthy) bodies. It traces how and why being healthy has become such a central value particularly in societies of industrialized countries. Health has turned not only into a central source of personal identity, but also into an important object of governance, with states investing in the health of their populations. The module further emphasizes the discussion on how (scientific) knowledge related to questions of food and health is produced but also contested. These issues will be discussed in relation to specific contemporary topics, such as the obesity epidemic, microplastic pollution, agricultural biotechnology, vertical farming or epigenetics. Throughout the course, students get to know relevant social science concepts, such as biopolitics, neoliberal orders and responsibilization, nutritional scientism, healthism, among others, which will enable them to think critically about the social and cultural aspects of food, health, innovation and technology.

Intended Learning Outcomes:

Students will understand and apply a range of key concepts, theoretical frameworks, and analytic tools from the domains of Science and Technology Studies (STS), Sociology, Anthropology, and related social science disciplines (biopolitics, nutritional scientism, healthism, as well as responsibilization and neoliberal orders, technological determinism). They will be able to analyze the complex interactions between food, health and questions of responsibility (e.g. food as a form of health identity; health paradigms in society, policy, research & innovation; food regulation/ labeling and notions of health and sustainability). Students will further:

- Discern how food and health relates to questions of social order (gender, religion, state, etc.)
- Gain a critical understanding of techno-scientific innovation in what comes to be understood as 'healthy,' and how this relates to wider political, economic and other social orders
- Comprehend how regulatory systems (policy, food and drug labeling, etc.) shape our understanding of what counts as "healthy" (food)
- Research interdisciplinary literature and write a paper on a health- and/or food-related issue that inquires who is considered responsible (state, industry, researchers, consumer activists, etc.)

Teaching and Learning Methods:

Students will receive input and benefit from the expertise of six university teachers who will individually or in teams present specific topics and key concepts. Students will also engage in extensive in-class discussions based on the reading, and do practical mini-workshops with their peers to learn how to reflect and position themselves with regard to these issues. Seminar sessions and discussions are based on assigned readings provided in the syllabus at the

beginning of the term. A key part of instruction is the close reading of weekly assigned texts and reflections of key arguments and concepts. Moreover, the course will use regular exercises to achieve learning progress and practice the application of course content to real-life cases.

Media:

Reader (literature provided in course moodle); power point presentations; flipcharts; video clips; newspaper articles

Reading List:

Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., & Fishman, J. R. (2003). Biomedicalization: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine. *American Sociological Review*, 68(2), 161-194.

Crawford, R. (1980). Healthism and the Medicalization of Everyday Life. *International Journal of Health Services*, 10(3), 365-388.

Nettleton, S. (1997). Governing the Risky Self: How to Become Healthy, Wealthy and Wise. In A. Petersen & R. Bunton (Eds.), *Foucault, Health and Medicine* (pp. 207-222). London/New York: Routledge.

Rose, N. (2006). *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-first Century*. Princeton, NJ: Princeton University Press.

Scrinis, G. (2008). On the Ideology of Nutritionism. *Gastronomica: The Journal of Critical Food Studies*, 8(1), 39.

Responsible for Module:

Penkler, Michael; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more seriously. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Management and Marketing | Management-Schwerpunkt: Management and Marketing

AdvSem-MM: Advanced Seminar Management & Marketing | Advanced Seminar Management & Marketing

Module Description

MGT001310: Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy | Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework focuses on the preparation of a full research-based marketing plan. Such an output is made up of two interrelated parts: the initial academic-research part and the latter practical business-like part. The research part requires the use of updated qualitative and quantitative methodologies. The business-like part demonstrates the understanding of international marketing strategy and advanced marketing as a whole. The group seminar paper is based on an extensive presentation (20 to 30 slides), in accordance with the guidelines provided during this advanced seminar. The group written assignment represents 100% of the seminar's evaluation. However, selected students receive an extra grade as a bonus for their proven "in-class attitude". Detailed information that well defines "in-class attitude" is provided during the opening session of the seminar.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Introducing Marketing Strategy in an international context, the role of marketing in a company, the meaning of marketing management, the required elements of marketing research, the transformation of marketing analysis into marketing strategy and objectives. If time allows, it's planned to tackle the deliverables of a marketing plan being an action plan and control standards.

Intended Learning Outcomes:

At the end of the seminar students will be able to understand the dynamics of marketing strategy in an international business | to realize the role of marketing strategy as a liaison between the company's vision and its tactics | to be able to address objectives based on marketing research | to address "strategic planning" in an international context for an existing company | to improve presentation skills.

Teaching and Learning Methods:

Frontal lectures, in-class discussions, group work, self-made case studies

Media:

Frontal lectures, online supervision

Reading List:

Donnelly, J. H. & Peter J. P. (2012). Preface to Marketing Management. 13th edition, McGraw-Hill.
Lehmann, D. R. & Winer, R. S. (2009). Analysis for Marketing Planning. 7th edition, McGraw-Hill.

Responsible for Module:**Courses (Type of course, Weekly hours per semester), Instructor:**

Advanced Seminar Marketing, Strategy, Leadership & Management: International Marketing Strategy (MGT001310) (Limited places) (Seminar, 4 SWS)

Abramovich D, Octavianus E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001335: Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms | Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each seminar participant will work individually on a specific topic in the field of CSR and sustainability of family firms.

Each student will write an academic essay (80% of the overall grade), based on existing literature on CSR and sustainability of family firms as well as on interview insights collected by the student. Each student will conduct a 1-hour interview with a family business owner of a medium sized family firm on sustainability and CSR topics. Students should demonstrate that:

- They are able to conduct semi-structured interviews to a high academic standard
- They can evaluate their interview insights in light of existing research on the topics of CSR and sustainability
- They can draw conclusions and identify opportunities for future research
- They are able to write a paper that follows a clear logic and is based on academic literature

Each student will present their work (20% of the overall grade) to an academic audience. Each student should demonstrate that they are able to answer questions to the empirical and theoretical part of their work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This module will explore actions towards a sustainable economy and ways to improve the social responsibility of businesses. In particular, it will assess how family firms' entrepreneurial and social activities and their unique culture affect CSR and sustainability. Topics covered in the module are:

- Contemporary environmental and social issues for organizations
- The non-financial goals of family firms and their consequences
- Family firms and environmental performance
- Family firms and external stakeholders
- Family firms and internal stakeholders
- Family firms and reporting
- Family firms and philanthropy
- Family firms and social entrepreneurship

Intended Learning Outcomes:

After completing the seminar students should understand how family business owners tackle pressing social and environmental issues. After completing the module students will be able to:

- Understand and critically reflect on the role of family ownership for CSR and sustainability
- Understand family owners' non-financial incentives to engage in CSR and sustainability
- Reflect on possible barriers to promote CSR and sustainability through the family firm
- Compare existing knowledge of CSR and sustainability with their own first-hand experience interviewing medium sized family firms in the region
- Evaluate a specific family firm's actions to promote CSR and sustainability
- Explore how family businesses can exploit sustainable opportunities

Moreover, students will be able to

- Search, understand, synthesize, analyze and apply academic literature
- Present and discuss their findings and conclusions to an academic audience

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, in which the instructor provides the theoretical foundations of family and social enterprises
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-life input will be given through multi-media resources and case studies

- Next to in-class discussions student interaction is also ensured through online technology, such as online polls.
- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor
- In a final presentation, students present the results of their seminar essays

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle):

- Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. 2010. Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly*, 55(1): 82-113.
- Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family business review*, 25(3), 258-279.
- Campopiano, G., De Massis, A. 2014. Corporate social responsibility reporting: a content analysis in family and non-family firms, *Journal of Business Ethics*, 1-24
- Campopiano, G., De Massis, A. & Chirico F. 2014. Firm Philanthropy in Small- and Medium-Sized Family Firms: The Effects of Family Involvement in Ownership and Management. *Family Business Review*, 27: 244-257
- Cruz, C.; Larraza-Kintana, M. Garcés-Galdeano, L. Berrone, P. 2014. Are family firms really more socially responsible? *Entrepreneurship Theory and Practice* 38(6), 1295–1316
- Deephouse, D. L., & Jaskiewicz, P. 2013. Do family firms have better reputations than nonfamily firms? An integration of socioemotional wealth and social identity theories. *Journal of management Studies*, 50(3), 337-360.
- Dyer, W., & Whetten, D. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory & Practice*, 30(6): 785-802.
- Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. 2011. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*, 5(1): 653-707.
- Kellermanns, F. W., Eddleston, K. A., and Zellweger, T. M. 2012. Extending the socioemotional wealth perspective: A look at the dark side. *Entrepreneurship Theory and Practice*, 36(6): 1175-1182.
- Le Breton-Miller, I., & Miller, D. 2016. Family firms and practices of sustainability: A contingency view. *Journal of Family Business Strategy*, 7(1), 26-33.
- Miller, D., & Le Breton-Miller, I. 2005. *Managing for the long run: Lessons in competitive advantage from great family businesses*: Harvard Business Press.
- Richards, M. 2022. When do Non-financial Goals Benefit Stakeholders? Theorizing on Care and Power in Family Firms. *Journal of Business Ethics*, 1-19.

- Richards, M., Zellweger, T., & Gond, J. P. 2017. Maintaining moral legitimacy through worlds and words: an explanation of firms' investment in sustainability certification. *Journal of Management Studies*, 54(5), 676-710.
- Spence, L. J. 2016. Small business social responsibility: Expanding core CSR theory. *Business & Society*, 55(1), 23-55.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001335): CSR and Sustainability in Family Firms (Limited places) (Seminar, 4 SWS)

Richards M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001339: Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management | Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Conceptual foundations of reputation management
- Topic 2. Reputation protection mechanisms
- Topic 3. Methods of reputation forming and maintaining
- Topic 4. Methods of crisis reputation management
- Topic 5. Methods of corporate reputation assessing

Intended Learning Outcomes:

- ability to increase the level of competitiveness of organizations as socio-economic systems taking into account the specifics of interpersonal competition in the trade environment

- identify actions that harm the information security of the trade organization, be able to apply methods to ensure it;
- to determine and implement a set of actions for the organization of e-commerce and goods and services promotion by means of Internet marketing.

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Eric B. Shiraev, Jennifer Keohane, Martijn Icks, Sergei A. Samoilenko. Character Assassination and Reputation Management: Theory and Applications. Routledge. 2021. 283.

John Doorley, Helio Fred Garcia. Reputation Management: The Key to Successful Public Relations and Corporate Communications. Routledge. 2006. 458.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001339): HR Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001340: Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management | Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Structure and functions of the human resources departments
- Topic 2. Competence approach in human resource management
- Topic 3. Planning of work with personnel in the organization
- Topic 4. Staff recruitment and staff selection processes
- Topic 5. Adaptation of staff in the organization
- Topic 6. Personnel evaluation and staff motivation
- Topic 7. Team cohesion and social development of staff
- Topic 8. Innovations in HR management

Intended Learning Outcomes:

- ability to organize the effective work of human resources according to the specifics of organization business objectives;
- ability to provide efficient activity of human resources services for solving human resource management tasks using different types of resources and labour instruments;
- ability to form an effective system of performance evaluation in different categories of work positions in the organization by using modern methods;
- ability to analyse the indicators of personnel movement in the organization and developing measures to stabilize the work of labour collective;

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Noe Raymond, Hollenbeck John, Gerhart Barry, Wright Patrick. Fundamentals of Human Resource Management. McGraw-Hill, 2019. 406.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001340): Reputation Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001342: Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI | Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20 minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Participants will develop a basic understanding of useful applications of AI in the area of strategic management. They learn how companies can strategically apply AI for gaining competitive advantage in different industries. Students will also improve their project management and teamwork skills, as they are required to elaborate a complex project topic on their own. They will create basic skills of academic writing and literature search, too. Furthermore, they strengthen their communication skills while presenting their results in front of the class.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterwards, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Presentation, discussion, academic literature, group work

Reading List:

- Russell, S. J. and Norvig, P. (2021): Artificial intelligence: A modern approach. Pearson Publishing
- Grant, R. M. (2019): Contemporary strategy analysis (10th ed.). John Wiley & Sons, Inc.
- Wodecki, A. (2019): Artificial Intelligence in value creation - Improving competitive advantage. Palgrave Macmillan

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001342): Gaining Competitive Advantage with AI (Seminar, 4 SWS)

Hutzschenreuter T, Lämmermann T, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001343: Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process | Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate on the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20-minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None, except an interest in AI and strategic management.

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining a competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Die Teilnehmer werden die Potentiale und Grenzen von KI für den Strategieprozess verstehen und lernen, wie Strategen innovative KI-Anwendungen für die Strategieentwicklung nutzen können, um einen Wettbewerbsvorteil zu erzielen. Die Studierenden verbessern auch ihre Projektmanagement- und Teamwork-Fähigkeiten, da sie ein komplexes Projektthema selbständig erarbeiten müssen. Sie erwerben auch grundlegende Fähigkeiten im wissenschaftlichen Schreiben und in der Literaturrecherche. Außerdem stärken sie ihre Kommunikationsfähigkeiten, indem sie ihre Ergebnisse vor der Gruppe präsentieren.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterward, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Präsentation, Diskussion, wissenschaftliche Literatur, Gruppenarbeit

Reading List:

- Russel, S. & Norvig, P., 2021. Artificial Intelligence. A Modern Approach. 4th edition. Hoboken: Pearson
- Johnson, G. et al., 2017. Exploring Strategy Text and Cases. 11th Edition. Edinburgh: Pearson Education
- Grant, R. M., 2019. Contemporary Strategy Analysis. 10th Edition. Hoboken: Wiley & Sons

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001343): AI and the Strategizing Process (Seminar, 4 SWS)

Hutzschenreuter T, Perkhofer F, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law | Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations | Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001179: Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption | Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written seminar paper (~15 pages, 50 % of the grade), whereas the results and conclusions of the seminar paper need to be presented (20 min, 50 % of the grade) in front of the class. The seminar paper as well as the presentation in front of the class demonstrate that students are able to reproduce and summarize their acquired knowledge about the respective research topic. Furthermore, the seminar paper and the related presentation show that the students are able to critically analyze the key aspects regarding their research question. By presenting their findings in front of the class, students prove that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics/consumer economics and/or consumer behavior theories.
Knowledge in empirical research methods.

Content:

Key topics of the seminar may include:

- Current issues in sustainable consumption
- Current issues in consumers and digitalization
- Current issues in consumer research

Intended Learning Outcomes:

After successful participation in the module students will have in-depth knowledge on the tackled focus of the module. Students will be able to (1) write a scientific research paper, (2) procure relevant literature and (3) structure a topic. Additionally, students will be able to (4) present their research findings in front of seminar participants, (5) answer their questions and (6) moderate a following discussion.

Teaching and Learning Methods:

The module is a seminar, in which the students will be assigned state-of-the-art research papers from the recent literature. They are expected to prepare high-quality presentations and write-ups, reflecting their analyses, understanding and insights from reading the papers and related literature. The lecturer will provide guidance and advice all along, from the choice of the initial topic, to tips on reading original literature, on scientific writing, and on giving successful presentations.

Media:

Slides, books, scientific papers

Reading List:

Ethridge, D. (2004). Research Methodology in Applied Economics, 2nd Edition. Ames: Blackwell Publishing.

Reisch, L. (2015). Handbook of research on sustainable consumption. Cheltenham: Elgar.

Relevant literature will be selected and communicated specifically.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001290: Advanced Seminar Marketing, Strategy, Leadership & Management: Risk Perception and Communication | Advanced Seminar Marketing, Strategy, Leadership & Management: Risk Perception and Communication

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based, in equal shares, on a written seminar paper (~15 pages) and a presentation in front of the class (~20 min.). Through the seminar paper as well as the presentation the students demonstrate that they are able to develop research questions and a corresponding methodology to analyze topics and issue management in risk perception and communication. They show that they can identify and use appropriate data sources. By presenting their findings in front of the class, students prove that they are able to summarize their key findings in a concise manner and to respond to further questions on their topics.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Consumer Behavior, empirical research methods such as Quantitative and Qualitative Methods in Consumer Research

Content:

This seminar is designed to familiarize students with current research in risk perception and risk communication, in particular with regard to health, environmental and natural risks.

- Review of relevant concepts from the fields of psychology, economics, and marketing
- Individual judgements about risks
- Social mechanisms underlying public discourse and stigma regarding potentially risky technologies
- Overview of media effect research and the role of media
- Communication of risks and crisis

- Public and consumer perception of risks
- Methodological approaches in research on issue management and crisis communication, with a focus on analysis of Twitter and other online data

Intended Learning Outcomes:

At the end of the lecture students will be able to describe how individuals make judgements about risks and relate this knowledge to relevant concepts from psychology, economics and marketing. In addition, students will be able to explain social mechanisms underlying public discourse and stigma regarding potentially risky technologies. Approaches in media effect research build the basis for students to evaluate the role of media in the social amplification of risk. Furthermore, students will be able to critically analyze how information on risks and crisis is perceived by consumers. In this context, students will be able to develop a research design to study issue management and crisis communication. Hence, students will be able to understand and practically apply theories in the field of risk perception and communication.

Teaching and Learning Methods:

During the lectures the contents are delivered via presentations, practical exercises and case studies. Group discussion will play an important role in this course which will be based on research articles and/or book chapters that should be read before the respective class.

Media:

Slides, book chapters, scientific papers

Reading List:

There is no textbook assigned for this course. A detailed reading list will be provided at the beginning of the course.

Kasperson, R. E. (2005). The social contours of risk / 1: Publics, risk communication and the social amplification of risk 1. publ. - London [a.o.]: Earthscan.

Kuran T., Sunstein C.R. (1999). Availability cascades and risk regulation. Stanford Law Review: 683-768.

Nabi, R.L. and Oliver M.B. (eds.) (2009). The SAGE handbook of media processes and effects. SAGE, Los Angeles (CA): Sage.

Tversky, A., Kahneman, D. (1973). Availability: A heuristic for judging frequency and probability. Cognitive Psychology, 5(2): 207–232.

Zinn, J. (2008): Social theories of risk and uncertainty. Blackwell Publishing. USA.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Elective Modules Management & Marketing | Wahlfächer Management & Marketing

WahlKat-MM: Catalogue of Elective Modules: Management & Marketing | Wahlkatalog: Management & Marketing

Module Description

MGT001310: Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy | Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework focuses on the preparation of a full research-based marketing plan. Such an output is made up of two interrelated parts: the initial academic-research part and the latter practical business-like part. The research part requires the use of updated qualitative and quantitative methodologies. The business-like part demonstrates the understanding of international marketing strategy and advanced marketing as a whole. The group seminar paper is based on an extensive presentation (20 to 30 slides), in accordance with the guidelines provided during this advanced seminar. The group written assignment represents 100% of the seminar's evaluation. However, selected students receive an extra grade as a bonus for their proven "in-class attitude". Detailed information that well defines "in-class attitude" is provided during the opening session of the seminar.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Introducing Marketing Strategy in an international context, the role of marketing in a company, the meaning of marketing management, the required elements of marketing research, the transformation of marketing analysis into marketing strategy and objectives. If time allows, it's planned to tackle the deliverables of a marketing plan being an action plan and control standards.

Intended Learning Outcomes:

At the end of the seminar students will be able to understand the dynamics of marketing strategy in an international business | to realize the role of marketing strategy as a liaison between the company's vision and its tactics | to be able to address objectives based on marketing research | to address "strategic planning" in an international context for an existing company | to improve presentation skills.

Teaching and Learning Methods:

Frontal lectures, in-class discussions, group work, self-made case studies

Media:

Frontal lectures, online supervision

Reading List:

Donnelly, J. H. & Peter J. P. (2012). Preface to Marketing Management. 13th edition, McGraw-Hill.
Lehmann, D. R. & Winer, R. S. (2009). Analysis for Marketing Planning. 7th edition, McGraw-Hill.

Responsible for Module:**Courses (Type of course, Weekly hours per semester), Instructor:**

Advanced Seminar Marketing, Strategy, Leadership & Management: International Marketing Strategy (MGT001310) (Limited places) (Seminar, 4 SWS)

Abramovich D, Octavianus E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001335: Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms | Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each seminar participant will work individually on a specific topic in the field of CSR and sustainability of family firms.

Each student will write an academic essay (80% of the overall grade), based on existing literature on CSR and sustainability of family firms as well as on interview insights collected by the student. Each student will conduct a 1-hour interview with a family business owner of a medium sized family firm on sustainability and CSR topics. Students should demonstrate that:

- They are able to conduct semi-structured interviews to a high academic standard
- They can evaluate their interview insights in light of existing research on the topics of CSR and sustainability
- They can draw conclusions and identify opportunities for future research
- They are able to write a paper that follows a clear logic and is based on academic literature

Each student will present their work (20% of the overall grade) to an academic audience. Each student should demonstrate that they are able to answer questions to the empirical and theoretical part of their work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This module will explore actions towards a sustainable economy and ways to improve the social responsibility of businesses. In particular, it will assess how family firms' entrepreneurial and social activities and their unique culture affect CSR and sustainability. Topics covered in the module are:

- Contemporary environmental and social issues for organizations
- The non-financial goals of family firms and their consequences
- Family firms and environmental performance
- Family firms and external stakeholders
- Family firms and internal stakeholders
- Family firms and reporting
- Family firms and philanthropy
- Family firms and social entrepreneurship

Intended Learning Outcomes:

After completing the seminar students should understand how family business owners tackle pressing social and environmental issues. After completing the module students will be able to:

- Understand and critically reflect on the role of family ownership for CSR and sustainability
- Understand family owners' non-financial incentives to engage in CSR and sustainability
- Reflect on possible barriers to promote CSR and sustainability through the family firm
- Compare existing knowledge of CSR and sustainability with their own first-hand experience interviewing medium sized family firms in the region
- Evaluate a specific family firm's actions to promote CSR and sustainability
- Explore how family businesses can exploit sustainable opportunities

Moreover, students will be able to

- Search, understand, synthesize, analyze and apply academic literature
- Present and discuss their findings and conclusions to an academic audience

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, in which the instructor provides the theoretical foundations of family and social enterprises
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-life input will be given through multi-media resources and case studies

- Next to in-class discussions student interaction is also ensured through online technology, such as online polls.
- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor
- In a final presentation, students present the results of their seminar essays

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle):

- Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. 2010. Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly*, 55(1): 82-113.
- Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family business review*, 25(3), 258-279.
- Campopiano, G., De Massis, A. 2014. Corporate social responsibility reporting: a content analysis in family and non-family firms, *Journal of Business Ethics*, 1-24
- Campopiano, G., De Massis, A. & Chirico F. 2014. Firm Philanthropy in Small- and Medium-Sized Family Firms: The Effects of Family Involvement in Ownership and Management. *Family Business Review*, 27: 244-257
- Cruz, C.; Larraza-Kintana, M. Garcés-Galdeano, L. Berrone, P. 2014. Are family firms really more socially responsible? *Entrepreneurship Theory and Practice* 38(6), 1295–1316
- Deephouse, D. L., & Jaskiewicz, P. 2013. Do family firms have better reputations than nonfamily firms? An integration of socioemotional wealth and social identity theories. *Journal of management Studies*, 50(3), 337-360.
- Dyer, W., & Whetten, D. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory & Practice*, 30(6): 785-802.
- Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. 2011. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*, 5(1): 653-707.
- Kellermanns, F. W., Eddleston, K. A., and Zellweger, T. M. 2012. Extending the socioemotional wealth perspective: A look at the dark side. *Entrepreneurship Theory and Practice*, 36(6): 1175-1182.
- Le Breton-Miller, I., & Miller, D. 2016. Family firms and practices of sustainability: A contingency view. *Journal of Family Business Strategy*, 7(1), 26-33.
- Miller, D., & Le Breton-Miller, I. 2005. *Managing for the long run: Lessons in competitive advantage from great family businesses*: Harvard Business Press.
- Richards, M. 2022. When do Non-financial Goals Benefit Stakeholders? Theorizing on Care and Power in Family Firms. *Journal of Business Ethics*, 1-19.

- Richards, M., Zellweger, T., & Gond, J. P. 2017. Maintaining moral legitimacy through worlds and words: an explanation of firms' investment in sustainability certification. *Journal of Management Studies*, 54(5), 676-710.
- Spence, L. J. 2016. Small business social responsibility: Expanding core CSR theory. *Business & Society*, 55(1), 23-55.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001335): CSR and Sustainability in Family Firms (Limited places) (Seminar, 4 SWS)

Richards M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001339: Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management | Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Conceptual foundations of reputation management
- Topic 2. Reputation protection mechanisms
- Topic 3. Methods of reputation forming and maintaining
- Topic 4. Methods of crisis reputation management
- Topic 5. Methods of corporate reputation assessing

Intended Learning Outcomes:

- ability to increase the level of competitiveness of organizations as socio-economic systems taking into account the specifics of interpersonal competition in the trade environment

- identify actions that harm the information security of the trade organization, be able to apply methods to ensure it;
- to determine and implement a set of actions for the organization of e-commerce and goods and services promotion by means of Internet marketing.

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Eric B. Shiraev, Jennifer Keohane, Martijn Icks, Sergei A. Samoilenko. Character Assassination and Reputation Management: Theory and Applications. Routledge. 2021. 283.

John Doorley, Helio Fred Garcia. Reputation Management: The Key to Successful Public Relations and Corporate Communications. Routledge. 2006. 458.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001339): HR Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001340: Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management | Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Structure and functions of the human resources departments
- Topic 2. Competence approach in human resource management
- Topic 3. Planning of work with personnel in the organization
- Topic 4. Staff recruitment and staff selection processes
- Topic 5. Adaptation of staff in the organization
- Topic 6. Personnel evaluation and staff motivation
- Topic 7. Team cohesion and social development of staff
- Topic 8. Innovations in HR management

Intended Learning Outcomes:

- ability to organize the effective work of human resources according to the specifics of organization business objectives;
- ability to provide efficient activity of human resources services for solving human resource management tasks using different types of resources and labour instruments;
- ability to form an effective system of performance evaluation in different categories of work positions in the organization by using modern methods;
- ability to analyse the indicators of personnel movement in the organization and developing measures to stabilize the work of labour collective;

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Noe Raymond, Hollenbeck John, Gerhart Barry, Wright Patrick. Fundamentals of Human Resource Management. McGraw-Hill, 2019. 406.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001340): Reputation Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001342: Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI | Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20 minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Participants will develop a basic understanding of useful applications of AI in the area of strategic management. They learn how companies can strategically apply AI for gaining competitive advantage in different industries. Students will also improve their project management and teamwork skills, as they are required to elaborate a complex project topic on their own. They will create basic skills of academic writing and literature search, too. Furthermore, they strengthen their communication skills while presenting their results in front of the class.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterwards, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Presentation, discussion, academic literature, group work

Reading List:

- Russell, S. J. and Norvig, P. (2021): Artificial intelligence: A modern approach. Pearson Publishing
- Grant, R. M. (2019): Contemporary strategy analysis (10th ed.). John Wiley & Sons, Inc.
- Wodecki, A. (2019): Artificial Intelligence in value creation - Improving competitive advantage. Palgrave Macmillan

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001342): Gaining Competitive Advantage with AI (Seminar, 4 SWS)

Hutzschenreuter T, Lämmermann T, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001343: Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process | Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate on the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20-minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None, except an interest in AI and strategic management.

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining a competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Die Teilnehmer werden die Potentiale und Grenzen von KI für den Strategieprozess verstehen und lernen, wie Strategen innovative KI-Anwendungen für die Strategieentwicklung nutzen können, um einen Wettbewerbsvorteil zu erzielen. Die Studierenden verbessern auch ihre Projektmanagement- und Teamwork-Fähigkeiten, da sie ein komplexes Projektthema selbständig erarbeiten müssen. Sie erwerben auch grundlegende Fähigkeiten im wissenschaftlichen Schreiben und in der Literaturrecherche. Außerdem stärken sie ihre Kommunikationsfähigkeiten, indem sie ihre Ergebnisse vor der Gruppe präsentieren.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterward, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Präsentation, Diskussion, wissenschaftliche Literatur, Gruppenarbeit

Reading List:

- Russel, S. & Norvig, P., 2021. Artificial Intelligence. A Modern Approach. 4th edition. Hoboken: Pearson
- Johnson, G. et al., 2017. Exploring Strategy Text and Cases. 11th Edition. Edinburgh: Pearson Education
- Grant, R. M., 2019. Contemporary Strategy Analysis. 10th Edition. Hoboken: Wiley & Sons

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001343): AI and the Strategizing Process (Seminar, 4 SWS)

Hutzschenreuter T, Perkhofer F, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law | Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations | Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:
Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.
Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.
Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.
Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.
Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.
Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)
Richards M, Safieh M, Zösmair S
For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001367: Introduction to R for Data Science | Introduction to R for Data Science

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments and solving the exercises. In addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None. This is an introductory course. It is suitable for beginners without any notable knowledge of programming or data analysis.

Content:

Generating insight from raw data is an essential skill across various scientific disciplines and applied fields. Among the core competencies of a data scientist are structuring projects and workflows, importing, preparing and transforming data sets, common programming methods (such as iteration, functions, conditionals), visualizing and modeling data, and communicating the results in a comprehensible and insightful manner. The module equips students with a solid foundation of such common methods in the field of data science. These methods are demonstrated and practiced using the open source programming language R, associated packages (especially the "tidyverse"), as well as the graphical user interface RStudio.

Intended Learning Outcomes:

At the end of the module students will know and understand commonly applied methods in the field of data science. They are capable of applying these methods to novel data sets and problems, and know how to independently structure and implement data-analytic projects. They are familiar with

the open source programming language R, the graphical user interface RStudio, as well as with common packages and their applications.

Teaching and Learning Methods:

Based on the suggested literature students will give short presentations, introducing the class to methods of programming, data wrangling and data analysis. The students are asked to integrate interactive elements and concrete demonstrations in these presentations. In exercises (solved in small groups or individually) the class practices and consolidates the implementation of the introduced methods by applying them to concrete data sets.

Media:

Reading List:

Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. O'Reilly Media, Inc.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Introduction to R for Data Science - Exercise (MGT001367) (Limited places) (Übung, 2 SWS)
Zilker V

Introduction to R for Data Science (MGT001367) (Limited places) (Seminar, 2 SWS)
Zilker V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001376: Digital Marketing & Text Analytics | Digital Marketing & Text Analytics

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written report consisting of 10 PPT content slides (90%) and in-class participation (10%). The written report will be in the format of a management-style presentation, focusing on the main insights and supported by appropriate visualizations and tables. Thereby, the examination tests the students' ability to translate the results from applying different text analytics methods into managerially relevant insights in a clear, concise, and compelling manner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic experience with R and/or Python is recommended (e.g., loading and exploring datasets, generating variables, creating visualizations, running regression analyses).

Content:

The module will cover the following topics:

- Trends in Digital Marketing & Text Analytics
- Text Analytics Methods (Lexicons, Machine Learning, Deep Learning)
- Sentiment Analysis
- Challenges of Natural Language Processing
- Ethical Considerations of Text Analytics

Intended Learning Outcomes:

Upon successful completion of the module, students will be able to:

- understand how text analytics can inform data-driven decision making
- apply diverse text analytics methods using R and/or Python to digital marketing problems
- evaluate which text analytics methods are appropriate contingent on the application context

- develop an end-to-end solution from unstructured data to structured insights

Teaching and Learning Methods:

The module will be held in the form of a seminar. The first block of the seminar is a lecture-style introductory session to applied text analytics in marketing. The seminar will put emphasis on in-class discussions, interactive materials, practical relevance, research-based, interdisciplinary teaching, and code examples (in R and Python). The seminar will offer an engaging learning environment, complemented by remote and in-class coaching opportunities. To apply the knowledge learned and gain first-hand experience in implementing different text analytics methods, the students will work on an individual case study that they submit by the end of the seminar.

Media:

Slides, research articles, textbooks, interactive websites, programming code (in R and Python)

Reading List:

Berger, J., Humphreys, A., Ludwig, S., Moe, W. W., Netzer, O., & Schweidel, D. A. (2020). Uniting the tribes: Using text for marketing insight. *Journal of Marketing*, 84(1), 1-25.
Hartmann, J., Heitmann, M., Siebert, C., & Schamp, C. (2022). More than a Feeling: Accuracy and Application of Sentiment Analysis. *International Journal of Research in Marketing*. Forthcoming.
Hartmann, J. & Netzer, O. (2022). Natural Language Processing in Marketing. *Review of Marketing Research*. Special Issue: Artificial Intelligence and Marketing. Forthcoming.
Additional references will be provided in the course.

Responsible for Module:

Hartmann, Jochen; Prof. Dr.: jochen.hartmann@tum.de

Courses (Type of course, Weekly hours per semester), Instructor:

Digital Marketing & Text Analytics (MGT001376) (Seminar, 2 SWS)

Hartmann J

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000997: Marketing Entrepreneurship Lab | Marketing Entrepreneurship Lab

Version of module description: Gültig ab summerterm 2013

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a presentation and a reflection paper.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Learn from Max Wittrock, marketing expert and co-founder of jokolade and mymuesli, practical marketing and business knowledge and apply your marketing skills to real world Start-ups. At the Marketing Entrepreneurship Lab students get the opportunity to improve their marketing knowledge and apply it to a real world challenge. Support a Start-up of your choice with a course-related project in the areas of strategic marketing, market research, product launch, etc (also possible as a team). The following topics are covered among others in the course:

- How do you create a marketing plan and decide on a strategy?
- How do you measure marketing effectiveness?
- The basics of Public Relations, Storytelling, and Social Media Marketing
- How to plan a Start-up market entry?
- How to balance budget and goals?
- The correlation of startup business models and marketing

Intended Learning Outcomes:

Have better understanding of marketing challenges and tools. Enable students to apply their theoretical knowledge about marketing and gain new capabilities in a professional and more practical direction by relating to real life startup marketing challenges.

Equip student with practical skills beyond the traditional marketing curriculum and thus close bridge students with startup founders to better equip them for working in a startup.

Teaching and Learning Methods:

lectures
group works
project-based learning
real Start-up cases

Media:

hybrid format, blocked seminar, presentation, discussion, clinic

Reading List:

will be presented at the start of the seminar

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001140: Luxury Marketing | Luxury Marketing

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on group presentations. During the module two presentations have to be held. One short presentation (25% of grade, presenting an article - 20 min) aims to prove if students are able to connect the theoretical material on luxury marketing with empirical results of the contemporary research, if they are able to analyze and present an academic article in a clear and organized way, and if they are able to provide a personal interpretation of the article. The second presentation (75% of grade, 45 min) assesses if the students understand the main elements of a luxury strategy with a focus on the 4Ps, and if they are able to apply the theoretical learning to a real case by conducting an audit of a luxury brand and by giving recommendations of how to improve the luxury marketing strategy of the assigned brand. They can use the theoretical material (lecturer's slides) as a support and they have to collect secondary data. This presentation is combined with a written composition that illustrates the results of the audit. The presentations are done by groups of four students. The students will receive an individual grade: the individual contribution will be identified by evaluating a personal recommendation to the luxury brand that each student has to provide as a result of the audit, and by evaluating the individual communication skills. Both presentations are followed by a discussion in which all the students can voluntarily participate.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

* First, the module starts with a discussion about how the meaning of luxury evolved from the past until now. It will elaborate how luxury differs from other related concepts.

- * Second, it will focus on understanding consumer behavior association with luxury products and brands. In particular, it will identify the underlying drivers of conspicuous consumption (e.g. self-reward, social elevation) and what consumers want to signal through the purchase of luxury products (e.g. status, wealth, power).
- * Third, the module will discuss best practices, do's and don'ts, when it comes to building, managing, and extending luxury brands. Especially, the symbolic power and the identity of luxury brands will be discussed.
- * Last but not least, it will discuss the 4Ps of luxury marketing and how to leverage them to develop an effective marketing strategy.

Intended Learning Outcomes:

Upon successful completion of this module, students are able (1) to understand the basic elements and the specific challenges of marketing luxury products and (2) to give examples from empirical evidence of the theoretical concepts. They are also able (3) to analyze, (4) review and (5) present academic papers related to the topic of luxury of the contemporary research. Finally, they are able (6) to conduct an audit of a luxury brand (7) by making recommendations to improve the luxury marketing strategy of the assigned brand and (8) to improve their communication skills.

Teaching and Learning Methods:

The module uses various teaching methods that should help facilitate students' learning. The students are provided during the lectures with theoretical material to acquire the basic knowledge of luxury marketing. The students have to present academic papers in class and discuss them with peers, in order to explore empirical results related to theoretical concepts. They also have to prepare an audit of a luxury brand focused on the 4Ps (product, price, promotion, and place), which they have to present in class, in order to apply in practice the theoretical learning. The audit can be performed using the theoretical material presented in class as a support.

Media:

Reading List:

- Han, Y. J., Nunes, J. C., & Drèze, X. (2010). Signaling status with luxury goods: The role of brand prominence. *Journal of Marketing*, 74(4), 15-30.
- Wang, Y., & Griskevicius, V. (2014). Conspicuous consumption, relationships, and rivals: Women's luxury products as signals to other women. *Journal of Consumer Research*, 40(5), 834-854.
- Bellezza, S., Gino, F., & Keinan, A. (2014). The red sneakers effect: Inferring status and competence from signals of nonconformity. *Journal of Consumer Research*, 41(1), 35-54.
- Mandel, N., Petrova, P. K., & Cialdini, R. B. (2006). Images of success and the preference for luxury brands. *Journal of Consumer Psychology*, 16(1), 57-69.
- Rucker, D. D., & Galinsky, A. D. (2008). Desire to acquire: Powerlessness and compensatory consumption. *Journal of Consumer Research*, 35(2), 257-267.

- Griskevicius, V., Tybur, J. M., & Van den Bergh, B. (2010). Going green to be seen: status, reputation, and conspicuous conservation. *Journal of personality and social psychology*, 98(3), 392.
- Hagtveldt, H., & Patrick, V. M. (2008). Art and the brand: The role of visual art in enhancing brand extendibility. *Journal of Consumer Psychology*, 18.
- Hagtveldt, H., & Patrick, V. M. (2009). The broad embrace of luxury: Hedonic potential as a driver of brand extendibility. *Journal of Consumer Psychology*, 19.
- Fuchs, C., Prandelli, E., Schreier, M., & Dahl, D. W. (2013). All that is users might not be gold: How labeling products as user designed backfires in the context of luxury fashion brands. *Journal of Marketing*, 77(5), 75-91.
- Wilcox, K., Kim, H. M., & Sen, S. (2009). Why do consumers buy counterfeit luxury brands?. *Journal of Marketing Research*, 46(2), 247-259.
- Willems, K., Janssens, W., Swinnen, G., Brengman, M., Streukens, S., & Vancauteren, M. (2012). From Armani to Zara: Impression formation based on fashion store patronage. *Journal of Business Research*, 65(10), 1487-1494.
- Ward, M. K., & Dahl, D. W. (2014). Should the Devil Sell Prada? Retail Rejection Increases Aspiring Consumers' Desire for the Brand. *Journal of Consumer Research*, 41(3), 590-609.

Responsible for Module:

Fuchs, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001179: Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption | Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written seminar paper (~15 pages, 50 % of the grade), whereas the results and conclusions of the seminar paper need to be presented (20 min, 50 % of the grade) in front of the class. The seminar paper as well as the presentation in front of the class demonstrate that students are able to reproduce and summarize their acquired knowledge about the respective research topic. Furthermore, the seminar paper and the related presentation show that the students are able to critically analyze the key aspects regarding their research question. By presenting their findings in front of the class, students prove that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics/consumer economics and/or consumer behavior theories.
Knowledge in empirical research methods.

Content:

Key topics of the seminar may include:

- Current issues in sustainable consumption
- Current issues in consumers and digitalization
- Current issues in consumer research

Intended Learning Outcomes:

After successful participation in the module students will have in-depth knowledge on the tackled focus of the module. Students will be able to (1) write a scientific research paper, (2) procure relevant literature and (3) structure a topic. Additionally, students will be able to (4) present their research findings in front of seminar participants, (5) answer their questions and (6) moderate a following discussion.

Teaching and Learning Methods:

The module is a seminar, in which the students will be assigned state-of-the-art research papers from the recent literature. They are expected to prepare high-quality presentations and write-ups, reflecting their analyses, understanding and insights from reading the papers and related literature. The lecturer will provide guidance and advice all along, from the choice of the initial topic, to tips on reading original literature, on scientific writing, and on giving successful presentations.

Media:

Slides, books, scientific papers

Reading List:

Ethridge, D. (2004). Research Methodology in Applied Economics, 2nd Edition. Ames: Blackwell Publishing.

Reisch, L. (2015). Handbook of research on sustainable consumption. Cheltenham: Elgar.

Relevant literature will be selected and communicated specifically.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Operations and Supply Chain Management | Management-Schwerpunkt: Operations and Supply Chain Management

AdvSem-OSCM: Advanced Seminar Operations & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management

Module Description

MGT001350: Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

Within this seminar, groups of students study a variety of problems with real-world applications. A supervisor with relevant research background guides each group through every step of their progress, from understanding the state-of-the-art literature to the final implementation of their extensions. Using selected scientific publications, the students will understand problems relevant to different industries and investigate various modeling and solution techniques to solve these problems.

Within this process, students develop a wide spectrum of skills, which ultimately prepares them for carrying out a thesis with high academic value.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the seminar focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides

Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Operations & Supply Chain Management (MGT001350): Production & Supply Chain Management (Seminar, 4 SWS)

Grunow M [L], Grunow M, Pahr A, Schömig-Beißner M, Fatemianaraki S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB19837: Advanced Seminar Operations & Supply Chain Management: Production and Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Produktion und Supply Chain Management

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

The development of methods and tools for quantitative operations and supply chain management can be challenging. Different contextual factors often require the adaptation of tools and methods. In this module, a specific focus within operations and supply chain management will be studied, and its specific challenges in terms of developing quantitative decision support tools will be addressed.

After a general analysis of the focus area and its main challenges, we identify several specific operations and supply chain management requirements with regard to supporting decision-making in practice. Using different scientific papers, we investigate possibilities to deal with the specific challenges, and see how traditional production planning and control methods and concepts can be utilized in this context.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the module focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides
Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Elective Modules Operations and Supply Chain Management | Wahlfächer Operations and Supply Chain Management

WahlKat-OSCM: Catalogue of Elective Modules: Operations & Supply Chain Management | Wahlkatalog: Operations & Supply Chain Management

Module Description

MGT001350: Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

Within this seminar, groups of students study a variety of problems with real-world applications. A supervisor with relevant research background guides each group through every step of their progress, from understanding the state-of-the-art literature to the final implementation of their extensions. Using selected scientific publications, the students will understand problems relevant to different industries and investigate various modeling and solution techniques to solve these problems.

Within this process, students develop a wide spectrum of skills, which ultimately prepares them for carrying out a thesis with high academic value.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the seminar focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides

Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Operations & Supply Chain Management (MGT001350): Production & Supply Chain Management (Seminar, 4 SWS)

Grunow M [L], Grunow M, Pahr A, Schömig-Beißner M, Fatemianaraki S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001370: Designing Manufacturing Systems | Designing Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The students demonstrate that they can create appropriate designs for different production systems using the approaches introduced in the lecture. Furthermore, students show that they are able to explain the fundamentals of the different design approaches and evaluate them. At the end of the lecture students will have a good understanding of the design of production systems and layouts, like job shops, flow lines, single flow rows, production centers, and flexible assembly layouts.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to designing of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these

decisions by applying various quantitative methods in application areas such as assembly systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Job shops
- Traditional assembly lines
- Flexible assembly lines
- Single flow row
- Center production

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in designing production systems.
- Distinguish the most important production layout types (job shop, flow lines and production centers). Analyze the layout types advantages and disadvantages, decide for practical layout problems, which type to choose.
- Apply rough and exact planning approaches for the most important layout types, including the application of heuristics and the formulation and adaption of mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the design problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Designing Manufacturing Systems(MGT001370) (Limited places) (Vorlesung, 4 SWS)

Grunow M, Okumusoglu B, Schömig-Beißner M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001371: Scheduling Manufacturing Systems | Scheduling Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The focus is on scheduling short term operations on the different manufacturing layout types.

The students have to show that for different production systems they are able to apply suitable scheduling approaches taught in the lecture. Furthermore, the students demonstrate that they are able to explain the fundamentals of the different scheduling approaches and evaluate them.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to scheduling of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these decisions by applying various quantitative methods in application areas such as assembly

systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Introduction to scheduling
- Job shops
- Flexible assembly systems
- Economic lot scheduling, block planning
- Scheduling AGV's in centers (online vs. offline scheduling)

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in scheduling production systems.
- Give an overview of the scheduling objectives and requirements in manufacturing.
- Evaluate and apply different planning procedures (shifting bottleneck, scheduling of flexible assembly systems, economic lot scheduling, block planning and online vs. offline scheduling) to develop production schedules for different types of systems such as assembly lines, food processing systems and AGVs in flexible assembly layouts and production centers.
- Apply heuristics and formulate and solve mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the scheduling problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000979: Inventory Management | Inventory Management

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a written exam (90 minutes) consisting of 4 questions, the participants can choose 3 out of 4. Each question has several parts assessing the different competence levels. In a first theory part, the student has to reproduce knowledge about inventory management concepts. In a second part, different calculation methods need to be applied with given data and the results be analyzed and interpreted. In a third part, the students need to develop ideas and concepts beyond the reproduction of knowledge and application of methods. In order to facilitate calculations and for backup of some statistical formulas, a formula sheet and a pocket calculator can be used.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

The module requires basic knowledge in statistics (discrete and continuous probability distributions) and Excel and the course "Modelling, Optimization, and Simulation" due to extensive use of Mixed-Integer Programming and Simulation methods.

Content:

Standard inventory control models and approaches are presented for single- and multi-period dynamic inventory models, multi-echelon models, and multi-product coordinated replenishment problems. Further, different approaches to data driven inventory policies are presented that address the estimation and analysis of model parameters. Case studies and board games are used to motivate these concepts.

Specifically, the module covers the topics:

- Performance metrics;
- Lot sizing: EOQ, EPQ, Wagner Whitin;
- Forecasting: Time series, regression, data analysis, probability distributions;

- Newsvendor model;
- Single echelon inventory control: (R,S), (s,Q) policies and parameter optimization;
- Multi echelon inventory control: Concepts, lot sizing, safety stock optimization, METRIC;
- Multiproduct models: ELSP, CLSP, DLSP, CSLP, PLSP;
- Warehouse scheduling, joint replenishment problems;
- Multi location problems;
- Sport Obermeyer Case and MIT Beer Distribution Game;
- Special topics: Perishable items, multi supplier models, lost sales models

Intended Learning Outcomes:

The participants will learn about different concepts in Inventory management and receive the knowledge to apply decision support tools for an effective design and operation of inventory management systems. They will be able to memorize different inventory control rules, identify the right model in different industry environment and be able to reproduce parameter calculations. They will be able to illustrate the impact of cost and service parameters on timing and sizes of replenishment decisions and generalize these findings to more complex multi-echelon and multi-product systems. This fundamental knowledge will enable participants to evaluate, compare and optimize different control systems, revise parameter settings and critically reflect on optional choices. Upon completion of this module, the participants will be able to develop and implement models and methods for new and innovative inventory management problems, e.g. arising in same-day home delivery, car-sharing or reverse logistics applications.

Teaching and Learning Methods:

The module includes lectures where students obtain knowledge about inventory modeling and optimization techniques. In exercise sessions, the students solve problems with the obtained knowledge, perform optimizations and simulations, interpret the findings and present and discuss their results to the other participants in the classroom. Computer programs are provided to the students who adapt those to determine inventory control parameters and to simulate inventory system performance. Case study and business game sessions give the participants a first hand, interactive experimental experience into the dynamics of inventory systems and real world problems. Guest lectures given by industry professionals supplement the theory parts and give the participants the opportunity to recognize problems, discover interesting challenges for choosing their thesis work and discuss with practitioners.

Media:

Literature, Slides, Case studies, Business games, Exercises, Software

Reading List:

- Silver, E.A., Pyke, D.F., Peterson, R. (1998), Inventory Management and Production Planning and Scheduling, 3rd edition, Wiley.
- Axsäter, S. (2006), Inventory Control, 2nd. Ed., Springer.
- Zipkin, P. (2000), Foundations of Inventory Management, McGraw-Hill.

Responsible for Module:

Minner, Stefan; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001088: Advanced Modeling, Optimization, and Simulation in Operations Management | Advanced Modeling, Optimization, and Simulation in Operations Management [AMOS]

Version of module description: Gültig ab summerterm 2016

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The offered module is composed of the sections optimization and simulation. In both sections, basic knowledge and skills for designing and evaluating service and production processes are taught. The solution of analyzed problems is gained either through the application of optimization methods or through simulation. Due to the different problem-solving approaches (and the use of different software packages), both sections are thought separately. To facilitate the learning success, the learning outcomes are examined directly at the end of each section. At the end of the optimization section, there is a written exam on modeling linear optimization problems. In addition to theoretical knowledge, the students' skills in modeling with OPL and IBM ILOG CPLEX are tested. At the end of the simulation section, there is also a written exam, in which the learning outcomes in discrete-event simulation, using the software AnyLogic are tested. Both exams evaluate the individual performance of the acquired theoretical and practical skills, requiring own calculations and argumentative answers. Exams are worth 60 points each and noncumulative. To pass the course, students need to pass both exams individually. The final grade of the module is the truncated average of the exam grades. Both exams take 60 minutes each. In the exams, no aids are allowed. In addition, students can achieve a 0.3/0.4-grade bonus (according to APSO/FPSO midterm) in each section through the successful participation in the respective homework assignments.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Management Science, Basic course in Statistics, Basic Course in Mathematics, Production and Logistics

Content:

The acquired skills are used in the field of operations management to understand, redesign, control and optimize the production of goods and services. The students learn quantitative methods for the analysis of decision problems in operations management, and therefore, the basis for all subsequent lectures at the Department of Operations & Supply Chain Management. The presented methods can be subdivided into two distinct study sections: optimization and simulation.

Optimization section:

- Introduction to linear programming, CPLEX Studio IDE, and IBM ILOG OPL
- LP formulations, e.g. production planning problems
- Model building with OPL, e.g. generic modeling, model testing with instances, scripting for pre- and post-processing
- Interpreting and using the solution of a LP model
- Spreadsheet input/output with OPL

Simulation section:

- Introduction to simulation, AnyLogic
- System; event; model; steps in a simulation study
- Data collection, statistical analyse and input modeling
- Fundamental simulation concepts in AnyLogic
- Simulation of simple systems together with verification, calibration, and validation
- Statistical simulation data output analysis having regard to different scenarios

Intended Learning Outcomes:

At the end of the module, students will be able to create mixed integer linear programming formulations, and discrete event simulation models of simple problems in production and operations management.

Furthermore, students will be able to solve MILP formulations in OPL and IBM ILOG Script, and implement discrete event simulation models in AnyLogic. The students also learn, how to evaluate and compare the calculated problem solutions.

Teaching and Learning Methods:

The weekly sessions consist of a lecture with an integrated exercise class. During the lecture, the content is presented and discussed. The students are invited to improve the acquired knowledge by studying the suggested literature. In the exercise, the students apply the acquired knowledge by solving and implementing given problems. The homework assignments allow students to individually improve their skills, by answering theoretical questions and implementing problems, using the respective software. After each homework assignment, the students are free to discuss their solutions and open questions in a Q&A session.

Media:

PowerPoint, Exercise sheets, Whiteboard

Reading List:

Optimization

- Williams, H. P. (1999): Model Building in Mathematical Programming. 4th edition.

Supplementary reading materials about optimization and linear programming

- Domschke, W. and Drexl, A. (2005): Einführung in Operations Research. 6th edition, Springer.
- Domschke, W., Scholl, A. and Voss, S. (1997): Produktionsplanung. 2nd edition, Springer.
- Hillier, F. S. and Lieberman, G. J. (2004): Introduction to Operations Research. 8th edition, McGraw-Hill.
- Klein, R. and Scholl, A. (2004): Planung und Entscheidung. Vahlen.
- Winston, W. L. (2004): Operations Research. 5th edition, Thomson.

Simulation:

- Kelton, W. D., Sadowski, R. P. and Sturrock, D. T. (2010): Simulation with ARENA. 5th edition, Boston: McGraw-Hill.

Supplementary reading materials about simulation and statistics

- Banks J., Carson J. S., Nelson, B. L. and Nicol. D. M. (2009): Discrete-Event System Simulation. 5th edition, Upper-Saddle-River: Prentice Hall.
- Law, A.M. (2007): Simulation modeling and analysis. 4th edition, McGraw-Hill, New York
- Bley Müller, J., Gehlert, G., Gülicher, H. (2008): Statistik für Wirtschaftswissenschaftler. 15th edition, München: Verlag Vahlen.

Responsible for Module:

Kolisch, Rainer; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Simulation in Operations Management (WI001088) (Limited places) (Seminar, 2 SWS)
Jost C, Pahr A

Advanced Modeling and Optimization in Operations Management (WI001088) (Limited places)
(Seminar, 2 SWS)
Jost C, Pahr A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001135: Stochastic Optimization | Stochastische Optimierung

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on of a final exam (60%), written presentation of the results obtained for the homework (40%), and bonus points are awarded for participation in discussions in the lecture and the lab. With this voluntary mid-term assignment students can improve their module grade. The homework during the semester serves to assess the ability to apply stochastic optimization to real world problems. By this method, the students continually reflect about the theory presented in class and learn to translate theoretical knowledge into practical solutions. The in-depth knowledge of the theory of stochastic optimization and the critical reflection of its limitations are assessed in a final written exam focussing on the theoretical knowledge. Moreover, the students can prove their ability to relate these theoretical results to real world problems. The presentation and discussion of the homework in the lab sessions measure students' ability to structure and present their results, connect them with state-of-the-art methods and theories, and present them in a scientific way.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Knowledge of basic linear optimization and basic probability theory would be an advantage. The required theory is reviewed in the class.

Content:

In this module students learn about the theory and the methods of stochastic optimization. The theory is complemented by a range of real-world examples with a focus on applications in energy trading and finance. Along with the examples an introduction to software tools is given that enables students to solve stochastic optimization problems. The required mathematical tools will be introduced along the way.

The module contents span the theory of stochastic optimization (two-stage and multi-stage), numerical solution methods, the treatment of risk via risk measures in stochastic optimization, as well as sampling based approaches.

In particular, topics of the course include but are not limited to

- What is stochastic optimization
- Two-stage linear stochastic optimization with recourse
- Computational methods
- Monte-Carlo methods
- Multi-stage models
- Risk measures in stochastic optimization

Intended Learning Outcomes:

After the successful completion of this module, students are able (1) to understand the basic theory of stochastic optimization, (2) to critically reflect the limitations of the theory, (3) to implement solution approaches for stochastic optimization using MATLAB in combination with numerical solvers, (4) to model real-world problems under uncertainty as stochastic optimization problems that can be treated with the methods introduced in the course, (5) to communicate the results to a scientific audience.

Teaching and Learning Methods:

The module combines several learning methods.

To facilitate a better understanding of the subject the course is divided into lectures and a lab (exercise). In the lectures theory is presented which is subsequently applied by students in homework assignments using MATLAB. The solutions are handed in and students can volunteer to present their solutions in the lab. In private reading, students complement the knowledge from the lecture with additional methods relevant for solving the cases. Students reflect on the theory and their applicability in class and during class discussion. By working on real world stochastic optimization problems, handling actual data, and designing numerical solution approaches as well as engaging in discussions of their homework solutions, participants get in-depth knowledge about the basics of stochastic optimization.

Media:

Lecture notes, presentations, scientific literature

Reading List:

Birge, J. and Louveaux, F. Introduction to Stochastic Programming. Springer Series in Operations Research and Financial Engineering, 2011 (second edition).

Shapiro, A. and Dentcheva, D. and Ruszczyński, A. Lectures on Stochastic Programming: Modeling and Theory. MOS-SIAM Series on Optimization. 2014 (second edition).

Responsible for Module:

Wozabal, David; Prof. Dr. rer. soc.

Courses (Type of course, Weekly hours per semester), Instructor:

Stochastic Optimization, Lecture, 2 SWS

Stochastic Optimization, Exercise, 2 SWS

Prof. Dr. David Wozabal

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Finance and Accounting | Management-Schwerpunkt: Finance and Accounting

AdvSem-FA: Advanced Seminar Finance & Accounting | Advanced Seminar Finance & Accounting

Module Description

MGT001358: Advanced Seminar Finance & Accounting: Data Science in Finance | Advanced Seminar Finance & Accounting: Data Science in Finance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written report of the final project accounts for 70% of the final grade, and the presentation of the project accounts for 30% of the final grade. The students are required to generate a project idea after consultation with the course instructor and develop it over a period of six to eight weeks. Students are to demonstrate their command of the methodologies covered in the first part of the course.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in application of data science techniques in a finance setting; basic knowledge of python is recommended but not required.

Content:

The main blocks are: 1. Basic semantics of Python 3. 2. Data processing packages and techniques. 3. Data visualisation tools. 4. An Introduction to machine learning. 5. Alternative data sources in finance (NLP based textual analysis, etc.)

Intended Learning Outcomes:

After completion of the course, students should have generated a generic workflow, how upon being confronted with a finance- related topic, to develop a hypothesis, find proper data sources, process the raw data, run statistical instruments on the dataset, and draw conclusions from the outcome. They should also learn how to communicate their ideas and results in an academic manner.

Teaching and Learning Methods:

For the first stage of the course, there will be 6-8 sessions of lectures. The final presentations will be held in a seminar style over one or two days depending on the number of participants.

Media:

Exemplary codes, websites, etc.

Reading List:

Python for Finance - Analyze Big Financial Data by Yves Hilpisch.

Responsible for Module:

Braun, Reiner; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (MGT001358): Data Science in Finance (Limited places)
(Seminar, 4 SWS)

Braun R, Dong Y

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB23005: Advanced Seminar Finance & Accounting: Behavioral and Experimental Economics | Advanced Seminar Finance & Accounting: Behavioral and Experimental Economics

Behavioral & Experimental Economics

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grading is based on a research paper (70%) including a presentation (30%). The research paper (11-13 pages) is a written draft of a topic. The research paper will be written in teams, whereas single parts have to be assigned to single team members. By writing the research paper in teams, students demonstrate their ability within a team to manage resources, and deadlines through timely submission of the enumerated tasks. Students demonstrate that they are able to complete the tasks of their project in a team environment.

The research paper reveals the student's acquired abilities in identifying a reasonable and relevant research question in behavioral economics. Moreover, the research paper reveals the student's ability to develop research designs and analytical methods to examine the identified research question. Students show that they are able to interpret and to communicate the results.

Furthermore students are asked to present (20 minutes + 10 minutes discussion) their research paper in front of the class. By presenting their findings in front of the class, students proof that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Working knowledge of the mandatory basic business courses

Content:

The module offers participants an overview of current issues in behavioral economics and gives them the opportunity to examine one topic in more detail. The module may serve as starting

point for further research, but also prepares participants for issues they are likely to face in their professional lives. Emphasis is put on aspects of experimental economics, social preferences, nudging, herding, and further phenomena of behavioral economics.

Intended Learning Outcomes:

After completing this module, students have an advanced knowledge of the module's core topic. They are able to identify theoretical and practical research questions and to develop research designs and analytical methods to examine the identified research question. In this context, they will compile a literature research and structure their work. Moreover, they are able to interpret and communicate the identified outcomes in an academically suitable way. Besides, the participants will be enabled to objectively analyze other seminar papers. They recognize potential conflicts in working together as a team and they reflect upon these considering varying conditions. They are able to integrate involved persons into the various tasks considering the group situation. Students are able to prepare a certain topic within a given time frame and to present it in clear and comprehensible manner to an audience. They can react and respond to questions and suggestions relating to their subject area brought up by the audience during a discussion.

Teaching and Learning Methods:

This module is a seminar. Students will read, discuss and work with academic research papers. In the course of the module students will write a research paper and present their findings in class. In interactive discussions students react to questions and comments of their classmates. In this interactive seminar atmosphere students get a detailed insight to topics of behavioral economics.

Media:

Books, case descriptions, academic papers, presentation slides

Reading List:

Gneezy, U., & Rustichini, A. (2000). Pay enough or don't pay at all. *The Quarterly Journal of Economics*, 115(3), 791-810.

Frey, B. S., & Oberholzer-Gee, F. (1997). The cost of price incentives: An empirical analysis of motivation crowding-out. *The American economic review*, 87(4), 746-755.

Gneezy, U., & Rustichini, A. (2000). A fine is a price. *The Journal of Legal Studies*, 29(1), 1-17.

Ariely, D., Bracha, A., & Meier, S. (2009). Doing good or doing well? Image motivation and monetary incentives in behaving prosocially. *American Economic Review*, 99(1), 544-55.

Falk, A., & Fischbacher, U. (2006). A theory of reciprocity. *Games and economic behavior*, 54(2), 293-315.

Camerer, C., Babcock, L., Loewenstein, G., & Thaler, R. (1997). Labor supply of New York City cabdrivers: One day at a time. *The Quarterly Journal of Economics*, 112(2), 407-441.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (WIB23005): Behavioral und Experimental Economics
(Limited places) (Seminar, 4 SWS)

Sittenthaler H, Mückenhausen V

For further information in this module, please click campus.tum.de or [here](#).

Fa-WahlKat: Elective Modules Finance and Accounting | Wahlfächer Finance and Accounting

WahlKat-FA: Catalogue of Elective Modules: Finance and Accounting | Wahlkatalog: Finance & Accounting

Module Description

MGT001352: Applied Sustainability Reporting | Angewandte Nachhaltigkeitsberichterstattung

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung besteht aus einer Übungsleistung. Diese besteht aus drei Bestandteilen: (1) einem 60minütigen schriftlichen Test (50%), (2) einer Präsentation der empirischen Analyse (25%) sowie einem dazugehörigen Executive Summary (25%). Im schriftlichen Test zeigen die Studierenden ihre Kenntnisse zu Sustainability Reporting sowie dem regulatorischen Umfeld auf sowie, dass sie in der Lage sind Sustainability Reporting Standards sowie deren Anwendung zu analysieren und konzeptionell-normativ zu beurteilen. Im Rahmen der empirischen Analyse demonstrieren die Studierenden ihre Fähigkeiten zur empirische Analyse von Sustainability Reports anhand ausgewählter Unternehmen. Die Studierenden werden ihre Ergebnisse im Rahmen einer 15minütigen Präsentation mit anschließender Diskussion vorstellen sowie ein schriftliches Executive Summary zu ihren Forschungsergebnissen erstellen.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

keine

Content:

Das Seminar führt in die aktuellen Entwicklungen der Nachhaltigkeitsberichterstattung ein und behandelt insbesondere folgende Themengebiete:

- aktuelle Sustainability Challenges sowie deren Effekte
- Regulatorische Rahmenbedingungen (z.B. European Green Deal)
- aktuelle Forschungsergebnisse zur Nachhaltigkeitsberichterstattung
- aktuelle Entwicklungen im Bereich der Sustainability Reporting Standards und Frameworks
- Nachhaltigkeitsberichterstattung nach den weltweit verbreiteten Standards der Global Reporting Initiative (GRI), den Standards/Entwürfen des International Sustainability Standards Board (ISSB) sowie den Standards/Entwürfen der Europäischen Union
- Empirische Analyse der Nachhaltigkeitsberichterstattung ausgewählter Unternehmen

Intended Learning Outcomes:

Nach dem Besuch der Lehrveranstaltung sind die Studierenden in der Lage

- die wichtigsten sozialen und ökologischen Sustainability Challenges sowie deren Effekte auf globaler, nationaler und regionaler Ebene zu beschreiben und einzuordnen
- aktuelle Entwicklungen im Bereich Sustainability Reporting zu erläutern sowie diese in das übergeordnete regulatorische Umfeld einzuordnen
- die Effekte von Sustainability Reporting auf Basis aktueller Forschungsergebnisse zu beurteilen
- verschiedene Standards und Frameworks zu Sustainability Reporting zu beschreiben und wesentliche Unterschiede aufzuzeigen
- Sustainability Reporting Standards konzeptionell-normativ zu analysieren und zu beurteilen
- Nachhaltigkeitsberichte empirisch zu analysieren und kritisch zu vergleichen
- die Anwendung von Sustainability Reporting Standards zu analysieren und zu beurteilen

Teaching and Learning Methods:

Der Kurs beinhaltet ein interaktives Seminar zu Sustainability Reporting bei dem das gemeinsame Erarbeiten von Kenntnissen und Fähigkeiten sowie die gemeinsame Diskussion und Erörterung im Vordergrund stehen. Hierbei werden die Studierenden in Einzel- und Gruppenarbeiten sowie gemeinsam im Plenum die zentralen Konzepte und Fähigkeiten zur konzeptionell-normativen Analyse von Sustainability Reporting Standards erarbeiten und anwenden. Im Rahmen der empirischen Analyse werden die Studierenden unter Anleitung die Nachhaltigkeitsberichterstattung ausgewählter Unternehmen empirisch analysieren und anschließend präsentieren, wobei eine aktive Diskussion der Ergebnisse mit allen Teilnehmenden erfolgt.

Media:

Moodle; Folien; Flipchart; Berichterstattungsnormen; Übungen; Fallstudien.

Reading List:

- European Financial Reporting Advisory Group. 2022. Sustainability Reporting Standards. Online available at: <https://www.efrag.org/lab3#subtitle1>
- International Sustainability Standards Boards. 2022. Sustainability related disclosures. Online available at: <https://www.ifrs.org/projects/work-plan/#sustainability>
- Global Reporting Initiative. 2021. The global standards for sustainability Reporting. Online available at: <https://www.globalreporting.org/standards>

Responsible for Module:

Ernstberger, Jürgen; Prof. Dr. rer. pol. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Applied Sustainability Reporting (MGT001352) (Seminar, 2 SWS)

Keiling M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001356: Managing Challenges in the BioTech Industry | Managing Challenges in the BioTech Industry

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written exam (60 minutes) with open questions. The exam serves to assess whether students (1) understand causes and the relevance of problems faced by firms in practice, (2) are able to compare and evaluate different approaches for solving these problems, and (3) can apply basic concepts and theories to solve these problems. There are no aids permitted in the exam.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Specialization/ Major in Finance & Accounting

Content:

The chair for Management Accounting offers different courses for "Advanced Topics in Finance & Accounting" which are mainly offered in cooperation with companies or guest lecturers with a long standing experience in management positions. The courses cover problems and questions which are highly relevant in practice. Topics of each individual course will be announced at the beginning of the semester and can change from semester to semester. This cover will broadly cover challenges for successful management, particularly with regard to R&D budgets, effective boards, and corporate social responsibility. In addition, it will highlight the special features of automation and innovation in a BioTech company.

Intended Learning Outcomes:

At the end of the module, students will have thorough knowledge of the topics covered by the chosen seminar. Students understand daily challenges of firms, the relevance as well as causes of problems faced by firms in practice. They are able to apply basic concepts and theories in practice.

to solve these problems and to compare and evaluate different approaches for solving these problems. These concepts and theories consider processes and analyses of the firm as well as increases in firm value.

Teaching and Learning Methods:

Experienced lectures discuss practical topics and challenges. They provide basic theories that help to overcome these challenges. Presentations based on PowerPoint and further lecture notes help for the understanding.

Media:

Presentations, lecture notes, discussions

Reading List:

Will be announced in the first lecture

Responsible for Module:

Friedl, Gunther; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Managing Challenges in the BioTech Industry (MGT001356) (limited places) (Seminar, 2 SWS)

Pötting S, Schoonjans E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001358: Advanced Seminar Finance & Accounting: Data Science in Finance | Advanced Seminar Finance & Accounting: Data Science in Finance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written report of the final project accounts for 70% of the final grade, and the presentation of the project accounts for 30% of the final grade. The students are required to generate a project idea after consultation with the course instructor and develop it over a period of six to eight weeks. Students are to demonstrate their command of the methodologies covered in the first part of the course.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in application of data science techniques in a finance setting; basic knowledge of python is recommended but not required.

Content:

The main blocks are: 1. Basic semantics of Python 3. 2. Data processing packages and techniques. 3. Data visualisation tools. 4. An Introduction to machine learning. 5. Alternative data sources in finance (NLP based textual analysis, etc.)

Intended Learning Outcomes:

After completion of the course, students should have generated a generic workflow, how upon being confronted with a finance- related topic, to develop a hypothesis, find proper data sources, process the raw data, run statistical instruments on the dataset, and draw conclusions from the outcome. They should also learn how to communicate their ideas and results in an academic manner.

Teaching and Learning Methods:

For the first stage of the course, there will be 6-8 sessions of lectures. The final presentations will be held in a seminar style over one or two days depending on the number of participants.

Media:

Exemplary codes, websites, etc.

Reading List:

Python for Finance - Analyze Big Financial Data by Yves Hilpisch.

Responsible for Module:

Braun, Reiner; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (MGT001358): Data Science in Finance (Limited places)
(Seminar, 4 SWS)

Braun R, Dong Y

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001087: Banking Law and Credit Collaterals | Bank- und Kreditsicherungsrecht

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In the final assessment students will need to demonstrate to what extent they have met the Learning Outcomes. The assessment will be held as a written exam of 60 minutes. In the first part of this exam (50% of the overall mark), students will be asked theoretical questions on issues of banking and finance law, such as the relevant contract law between banks, customers and advisers, types of debt finance, loans (including consumer protection) and credit collaterals (including potential liability risks). In the second part (about 50 per cent of the overall mark) they apply this knowledge to unknown fictional cases. Students will identify issues of finance law that might arise in typical business situations, analyse the relevant law and develop recommendations based upon this analysis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Students should have a general understanding of the law of contract and the law of chattels, for example evidenced by the module "Wirtschaftsprivatrecht 1" or similar.

Content:

Basics of banking law (contract law, payment systems, terms and conditions, banking supervision); financial advisers; loan agreements and alternative forms of funding; credit collaterals.

Intended Learning Outcomes:

After this module, students will be able to understand the contractual relationships between banks, customers and financial advisers. In particular, they will be able to identify contractual obligations and liability risks; analyse and evaluate loan agreements and other financing tools in relation to

other forms of entrepreneurial finance; to identify and assess company assets as potential credit collaterals; to present the results of their studies in a written memorandum.

Teaching and Learning Methods:

The module will cover the theoretical aspects of the subject in a discussion with the lecturer. It will also include case studies. These will allow students to work individually or in a group on case scenarios (known and unknown). This practical application of the delivered contents facilitates the students' abilities to structure their answers appropriately and to present their findings in writing.

Media:

PPT-slides, reader and cases will be made available on Moodle.

Reading List:

Will be referred to in the course materials

Responsible for Module:

Maume, Philipp; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Economics and Econometrics | Management-Schwerpunkt: Economics and Econometrics

AdvSem-EE: Advanced Seminar Economics & Econometrics | Advanced Seminar Economics & Econometrics

Module Description

MGT001344: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;

- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

- Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In *Journal of Economic Literature*, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In *Global Environmental Politics* 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.
- Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.
- Glavee-Geo, Richard; Engelseth, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics : JBE*, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.
- Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.
- Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.
- Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.
- Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.
- Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.
- Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.
- Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.
- Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001353: Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking | Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Seminarteilnehmer:innen bearbeiten in Teams aus je zwei Studiernedne selbständig ein Thema zur Ökonomie der Zentralbanken. Die Prüfungsleistung besteht aus zwei Teilen:

- 1) Präsentation des vom jeweiligen Teilnehmer ausgewählten Themas inkl. anschließender Diskussion.
- 2) Seminararbeit zum behandelten Thema (max. 12 Seiten)

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Principles of Micro- and Macroeconomics

Content:

This module provides students with an in-depth insight into the various tasks and objectives of national and supranational central banks. The focus is in particular on the Deutsche Bundesbank and its business areas and tasks. The seminar is divided into three thematic blocks: (1) Monetary Policy (2) Financial Stability and (3) Money & Non-Cash Payments.

Intended Learning Outcomes:

After participation in the module event, the students are able to understand both the theoretical and the applied view of the role of central banks in the general economy and are able to discuss them before the background of current topics. Students can therefore (1) identify and (2) conceptualize various important issues related to central banking. Students will be able to (3) identify gaps in understanding of the focus topic and (4) develop suggestions to improve understanding of the field.

In addition, they will be able to improve their presentation skills by presenting their topic to their fellow students (5) and their scientific writing skills by writing the seminar research paper (6). By working in groups, (6) students will also improve on their teamwork skills.

The aim of the seminar is also to build a bridge to the research project "Effects of the EBA stress tests on the assignment of credit ratings to European banks", which is currently being carried out in cooperation with the Deutsche Bundesbank. The seminar will help to transfer the theoretical and empirical research findings to teaching and will possibly serve as a basis for possible future final theses or research work.

Teaching and Learning Methods:

The seminar consists of several lecture dates (on selected practical topics by employees from the Deutsche Bundesbank). These serve as the basis for the subsequent analysis, presentation and creation of a seminar paper by the seminar participants (in teams of two/group work) on a self-selected topic on the economics of central banks. The examination consists of the seminar presentation and the seminar paper.

Media:

Slides, presentation, literature

Reading List:

Mayes, Siklos, Jan-Egbert Sturm (2019). The Oxford Handbook of the Economics of Central Banking. Oxford University Press

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (MGT001353): The Economics of Central Banking (Limited places) (Seminar, 4 SWS)

Hottenrott H, Gschnaidtner C, Römer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIV05001: Advanced Seminar Economics, Policy & Econometrics: Economics of Innovation | Advanced Seminar Economics, Policy & Econometrics: Economics of Innovation [ASEoI] *Economics of Innovation*

Version of module description: Gültig ab winterterm 2016/17

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students will work in small groups on one of five topics: Creation of knowledge, diffusion of knowledge, industry and macroeconomic aspects, intellectual property rights, innovation policy. The group work aims at 1) understanding the topic in depth and 2) presenting the most important insights from their topic to classmates. Moreover, the students will derive research gaps in the literature related to their topic and summarize both main insights and research gaps in a presentation (20-30 min. per person) to the class. By presenting in a team, students demonstrate their ability within a team to manage resources, and deadlines through timely submission of the enumerated tasks. Finally, they will submit an extended version of the presentation topic as a written research paper (8.000 to 10.000 words). By writing the research paper, students show their ability to work independently on solving complex scholarly problems related to the Economics of Innovation.

The final grade will be based on the written research paper with a weight of 80% and the presentation with a weight of 20%

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Familiarity with microeconomics

Content:

This module will provide students in-depth insights into the field of the Economics of Innovation. The module will discuss some of the prevailing models in the field of Industrial Organization dedicated to the analysis of the incentives and constraints to innovative activities (R&D activities)

as well their relation with imitation, spillovers, firm size and market structure. The module also comprises a dynamic and knowledge-based view, introducing models involving the direct generation of new knowledge, the catching-up/falling behind dynamics of competition and the role played by market selection between innovative firms. The objective of is also to apply the acquired knowledge to selected topics in the field of innovation research. The students will be asked to write a research paper and to present their work in class.

Intended Learning Outcomes:

This module introduces the students to the main issues in the economics of innovation and advances their understanding of the core concepts and principles in the field. The ultimate objective to enhance both theoretical as well as an applied view on the topic enabling students to understand academic as well as public debate on questions related to the economics behind innovation and technological progress. Upon successful completion of this module, students will be therefore able (1) to identify and (2) conceptualize different important issues related to the Economics of Innovation. They (3) are able to identify gaps in the understanding of the focal topic and (4) developed suggestions for improving the understanding of the field. In addition, by presenting their topic to the class, they will (5) enhance their presentation skills and by writing the research paper (6) their scientific writing skills. Through working in groups, the (6) students will work on their teamwork skills.

Teaching and Learning Methods:

The module is a seminar, in which the students will gain in-depth insights in the Economics of Innovation. The seminar will start with an introductory lecture, which will provide the bases for deeper study of the most relevant topics. The first phase will then concentrate on problem-based learning by reading relevant scientific literature and by discussing these articles in the group. In the second phase, students will individually elaborate a written paper as well as presentations in which they need to show their understanding of their focal topic as well as show their capability to identify research gaps in the discussed literature.

Media:

Reading List:

in general:

- Fagerberg, J., Mowery, D. and Nelson, R. R. (2010), Oxford Handbook of Innovation, Oxford: Oxford University Press

- Hall, B. H. and Rosenberg, N. (2010), Handbook of the Economics of Innovation, Oxford: Elsevier,

specific topics:

- Czarnitzki, D., Hottenrott, H. and Thorwarth, S. (2011) 'Industrial research versus development investment - the implications of financial constraints', Cambridge Journal of Economics, 35, 527-544.

- Jaffe, A., Trajtenberg, M. and Henderson, R. (1993), 'Geographic Localization of

Knowledge Spillovers as Evidenced by Patent Citations', Quarterly Journal of Economics, 108, 577-598.

- Aghion, P., Dechezleprêtre, A., Hemous, D., Martin, R. and Van Reenen, J. (2016), 'Carbon Taxes, Path Dependency and Directed Technical Change: Evidence from the Auto Industry', Journal of Political Economy, 124 (1).

- Gallini, N. und Scotchmer, S. (2002), 'Intellectual Property: When Is It the Best Incentive System?', in: Jaffe et al. (Eds.), Innovation Policy and the Economy, MIT Press, 51-77.

- Lundval & Borrás (2005), 'Science, technology, and innovation policy', in: Fagerberg, J., Mowery, D. and Nelson, R. R. (eds.), Oxford Handbook of Innovation, Oxford: Oxford University Press, 599-631.

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (WIV05001): Economics of Innovation (Limited places) (Seminar, 4 SWS)

Hottenrott H, Widmann R

For further information in this module, please click campus.tum.de or [here](#).

Elective Modules Economics & Econometrics | Wahlfächer Economics & Econometrics

WahlKat-EE: Catalogue of Elective Modules: Economics & Econometrics | Wahlkatalog: Economics & Econometrics

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of exiting process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given research questions, which process measures can be collected with the methods, and how to interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:**Reading List:**

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelsen, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001353: Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking | Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Seminarteilnehmer:innen bearbeiten in Teams aus je zwei Studierenden selbständig ein Thema zur Ökonomie der Zentralbanken. Die Prüfungsleistung besteht aus zwei Teilen:

- 1) Präsentation des vom jeweiligen Teilnehmer ausgewählten Themas inkl. anschließender Diskussion.
- 2) Seminararbeit zum behandelten Thema (max. 12 Seiten)

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Principles of Micro- and Macroeconomics

Content:

This module provides students with an in-depth insight into the various tasks and objectives of national and supranational central banks. The focus is in particular on the Deutsche Bundesbank and its business areas and tasks. The seminar is divided into three thematic blocks: (1) Monetary Policy (2) Financial Stability and (3) Money & Non-Cash Payments.

Intended Learning Outcomes:

After participation in the module event, the students are able to understand both the theoretical and the applied view of the role of central banks in the general economy and are able to discuss them before the background of current topics. Students can therefore (1) identify and (2) conceptualize various important issues related to central banking. Students will be able to (3) identify gaps in understanding of the focus topic and (4) develop suggestions to improve understanding of the field.

In addition, they will be able to improve their presentation skills by presenting their topic to their fellow students (5) and their scientific writing skills by writing the seminar research paper (6). By working in groups, (6) students will also improve on their teamwork skills.

The aim of the seminar is also to build a bridge to the research project "Effects of the EBA stress tests on the assignment of credit ratings to European banks", which is currently being carried out in cooperation with the Deutsche Bundesbank. The seminar will help to transfer the theoretical and empirical research findings to teaching and will possibly serve as a basis for possible future final theses or research work.

Teaching and Learning Methods:

The seminar consists of several lecture dates (on selected practical topics by employees from the Deutsche Bundesbank). These serve as the basis for the subsequent analysis, presentation and creation of a seminar paper by the seminar participants (in teams of two/group work) on a self-selected topic on the economics of central banks. The examination consists of the seminar presentation and the seminar paper.

Media:

Slides, presentation, literature

Reading List:

Mayes, Siklos, Jan-Egbert Sturm (2019). The Oxford Handbook of the Economics of Central Banking. Oxford University Press

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (MGT001353): The Economics of Central Banking (Limited places) (Seminar, 4 SWS)

Hottenrott H, Gschnaidtner C, Römer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

POL62200: Energy Transformation | Energy Transformation

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

For this module, evaluations will be based on written work and a presentation. The written assignment for the module will be of a length of approximately 20-25 pages. The topic of the module paper is to be developed in consultation with the seminar leaders and will deal with a specific topic of the seminar (energy transformation) and its technological, political, and social dimensions. The paper will be introduced with a precise question and then analyzed in depth. The methodology of research needs to be indicated and a comprehensive bibliography included. Students will be expected to prepare and give a presentation of at least 20 minutes tied to a session topic. Group presentations of up to three students are possible as long as individual contributions are discernible.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Ring lecture „Politics & Technology“

Content:

For a variety of reasons, including energy security, environment and climate concerns, and the potential to develop new technologies and processes, cities, countries and entire regions are pursuing low-carbon energy transitions. Understandings of what the best approach to a low carbon energy transition is, however, vary widely. The extent to which energy transitions are occurring in various sectors (power, heating/cooling, transportation) differs significantly. Why is this the case? What factors support or inhibit the scaling-up of policy solutions? What are the challenges associated with large scale energy system transformations? How similar or different are energy system transformations to other major transformations which have occurred in the past or which may need to occur in the future? This module will consider these and other questions in the context of Germany, at the European level and internationally.

Intended Learning Outcomes:

After participating in this module, students will understand the arguments underpinning decisions to pursue low carbon energy transitions, how low carbon energy transitions are affected by broader economic, technological, and political factors, and the ways in which actors at the local, national, or international level may act to promote or inhibit change. They will have gained insights into system transformation thinking, understand aspects of the production, distribution and utilization of energy and their interplay; apply methods of comparative policy analysis to energy policy in different political systems; be able to identify challenges of policy-making in national politics and the European multi-level system; to critically analyze energy policy in Germany, Europe, and internationally (for example in China, Japan, India, the United States as well as at the global level); to analyze the factors determining German, European, and international energy politics, and to evaluate the effects of different energy policy governance instruments (like legal regulation, planning, incentive design, taxes, subsidies, etc.).

Teaching and Learning Methods:

The module is offered in the form of two seminars, each dealing with different, but complementary thematic areas. One will be focused more on the transition of the energy systems in Germany and Europe while the other will concentrate more on the international and global level. To obtain a deeper understanding of the module's topics a combination of independent work and general discussion will be used in the seminar. Seminars will include both direct input from the instructor and a wide variety of active learning methods. During the seminars, there will be in-depth discussions and inputs by students. Concrete examples will be used to practice, analyze, and evaluate the material which has been presented. Both the technical and scientific aspects of issues as well as their political and social implications will be discussed. The presentations developed and given by the students and ensuing discussions will contribute to the students' understanding of the seminar materials and instructor's inputs.

Media:

Online-Reader, PowerPoint

Reading List:

Moe, Espin. 2015. Renewable Energy Transformation or Fossil Fuel Backlash: Vested Interests in the Political Economy. Palgrave MacMillan.

Araújo, K., ed. 2022. Routledge Handbook of Energy Transitions. Routledge.

A reader of seminar texts with up-to-date and cutting edge scientific literature will be made available at the start of the semester.

Responsible for Module:

Schreurs, Miranda; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

(POL62200) Energy Transformation (Seminar 1 + 2) (Seminar, 4 SWS)

Cetkovic S (Mohammed N)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000258: Empirical Research in Economics and Management | Empirical Research in Economics and Management

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final written exam (120 minutes) is a means to assess students' understanding of the basic and advanced theories of empirical research in economics and management research. Students have to show that they understand different research designs. They have to prove that they are familiar with the basic concepts of different empirical methods, therefore they have to analyze data as well as to interpret the results of these different methods.

The exam is 100% based on multiple choice questions.

Students may use a non-programmable calculator and a non-electronic dictionary for the exam.

Students have the possibility to improve their final grade by taking a voluntarily midterm assignment. The final grade can be improved by 0,3. The midterm assignment consists of handing in two practice sheets. The completion of the practice sheets is not mandatory, but highly recommended. The exercise sheets are a means to assess students' understanding learning progress of the basic theories of empirical research for the further course of the module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

This module prepares students for qualitative and quantitative research (e.g. for their Master's Thesis) by introducing them to basic and advanced topics of empirical research.

Amongst others, the topics are:

- Experiment design
- Correlation analysis
- Linear and multiple regression models

- Qualitative methods
- Factor- and cluster analysis
- Conjoint analysis

The acquired skills are important for students' Master's Thesis but are equally important to understand and analyze data and statistics in their future career and everyday life.

Intended Learning Outcomes:

After the successful participation in the module Empirical Research in Economics and Management, students will be able to understand the most important methods of empirical research, covering basic as well as advanced aspects of research design, data collection, data analysis, and interpretation. Students will learn how to understand and analyze academic empirical research and be in a position to critically question in-press reports which refer to empirical studies. Students will learn to apply basic methods of empirical research. Students will learn the basics of how to plan, set up, and conduct an empirical research project themselves (e.g., for their seminar paper or their final thesis). Finally, students will learn to interpret empirical research results.

Teaching and Learning Methods:

The module consists of lectures and integrated exercises (both will be recorded on Lecturio - but active participation is recommended).

The lectures serve to build a thorough theoretical understanding of the related scientific concepts and methods.

In the exercises students learn to apply the methods, they have learned in the lectures, in concrete analyses and interpretations. In addition to the examples of the integrated exercises, two practice sheets are provided on which the student can practice individually. The practice sheets include various topics, such as regression analysis, factor analysis, cluster analysis, and conjoint analysis, which are relevant for the exam. Both practice sheets will be discussed in detail during the tutorial sessions.

Media:

Lecture slides are available via Moodle.

Reading List:

- Eisenhardt, K (1989). Building Theory from Case Study Research. The Academy of Management Review, 14(4), 532-550.
- Singleton Jr, R., Straits, B. C., Straits, M. M., & McAllister, R. J. (2010). Approaches to social research. Oxford University Press.
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 10: Regression with Panel Data,
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 14: Introduction to Time Series Regression and Forecasting.

Responsible for Module:

Hirsch, Stefan; Prof. Dr. agr.

Courses (Type of course, Weekly hours per semester), Instructor:

Empirical Research in Economics and Management - Exercise (WIHN0258) (MiM Campus Heilbronn) (Übung, 2 SWS)

Förderer J

Empirical Research in Economics and Management - Lecture (WIHN0258) (MiM Campus Heilbronn) (Vorlesung, 2 SWS)

Förderer J, Kircher T

Empirical Research in Management and Economics (WI000258) (Vorlesung, 2 SWS)

Pachur T, Erben A

Empirical Research in Management and Economics (WI000258) - Exercise (Übung, 2 SWS)

Pachur T, Zilker V, Hof L, Erben A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001145: Energy Economics | Energy Economics

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module entails a final written exam (120 minutes). The exam is a closed-book exam. By answering the questions students show their ability to differentiate and evaluate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Moreover students show their ability to discuss and apply theoretical and empirical methods to selected topics in energy markets. They show that they are able to analyze and assess recent energy market developments, such as for instance the energy transition, using the theoretical and empirical tools they have acquired.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses at TUM or elsewhere in microeconomics and introductory statistics or econometrics

Content:

This module covers the following topics:

- Economics of energy markets
- Analysis of producer strategies
- Analysis of consumer behavior
- Fundamentals of primary energy markets
- Fundamentals of electricity markets
- Analysis of network industries
- Network regulation
- Microeconomics
- Game theory
- Econometrics
- Energy policy

Intended Learning Outcomes:

Students are able to explain and to differentiate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Furthermore, they are able to summarize and compare different strategies and behavior of producers and consumers, as well as on different forms of regulation of network industries. Students are also able to discuss and apply theoretical and empirical methods to selected topics in energy markets. With these tools student will thus be able to analyze and assess recent energy market developments, such as for instance the energy transition.

Teaching and Learning Methods:

The module is a lecture consisting of PowerPoint presentations so as to offer and explain to students all different topics covered in this module. A guest lecture is planned in which practitioners present on selected topics in energy markets. The exercise course comprises different problem sets that discuss problems covered during the lecture. Problem sets are solved individually or in group work and, supported by a presentation, derived and solved jointly with the tutor.

Media:

PowerPoint, exercise sheets, whiteboard, reader

Reading List:

Viscusi, W. et al. (2005): Economics of Regulation and Antitrust, MIT Press. Stoft, S. (2002): Power System Economics, Wiley. Selected journal articles.

Responsible for Module:

Schwenen, Sebastian; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energy Economics - Exercise (WI001145) (Übung, 2 SWS)

Schwenen S, Kiszka A

Energy Economics (WI001145) (Vorlesung, 2 SWS)

Schwenen S, Kiszka A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more seriously. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Energy Markets | Management-Schwerpunkt: Energy Markets

AdvSem-EM: Advanced Seminar Modules Energy Markets | Advanced Seminar Energy Markets

Module Description

MGT001365: Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective | Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on the presentation, which counts with 30%, and the report, assigned 70%.

Case study report: The final study team-report, written in English, should consist of max. 15 pages (excl. references and the title page). Students' work may be theoretical/analytical, empirical, or a literature survey but should include own thoughts and suggestions on the proposed solution. Giving a short (intro)overview regarding the relevant (and topical) literature is always required.

Final presentation: 30 minutes per presentation, 15-20 for a talk and 10 minutes for class-wide discussion.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Students learn the problematics and frameworks for the energy transition analysis, considering challenges and solutions for individual firms across various industries, e.g. steel, power, O&G.

Intended Learning Outcomes:

The aim of this seminar is to

1. Introduce and provide the understanding of: the decarbonisation; its associated challenges and problems (technical, economic, financial) faced by companies; and investment and market opportunities emerging in Germany and internationally;
2. Explain the scope 1, 2, 3 emissions, emission calculation, standards, and introduce possible decarbonization frameworks through examples;
3. Equip the students with the analytical tools and facts critical in making energy transition decisions and allow them to test their learned skills on the real-world problems.

Teaching and Learning Methods:

Project examples, Intro on analytical tools and important facts, Interactive workshop discussing case studies, Hand-on session about decarbonization modeling approaches, analysis frameworks, solution discussion, In-progress consultation

Media:**Reading List:**

- Dejuán, Ó., Lenzen, M., & Cadarso, M. Á. (Eds.). (2017). Environmental and economic impacts of decarbonization: Input-output studies on the consequences of the 2015 Paris Agreements. Routledge.
- Johnston, R. J., Blakemore, R., & Bell, R. (2020). The role of oil and gas companies in the energy transition. Atlantic Council.
- Lenox, M., & Duff, R. (2021). The Decarbonization Imperative: Transforming the Global Economy by 2050. Stanford University Press.
- Peszko, G., Van Der Mensbrugghe, D., Golub, A., Ward, J., Marijs, C., Schopp, A., ... & Midgley, A. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. World Bank Publications.
- Harvey, H., Orvis, R., & Rissman, J. (2018). Designing climate solutions: a policy guide for low-carbon energy. Island Press.
- Ghosh, N., & Gupta, D. (2022). Decarbonization strategy of businesses, stock return performance and investment styles: a systematic review. Benchmarking: An International Journal.
- Jenkins, J. D., Luke, M., & Thernstrom, S. (2018). Getting to zero carbon emissions in the electric power sector. Joule, 2(12), 2498-2510.
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2021). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. Review of International Political Economy, 1-28.

- De Cian, E., Dasgupta, S., Hof, A. F., van Sluisveld, M. A., Köhler, J., Pfluger, B., & van Vuuren, D. P. (2020). Actors, decision-making, and institutions in quantitative system modelling. *Technological Forecasting and Social Change*, 151, 119480.
- Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow III, W. R., Zhou, N., ... & Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. *Applied Energy*, 266, 114848.
- Eckerle, K., Whelan, T., DeNeve, B., Bhojani, S., Platko, J., & Wisniewski, R. (2020). Using the Return on Sustainability Investment (ROSI) Framework to Value Accelerated Decarbonization. *Journal of Applied Corporate Finance*, 32(2), 100-107.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Peñasco, C., Anadón, L. D., & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, 11(3), 257-265.
- Skoczkowski, T., Verdolini, E., Bielecki, S., Kochański, M., Korczak, K., & Węglarz, A. (2020). Technology innovation system analysis of decarbonisation options in the EU steel industry. *Energy*, 212, 118688.

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective (MGT001365) Limited places (Seminar, 4 SWS)
Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001254: Advanced Seminar Energy Markets: Economics of Energy and Technology | Advanced Seminar Energy Markets: Economics of Energy and Technology

Version of module description: Gültig ab summerterm 2020

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final examination consist of a seminar paper and an oral in-class presentation. Students are to investigate various energy technologies, their economics and market implications. The seminar paper constitutes the final grade. The final presentation offers the opportunity to improve the grade of the paper.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

- Energy technology driven changes in energy production/supply strategies and in energy trade (domestic / international) over the past decade.
- The impact of technological changes and uncertainties on energy resource and resource-utilizing industries development path and substitutability
- How economic / financial / operational / technical considerations define new technology projects, especially their scale
- New Technologies at Glance:
- Prosumers, Digitization, Sector coupling (Power + Heat)
- Hydrogen & Ammonia (trade, production, utilization)
- Alternative (H2 and battery-based) Mobility
- Smart City: a nexus of technologies (coordination vs. competition of technologies)
- Unconventional Resources (technology that changed resource endowment, supply capabilities, and energy costs)

Intended Learning Outcomes:

After attending this seminar students will be able to:

1. Introduce and provide the understanding of the novel energy-related technologies;
 2. Explain the role of technologies and technology-related uncertainties in energy and associated industries and markets;
 3. Enhance their ability to conduct sound and independent research in the area of energy markets.
- To fulfill these goals, students have to develop a well-structured research agenda and prove their ability to present their findings in written and oral form.

Teaching and Learning Methods:

Seminar meetings in block with discussions of research topics/questions

Media:

Power Point, Zoom

Reading List:

1. Prosumers, digitalization, sector coupling
 - a. Decentralised Energy a Global Game Changer, book by Christoph Burger, Antony Froggatt, Catherine Mitchell, Jens Weinmann
 - b. Espe, E., Potdar, V., & Chang, E., 2018, Prosumer Communities and Relationships in Smart Grids: A Literature Review, Evolution and Future Directions. *Energies*, 11(10).
 - c. Frattini, F., Bianchi, M., De Massis, A., & Sikimic, U. (2013). The Role of Early Adopters in the Diffusion of New Products: Differences between Platform and Nonplatform Innovations. *Journal of Product Innovation Management*, 31(3), 466–488.
 - d. Lüth, A., Zepter, J. M., Crespo del Granado, P., & Egging, R. (2018). Local electricity market designs for peer-to-peer trading: The role of battery flexibility. *Applied Energy*, 229, 1233–1243.
2. Hydrogen
 - a. Hydrogen production, ed. by Muhammet Kayfecia, Ali Kec,ebaşb, Mutlucan Bayatc
 - b. Abhinav Bhaskar & Mohsen Assadi & Homam Nikpey Somehsaraei, 2020, Decarbonization of the Iron and Steel Industry with Direct Reduction of Iron Ore with Green Hydrogen, *Energies Journal*, vol. 13(3), pages 1-23, February.
 - c. Mark Ruth, Melissa Laffen, Thomas A. Timbario, 2009, Hydrogen Pathways: Cost, Well-to-Wheels Energy Use, and Emissions for the Current Technology Status of Seven Hydrogen Production, Delivery, and Distribution Scenarios, Technical Report NREL/TP-6A1-46612.
3. Alternative Mobility
 - a. The future of mobility is at our doorstep, 2019, by Timo Möller, Asutosh Padhi, Dickon Pinner, and Andreas Tschiesner
 - b. Anja Peters, Claus Doll, Fabian Kley, Patrick Plötz, Andreas Sauer, Wolfgang Schade, etc, 2012, Electric mobility concepts and their significance for the economy, society and the environment, Working report no. 153 by the Office of Technology Assessment at the German Bundestag
4. Smart Cities and Regions
 - a. Smart and Sustainable Planning for Cities and Regions, Results of SSPCR 2017, edited by Adriano Bisello, Daniele Vettorato, Pierre Laconte, Simona Costa, 2018 Edition

5. Unconventional

a. Karel Janda, Ivan Kondratenko, 2018, An Overview of Economic Impacts of U.S. Shale Gas Revolution, MPRA Paper No. 83946

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Markets: Economics of Energy and Technology (WI001254) (Limited places) (Seminar, 4 SWS)

Berdysheva S, Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

EM-WahlKat: Elective Modules Modules Energy Markets | Wahlfächer Energy Markets

WahlKat-EM: Catalogue of Elective Modules: Modules Energy Markets | Wahlkatalog: Energy Markets

Module Description

MGT001365: Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective | Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on the presentation, which counts with 30%, and the report, assigned 70%.

Case study report: The final study team-report, written in English, should consist of max. 15 pages (excl. references and the title page). Students' work may be theoretical/analytical, empirical, or a literature survey but should include own thoughts and suggestions on the proposed solution. Giving a short (intro)overview regarding the relevant (and topical) literature is always required.

Final presentation: 30 minutes per presentation, 15-20 for a talk and 10 minutes for class-wide discussion.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Students learn the problematics and frameworks for the energy transition analysis, considering challenges and solutions for individual firms across various industries, e.g. steel, power, O&G.

Intended Learning Outcomes:

The aim of this seminar is to

1. Introduce and provide the understanding of: the decarbonisation; its associated challenges and problems (technical, economic, financial) faced by companies; and investment and market opportunities emerging in Germany and internationally;
2. Explain the scope 1, 2, 3 emissions, emission calculation, standards, and introduce possible decarbonization frameworks through examples;
3. Equip the students with the analytical tools and facts critical in making energy transition decisions and allow them to test their learned skills on the real-world problems.

Teaching and Learning Methods:

Project examples, Intro on analytical tools and important facts, Interactive workshop discussing case studies, Hand-on session about decarbonization modeling approaches, analysis frameworks, solution discussion, In-progress consultation

Media:**Reading List:**

- Dejuán, Ó., Lenzen, M., & Cadarso, M. Á. (Eds.). (2017). Environmental and economic impacts of decarbonization: Input-output studies on the consequences of the 2015 Paris Agreements. Routledge.
- Johnston, R. J., Blakemore, R., & Bell, R. (2020). The role of oil and gas companies in the energy transition. Atlantic Council.
- Lenox, M., & Duff, R. (2021). The Decarbonization Imperative: Transforming the Global Economy by 2050. Stanford University Press.
- Peszko, G., Van Der Mensbrugghe, D., Golub, A., Ward, J., Marijs, C., Schopp, A., ... & Midgley, A. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. World Bank Publications.
- Harvey, H., Orvis, R., & Rissman, J. (2018). Designing climate solutions: a policy guide for low-carbon energy. Island Press.
- Ghosh, N., & Gupta, D. (2022). Decarbonization strategy of businesses, stock return performance and investment styles: a systematic review. Benchmarking: An International Journal.
- Jenkins, J. D., Luke, M., & Thernstrom, S. (2018). Getting to zero carbon emissions in the electric power sector. Joule, 2(12), 2498-2510.
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2021). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. Review of International Political Economy, 1-28.

- De Cian, E., Dasgupta, S., Hof, A. F., van Sluisveld, M. A., Köhler, J., Pfluger, B., & van Vuuren, D. P. (2020). Actors, decision-making, and institutions in quantitative system modelling. *Technological Forecasting and Social Change*, 151, 119480.
- Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow III, W. R., Zhou, N., ... & Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. *Applied Energy*, 266, 114848.
- Eckerle, K., Whelan, T., DeNeve, B., Bhojani, S., Platko, J., & Wisniewski, R. (2020). Using the Return on Sustainability Investment (ROSI) Framework to Value Accelerated Decarbonization. *Journal of Applied Corporate Finance*, 32(2), 100-107.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Peñasco, C., Anadón, L. D., & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, 11(3), 257-265.
- Skoczkowski, T., Verdolini, E., Bielecki, S., Kocharński, M., Korczak, K., & Węglarz, A. (2020). Technology innovation system analysis of decarbonisation options in the EU steel industry. *Energy*, 212, 118688.

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective (MGT001365) Limited places (Seminar, 4 SWS)
Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000946: Energy Markets I | Energy Markets I

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module entails a written exam at the end of the term (60 minutes). In order to optimally assess the students' achievements, the exam will consist of both, a multiple choice part (20%) and open questions (80%). In the multiple choice part students mainly show that they have professional knowledge regarding the characteristics of energy markets and that are able to classify it. With answering the open questions, students demonstrate their ability to solve problems as well as their ability of abstraction. Mathematical problems will be complemented by questions mainly aiming at economic intuition and thought patterns. Apart from a non-programmable calculator no further tools or documents are permitted (closed book).

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic knowledge in economics (competition theory), basics in corporate strategy (Porter etc.), ideally industrial economics (market power, oligopoly, barriers to market entry, transparency etc.) and trade (call, put, forward, future etc.)

Modules:

- Investment and Financial Management
- Mikroökonomik (Economics I)
- Industrieökonomik (Industrial Economics)
- Introduction to Strategy and Organization

Content:

This module gives a broad overview of energy markets and energy industries across all commodities. It covers the whole energy value chain from primary energy supply to energy consumption and presents the most relevant economic concepts.

Focus issues are forecasting energy demand, primary energy exploration and production, supply and demand curves / merit orders in different commodities, specific feature of energy markets, price formation and organised energy trading.

The module will be continued in summer with energy markets 2, focusing on renewables and grid regulation.

Intended Learning Outcomes:

After successful participation in the module, students possess a broad basic knowledge regarding the economic specifications of energy markets. Furthermore, students are able to solve energy related problems self-reliantly using both, mathematical techniques as well as attained economic intuition.

Participants are moreover able to transfer economic principles on the special demands of energy markets.

After studying the provided literature, students are able to analyze and assess questions arising in terms of energy policy and recent developments in the fields of energy markets.

Participation in the module leads to a better understanding of energy markets and enables students to develop and evaluate business processes and models in the field of energy economics.

Taking part in the module enables students to competently advocate their views in discussions addressing energy economics and markets.

Teaching and Learning Methods:

The module consists of a lecture and an associated exercise course. The lecture provides basic knowledge about economical characteristics of energy markets via presentations. Students are encouraged to study the literature and discuss the provided topics. During the exercise courses, selected examples of problems arising in energy markets are discussed.

Media:

Slides and exercises

Reading List:

Erdmann, G. / Zweifel, P. (2010) Energy Economics: Theory and Applications; Springer 2017.

Ströbele, W. / Pfaffenberger, W. / Heuterkes, M. (2012) Energiewirtschaft - Einführung in Theorie und Politik; 3. Auflage; Oldenbourg 2012.

Bhattacharyya, S. (2011) Energy Economics - Concepts, Issues, Markets and Governance; Springer 2011.

Responsible for Module:

Wozabal, David; Prof. Dr. rer. soc.

Courses (Type of course, Weekly hours per semester), Instructor:

Energy Markets I (WI000946) (Vorlesung, 2 SWS)

Ikonnikova S [L], Bieberbach F, Gatscher D

Energy Markets I - Exercise (WI000946) (Übung, 2 SWS)

Ikonnikova S [L], Gatscher D

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Management: Life Sciences Management and Policy | Management-Schwerpunkt: Life Sciences Management and Policy

AdvSem-LSMP: Advanced Seminar Life Sciences Management & Policy | Advanced Seminar Life Sciences Management & Policy

Module Description

MGT001344: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

-Locks-ins and levers for facilitating a transitions toward more sustainable food systems;

- Food labels (origin-based labels, animal welfare labels);
 - Food quality standards;
 - Potential paths for a transition to more sustainable food systems
 - Private and public governance in food sectors
 - Fairness in business relationships
 - European and national regulations and policies concerning the food sector
- From a methodological point of view, the focus of this module is on
- Exploratory and Qualitative research methods
 - Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In *Journal of Economic Literature*, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In *Global Environmental Politics* 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelseth, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics : JBE*, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

-European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

-Exploratory and Qualitative research methods

-Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Life Sciences, Management & Policy: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Life Sciences, Management & Policy: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship (WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

LSMP-WahlKat: Elective Modules Modules Life Sciences Management & Policy | Wahlfächer Life Sciences Management & Policy

WahlKat-LSMP: Catalogue of Elective Modules: Life Sciences Management & Policy | Wahlkatalog: Life Sciences Management & Policy

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of exiting process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given research questions, which process measures can be collected with the methods, and how to interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:**Reading List:**

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelse, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

-European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

-Exploratory and Qualitative research methods

-Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000948: Food Economics | Food Economics

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Students prove their achievement of learning outcomes in e-test of 60 minutes with open questions. The exam is designed to test whether students understand the discussed topics and publications, whether they can describe and explain them in a meaningful and exact way, and whether they can critically reflect on assumptions, methodology, results, and political and societal implications of research in food economics. An e-test with open questions is the most suitable format to account for the discursive and reflective nature of the abilities examined.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

The course applies microeconomic theory to study questions of food demand and supply. Students should feel comfortable with the material in microeconomic courses at introductory level.

Content:

The course is intended to provide students with in-depth coverage of food economics with an emphasis on trends and phenomena of food markets and value chains, food labelling, food safety, food consumption, nutrition and food policy. Taking examples from these domains the course introduces a variety of economic models that are being used in food-economic research.

Intended Learning Outcomes:

At the end of the module, the students are able to (1) outline important trends and phenomena in food markets in Germany, Europe and the world, (2) analyse consumer and firm behavior in food markets based on economic theory, (3) assess the effectiveness of food policy instruments, (4) acquaint themselves with scientific literature in the area of food economics and discuss and evaluate crucial assumptions, choice of methodology and implications of results.

Teaching and Learning Methods:

The module is designed as an interactive lecture where both lecturers and students provide input for discussion. In order to set up a common basis for participants, lecturers present information on major features and trends on food markets and economic concepts used to analyze them. To familiarize themselves with economic research, students read selected journal articles from the field of agricultural and food economics and prepare a short presentation of 15 minutes and a short report of about 2 pages once per semester, summarising the main hypotheses, methods applied, results obtained and implications derived. Subsequent discussions in classroom on assumptions, limitations of data and methods, as well as on different ways to interpret results deepen students' understanding of the potential and restrictions of research in food economics.

Media:

Slides, textbooks, journal articles, blackboard, collection of summaries of publications.

Reading List:

Lusk, J. L., Roosen, J., & Shogren, J. F. (eds.) (2011). The Oxford handbook of the economics of food consumption and policy. Oxford University Press: New York.

Additional references are provided in the course.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Food Economics (WI000948) (Vorlesung, 4 SWS)

Roosen J, Menapace L, Rackl J, Ola O

For further information in this module, please click campus.tum.de or [here](#).

No management specialization chosen | No management specialization chosen

Advanced Seminar in Management | Advanced Seminar in Management

AdvSem-EE: Advanced Seminar Economics & Econometrics | Advanced Seminar Economics & Econometrics

Module Description

MGT001344: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system

(un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In *Journal of Economic Literature*, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In *Global Environmental Politics* 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelse, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics : JBE*, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001353: Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking | Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Seminarteilnehmer:innen bearbeiten in Teams aus je zwei Studiernedne selbständig ein Thema zur Ökonomie der Zentralbanken. Die Prüfungsleistung besteht aus zwei Teilen:

- 1) Präsentation des vom jeweiligen Teilnehmer ausgewählten Themas inkl. anschließender Diskussion.
- 2) Seminararbeit zum behandelten Thema (max. 12 Seiten)

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Principles of Micro- and Macroeconomics

Content:

This module provides students with an in-depth insight into the various tasks and objectives of national and supranational central banks. The focus is in particular on the Deutsche Bundesbank and its business areas and tasks. The seminar is divided into three thematic blocks: (1) Monetary Policy (2) Financial Stability and (3) Money & Non-Cash Payments.

Intended Learning Outcomes:

After participation in the module event, the students are able to understand both the theoretical and the applied view of the role of central banks in the general economy and are able to discuss them before the background of current topics. Students can therefore (1) identify and (2) conceptualize various important issues related to central banking. Students will be able to (3) identify gaps in understanding of the focus topic and (4) develop suggestions to improve understanding of the field.

In addition, they will be able to improve their presentation skills by presenting their topic to their fellow students (5) and their scientific writing skills by writing the seminar research paper (6). By working in groups, (6) students will also improve on their teamwork skills.

The aim of the seminar is also to build a bridge to the research project "Effects of the EBA stress tests on the assignment of credit ratings to European banks", which is currently being carried out in cooperation with the Deutsche Bundesbank. The seminar will help to transfer the theoretical and empirical research findings to teaching and will possibly serve as a basis for possible future final theses or research work.

Teaching and Learning Methods:

The seminar consists of several lecture dates (on selected practical topics by employees from the Deutsche Bundesbank). These serve as the basis for the subsequent analysis, presentation and creation of a seminar paper by the seminar participants (in teams of two/group work) on a self-selected topic on the economics of central banks. The examination consists of the seminar presentation and the seminar paper.

Media:

Slides, presentation, literature

Reading List:

Mayes, Siklos, Jan-Egbert Sturm (2019). The Oxford Handbook of the Economics of Central Banking. Oxford University Press

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (MGT001353): The Economics of Central Banking (Limited places) (Seminar, 4 SWS)

Hottenrott H, Gschnaidtner C, Römer K

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-EM: Advanced Seminar Modules Energy Markets | Advanced Seminar Energy Markets

Module Description

MGT001365: Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective | Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on the presentation, which counts with 30%, and the report, assigned 70%.

Case study report: The final study team-report, written in English, should consist of max. 15 pages (excl. references and the title page). Students' work may be theoretical/analytical, empirical, or a literature survey but should include own thoughts and suggestions on the proposed solution. Giving a short (intro)overview regarding the relevant (and topical) literature is always required.

Final presentation: 30 minutes per presentation, 15-20 for a talk and 10 minutes for class-wide discussion.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Students learn the problematics and frameworks for the energy transition analysis, considering challenges and solutions for individual firms across various industries, e.g. steel, power, O&G.

Intended Learning Outcomes:

The aim of this seminar is to

1. Introduce and provide the understanding of: the decarbonisation; its associated challenges and problems (technical, economic, financial) faced by companies; and investment and market opportunities emerging in Germany and internationally;
2. Explain the scope 1, 2, 3 emissions, emission calculation, standards, and introduce possible decarbonization frameworks through examples;
3. Equip the students with the analytical tools and facts critical in making energy transition decisions and allow them to test their learned skills on the real-world problems.

Teaching and Learning Methods:

Project examples, Intro on analytical tools and important facts, Interactive workshop discussing case studies, Hand-on session about decarbonization modeling approaches, analysis frameworks, solution discussion, In-progress consultation

Media:

Reading List:

- Dejuán, Ó., Lenzen, M., & Cadarso, M. Á. (Eds.). (2017). Environmental and economic impacts of decarbonization: Input-output studies on the consequences of the 2015 Paris Agreements. Routledge.
- Johnston, R. J., Blakemore, R., & Bell, R. (2020). The role of oil and gas companies in the energy transition. Atlantic Council.
- Lenox, M., & Duff, R. (2021). The Decarbonization Imperative: Transforming the Global Economy by 2050. Stanford University Press.
- Peszko, G., Van Der Mensbrugghe, D., Golub, A., Ward, J., Marijs, C., Schopp, A., ... & Midgley, A. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. World Bank Publications.
- Harvey, H., Orvis, R., & Rissman, J. (2018). Designing climate solutions: a policy guide for low-carbon energy. Island Press.
- Ghosh, N., & Gupta, D. (2022). Decarbonization strategy of businesses, stock return performance and investment styles: a systematic review. Benchmarking: An International Journal.
- Jenkins, J. D., Luke, M., & Thernstrom, S. (2018). Getting to zero carbon emissions in the electric power sector. Joule, 2(12), 2498-2510.
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2021). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. Review of International Political Economy, 1-28.
- De Cian, E., Dasgupta, S., Hof, A. F., van Sluisveld, M. A., Köhler, J., Pfluger, B., & van Vuuren, D. P. (2020). Actors, decision-making, and institutions in quantitative system modelling. Technological Forecasting and Social Change, 151, 119480.
- Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow III, W. R., Zhou, N., ... & Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. Applied Energy, 266, 114848.

- Eckerle, K., Whelan, T., DeNeve, B., Bhojani, S., Platko, J., & Wisniewski, R. (2020). Using the Return on Sustainability Investment (ROSI) Framework to Value Accelerated Decarbonization. *Journal of Applied Corporate Finance*, 32(2), 100-107.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Peñasco, C., Anadón, L. D., & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, 11(3), 257-265.
- Skoczkowski, T., Verdolini, E., Bielecki, S., Kocharński, M., Korczak, K., & Węglarz, A. (2020). Technology innovation system analysis of decarbonisation options in the EU steel industry. *Energy*, 212, 118688.

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective (MGT001365) Limited places (Seminar, 4 SWS)

Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-FA: Advanced Seminar Finance & Accounting | Advanced Seminar Finance & Accounting

Module Description

MGT001358: Advanced Seminar Finance & Accounting: Data Science in Finance | Advanced Seminar Finance & Accounting: Data Science in Finance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written report of the final project accounts for 70% of the final grade, and the presentation of the project accounts for 30% of the final grade. The students are required to generate a project idea after consultation with the course instructor and develop it over a period of six to eight weeks. Students are to demonstrate their command of the methodologies covered in the first part of the course.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in application of data science techniques in a finance setting; basic knowledge of python is recommended but not required.

Content:

The main blocks are: 1. Basic semantics of Python 3. 2. Data processing packages and techniques. 3. Data visualisation tools. 4. An Introduction to machine learning. 5. Alternative data sources in finance (NLP based textual analysis, etc.)

Intended Learning Outcomes:

After completion of the course, students should have generated a generic workflow, how upon being confronted with a finance- related topic, to develop a hypothesis, find proper data sources, process the raw data, run statistical instruments on the dataset, and draw conclusions from the

outcome. They should also learn how to communicate their ideas and results in an academic manner.

Teaching and Learning Methods:

For the first stage of the course, there will be 6-8 sessions of lectures. The final presentations will be held in a seminar style over one or two days depending on the number of participants.

Media:

Exemplary codes, websites, etc.

Reading List:

Python for Finance - Analyze Big Financial Data by Yves Hilpisch.

Responsible for Module:

Braun, Reiner; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (MGT001358): Data Science in Finance (Limited places)
(Seminar, 4 SWS)

Braun R, Dong Y

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-IE: Advanced Seminar Innovation & Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship

Module Description

MGT001355: Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for this seminar is based on a final written seminar paper (65%), the final presentation of the seminar paper (20%), and feedback on a peer's seminar paper (15%). Please note that dropping the course after topics have been chosen and announced leads to grade 5.0 (failed). While the grade for your final seminar paper (10 / 15 pages +/- 10%) will be determined purely on the last version you hand in before the final submission deadline (see "course outline"), you will also have to iterate on this throughout the class, by writing a draft paper earlier in the semester and giving a 10-15 minutes presentation on this earlier version (worth 15% of your grade).

Please note that we will require you not only to submit your paper to us via Moodle, but also to TurnItIn, for an automated citation check.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

The module consists of an introduction to problematization methods for academic research/ process of scientific writing. Early on in the course, the topics for each student's seminar paper will

be decided. Based on their topic students prepare their term paper which they will present at the end of the module.

The module also involves multiple (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Intended Learning Outcomes:

After the successful completion of this module, students are able to:

1. Understand the scientific research process
2. Understanding the steps in writing a scientific seminar paper, including how to evaluate academic literature, engage in an academic debate, and prepare and defend academic arguments.
3. Develop critical thinking and several soft-skills, including but not limited to: analytical skills, presentation, argumentation, storytelling, and synthesis.

Teaching and Learning Methods:

The goal of this module is for students to understand key concepts relevant to academic research on environmental entrepreneurship. This body of research focuses on market-based mechanisms to address environmental problems (e.g. entrepreneurship in the context of sectors such as renewable energy). Through the course they will develop specialist knowledge on their selected topic of interest.

More broadly the seminar work also prepares students for academic work (e.g. Masters Thesis, preview into PhD work). Students will write a seminar paper on a specific topic, present this topic to the class, discuss papers, and be involved in scientific discussions on a variety of topics in class. Students are provided with an overview of important readings and literature. Over the course, students will develop their own research questions and identify relevant readings in advancing their seminar paper.

Media:

Presentations, videos, interactive team-work templates

Reading List:

York, Jeffrey G., and Sankaran Venkataraman. "The entrepreneur–environment nexus: Uncertainty, innovation, and allocation." *Journal of business Venturing* 25.5 (2010): 449-463.

Vedula, Siddharth, et al. "Entrepreneurship for the public good: a review, critique, and path forward for social and environmental entrepreneurship research." *Academy of Management Annals* 16.1 (2022): 391-425.

*A full list of readings will be provided at the course introduction

Responsible for Module:

Vedula, Siddharth; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship (MGT001355)
(Seminar, 4 SWS)

Vedula S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law | Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations | Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship
(WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB26995: Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design | Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a seminar paper (65% of grade) and a set of presentations (35% of grade). Drawing on the seminar paper, we will examine the degree to which students are able to engage in an academic discussion in the field of innovation, organization design, or strategic entrepreneurship; define and structure a complex problem from that field, and describe and analyze it academically. Two presentations will further highlight whether students are able to present their findings comprehensively and precise (seminar paper presentation: 15 minutes; 25% of total grade) and whether they are capable of applying and connecting their insights in the form of feedback on another seminar paper (discussion of another paper: 8 minutes; 10% of total grade). Across both presentations, we will further evaluate if students are available to communicate clearly and to perform professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

Introductory courses on research methods (for example, "Empirical Research in Management and Economics").

Content:

The module prepares students for the scientific work in their master theses and provides them with deepening insights into academic literature on innovation, organization design, or strategic entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Accordingly, students in this seminar may choose from a broad range of topics around the development of new and established businesses, the strategies managers devise and execute

including questions of positioning, and the organizational design choices they have to deal with. Potential areas questions of study may include:

- Venture creation: How are new businesses created and how do they evolve?
- Organization design: How do their structures develop and change?
- Growth strategies: Are there different paths to consistent configurations and if yes, how do they differ from each other?
- New forms of organizing: What role do supposedly more novel approaches to conducting business (ecosystems, crowdsourcing, open innovation...) or funding companies (incubators, crowdfunding...) play, when should be used, by whom, and how?
- Role of environmental conditions: How does the business environment influence the decision-making of new or established ventures, such as through membership in categories?

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand academic literature on the topic of innovation, organization design, or strategic entrepreneurship. Furthermore, students are able (3) to create their own academic paper. Additionally, they will be able (4) to present their paper and (5) summarize their findings. Moreover, students learn how (6) to lead a academic discussion. Finally, they (7) understand the process of scientific publication.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing and several sessions about academic problem definition and solving, based on which students may select and continuously refine their topic. The topic choice will further be discussed in individual feedback meetings with the seminar instructors.

Based on their topic, students will prepare their term paper which they will present at the end of the module. The students are continuously supervised by the instructors of the module. The module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The seminar topics may also be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

- Davis, M. S. 1971. That's interesting. *Philosophy of the Social Sciences*, 1(2): 309-344. (Note: the first and last sections are particularly "interesting")
- Sutton, R. I. & Staw, B. M. 1995. What theory is not. *Administrative Science Quarterly*, 40(3): 371-384. (Note: this article has several responses in the same issue of the journal which you may also find helpful.)

Further readings will be detailed in the respective course syllabi before the first session of class.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation and Organization Design (WIB26995) (Limited places) (Seminar, 4 SWS)

Alexy O [L], Reetz D (Huber D)

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-LSMP: Advanced Seminar Life Sciences Management & Policy | Advanced Seminar Life Sciences Management & Policy

Module Description

MGT001344: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems

- Private and public governance in food sectors
 - Fairness in business relationships
 - European and national regulations and policies concerning the food sector
- From a methodological point of view, the focus of this module is on
- Exploratory and Qualitative research methods
 - Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature,

Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In *Global Environmental Politics* 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelseth, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

-European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

-Exploratory and Qualitative research methods

-Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-MM: Advanced Seminar Management & Marketing | Advanced Seminar Management & Marketing

Module Description

MGT001310: Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy | Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework focuses on the preparation of a full research-based marketing plan. Such an output is made up of two interrelated parts: the initial academic-research part and the latter practical business-like part. The research part requires the use of updated qualitative and quantitative methodologies. The business-like part demonstrates the understanding of international marketing strategy and advanced marketing as a whole. The group seminar paper is based on an extensive presentation (20 to 30 slides), in accordance with the guidelines provided during this advanced seminar. The group written assignment represents 100% of the seminar's evaluation. However, selected students receive an extra grade as a bonus for their proven "in-class attitude". Detailed information that well defines "in-class attitude" is provided during the opening session of the seminar.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Introducing Marketing Strategy in an international context, the role of marketing in a company, the meaning of marketing management, the required elements of marketing research, the

transformation of marketing analysis into marketing strategy and objectives. If time allows, it's planned to tackle the deliverables of a marketing plan being an action plan and control standards.

Intended Learning Outcomes:

At the end of the seminar students will be able to understand the dynamics of marketing strategy in an international business | to realize the role of marketing strategy as a liaison between the company's vision and its tactics | to be able to address objectives based on marketing research | to address "strategic planning" in an international context for an existing company | to improve presentation skills.

Teaching and Learning Methods:

Frontal lectures, in-class discussions, group work, self-made case studies

Media:

Frontal lectures, online supervision

Reading List:

Donnelly, J. H. & Peter J. P. (2012). Preface to Marketing Management. 13th edition, McGraw-Hill.
Lehmann, D. R. & Winer, R. S. (2009). Analysis for Marketing Planning. 7th edition, McGraw-Hill.

Responsible for Module:

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management: International Marketing Strategy (MGT001310) (Limited places) (Seminar, 4 SWS)

Abramovich D, Octavianus E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001335: Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms | Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each seminar participant will work individually on a specific topic in the field of CSR and sustainability of family firms.

Each student will write an academic essay (80% of the overall grade), based on existing literature on CSR and sustainability of family firms as well as on interview insights collected by the student. Each student will conduct a 1-hour interview with a family business owner of a medium sized family firm on sustainability and CSR topics. Students should demonstrate that:

- They are able to conduct semi-structured interviews to a high academic standard
- They can evaluate their interview insights in light of existing research on the topics of CSR and sustainability
- They can draw conclusions and identify opportunities for future research
- They are able to write a paper that follows a clear logic and is based on academic literature

Each student will present their work (20% of the overall grade) to an academic audience. Each student should demonstrate that they are able to answer questions to the empirical and theoretical part of their work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This module will explore actions towards a sustainable economy and ways to improve the social responsibility of businesses. In particular, it will assess how family firms' entrepreneurial and social activities and their unique culture affect CSR and sustainability. Topics covered in the module are:

- Contemporary environmental and social issues for organizations
- The non-financial goals of family firms and their consequences
- Family firms and environmental performance
- Family firms and external stakeholders
- Family firms and internal stakeholders
- Family firms and reporting
- Family firms and philanthropy
- Family firms and social entrepreneurship

Intended Learning Outcomes:

After completing the seminar students should understand how family business owners tackle pressing social and environmental issues. After completing the module students will be able to:

- Understand and critically reflect on the role of family ownership for CSR and sustainability
- Understand family owners' non-financial incentives to engage in CSR and sustainability
- Reflect on possible barriers to promote CSR and sustainability through the family firm
- Compare existing knowledge of CSR and sustainability with their own first-hand experience interviewing medium sized family firms in the region
- Evaluate a specific family firm's actions to promote CSR and sustainability
- Explore how family businesses can exploit sustainable opportunities

Moreover, students will be able to

- Search, understand, synthesize, analyze and apply academic literature
- Present and discuss their findings and conclusions to an academic audience

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, in which the instructor provides the theoretical foundations of family and social enterprises
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-life input will be given through multi-media resources and case studies

- Next to in-class discussions student interaction is also ensured through online technology, such as online polls.
- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor
- In a final presentation, students present the results of their seminar essays

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle):

- Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. 2010. Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly*, 55(1): 82-113.
- Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family business review*, 25(3), 258-279.
- Campopiano, G., De Massis, A. 2014. Corporate social responsibility reporting: a content analysis in family and non-family firms, *Journal of Business Ethics*, 1-24
- Campopiano, G., De Massis, A. & Chirico F. 2014. Firm Philanthropy in Small- and Medium-Sized Family Firms: The Effects of Family Involvement in Ownership and Management. *Family Business Review*, 27: 244-257
- Cruz, C.; Larraza-Kintana, M. Garcés-Galdeano, L. Berrone, P. 2014. Are family firms really more socially responsible? *Entrepreneurship Theory and Practice* 38(6), 1295–1316
- Deephouse, D. L., & Jaskiewicz, P. 2013. Do family firms have better reputations than nonfamily firms? An integration of socioemotional wealth and social identity theories. *Journal of management Studies*, 50(3), 337-360.
- Dyer, W., & Whetten, D. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory & Practice*, 30(6): 785-802.
- Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. 2011. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*, 5(1): 653-707.
- Kellermanns, F. W., Eddleston, K. A., and Zellweger, T. M. 2012. Extending the socioemotional wealth perspective: A look at the dark side. *Entrepreneurship Theory and Practice*, 36(6): 1175-1182.
- Le Breton-Miller, I., & Miller, D. 2016. Family firms and practices of sustainability: A contingency view. *Journal of Family Business Strategy*, 7(1), 26-33.
- Miller, D., & Le Breton-Miller, I. 2005. *Managing for the long run: Lessons in competitive advantage from great family businesses*: Harvard Business Press.
- Richards, M. 2022. When do Non-financial Goals Benefit Stakeholders? Theorizing on Care and Power in Family Firms. *Journal of Business Ethics*, 1-19.

- Richards, M., Zellweger, T., & Gond, J. P. 2017. Maintaining moral legitimacy through worlds and words: an explanation of firms' investment in sustainability certification. *Journal of Management Studies*, 54(5), 676-710.
- Spence, L. J. 2016. Small business social responsibility: Expanding core CSR theory. *Business & Society*, 55(1), 23-55.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001335): CSR and Sustainability in Family Firms (Limited places) (Seminar, 4 SWS)

Richards M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001339: Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management | Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Conceptual foundations of reputation management
- Topic 2. Reputation protection mechanisms
- Topic 3. Methods of reputation forming and maintaining
- Topic 4. Methods of crisis reputation management
- Topic 5. Methods of corporate reputation assessing

Intended Learning Outcomes:

- ability to increase the level of competitiveness of organizations as socio-economic systems taking into account the specifics of interpersonal competition in the trade environment

- identify actions that harm the information security of the trade organization, be able to apply methods to ensure it;
- to determine and implement a set of actions for the organization of e-commerce and goods and services promotion by means of Internet marketing.

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Eric B. Shiraev, Jennifer Keohane, Martijn Icks, Sergei A. Samoilenko. Character Assassination and Reputation Management: Theory and Applications. Routledge. 2021. 283.

John Doorley, Helio Fred Garcia. Reputation Management: The Key to Successful Public Relations and Corporate Communications. Routledge. 2006. 458.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001339): HR Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001340: Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management | Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Structure and functions of the human resources departments
- Topic 2. Competence approach in human resource management
- Topic 3. Planning of work with personnel in the organization
- Topic 4. Staff recruitment and staff selection processes
- Topic 5. Adaptation of staff in the organization
- Topic 6. Personnel evaluation and staff motivation
- Topic 7. Team cohesion and social development of staff
- Topic 8. Innovations in HR management

Intended Learning Outcomes:

- ability to organize the effective work of human resources according to the specifics of organization business objectives;
- ability to provide efficient activity of human resources services for solving human resource management tasks using different types of resources and labour instruments;
- ability to form an effective system of performance evaluation in different categories of work positions in the organization by using modern methods;
- ability to analyse the indicators of personnel movement in the organization and developing measures to stabilize the work of labour collective;

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Noe Raymond, Hollenbeck John, Gerhart Barry, Wright Patrick. Fundamentals of Human Resource Management. McGraw-Hill, 2019. 406.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001340): Reputation Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001342: Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI | Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20 minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Participants will develop a basic understanding of useful applications of AI in the area of strategic management. They learn how companies can strategically apply AI for gaining competitive advantage in different industries. Students will also improve their project management and teamwork skills, as they are required to elaborate a complex project topic on their own. They will create basic skills of academic writing and literature search, too. Furthermore, they strengthen their communication skills while presenting their results in front of the class.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterwards, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Presentation, discussion, academic literature, group work

Reading List:

- Russell, S. J. and Norvig, P. (2021): Artificial intelligence: A modern approach. Pearson Publishing
- Grant, R. M. (2019): Contemporary strategy analysis (10th ed.). John Wiley & Sons, Inc.
- Wodecki, A. (2019): Artificial Intelligence in value creation - Improving competitive advantage. Palgrave Macmillan

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001342): Gaining Competitive Advantage with AI (Seminar, 4 SWS)

Hutzschenreuter T, Lämmermann T, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001343: Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process | Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate on the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20-minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None, except an interest in AI and strategic management.

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining a competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Die Teilnehmer werden die Potentiale und Grenzen von KI für den Strategieprozess verstehen und lernen, wie Strategen innovative KI-Anwendungen für die Strategieentwicklung nutzen können, um einen Wettbewerbsvorteil zu erzielen. Die Studierenden verbessern auch ihre Projektmanagement- und Teamwork-Fähigkeiten, da sie ein komplexes Projektthema selbständig erarbeiten müssen. Sie erwerben auch grundlegende Fähigkeiten im wissenschaftlichen Schreiben und in der Literaturrecherche. Außerdem stärken sie ihre Kommunikationsfähigkeiten, indem sie ihre Ergebnisse vor der Gruppe präsentieren.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterward, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Präsentation, Diskussion, wissenschaftliche Literatur, Gruppenarbeit

Reading List:

- Russel, S. & Norvig, P., 2021. Artificial Intelligence. A Modern Approach. 4th edition. Hoboken: Pearson
- Johnson, G. et al., 2017. Exploring Strategy Text and Cases. 11th Edition. Edinburgh: Pearson Education
- Grant, R. M., 2019. Contemporary Strategy Analysis. 10th Edition. Hoboken: Wiley & Sons

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001343): AI and the Strategizing Process (Seminar, 4 SWS)

Hutzschenreuter T, Perkhofer F, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law | Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations | Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001179: Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption | Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written seminar paper (~15 pages, 50 % of the grade), whereas the results and conclusions of the seminar paper need to be presented (20 min, 50 % of the grade) in front of the class. The seminar paper as well as the presentation in front of the class demonstrate that students are able to reproduce and summarize their acquired knowledge about the respective research topic. Furthermore, the seminar paper and the related presentation show that the students are able to critically analyze the key aspects regarding their research question. By presenting their findings in front of the class, students prove that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics/consumer economics and/or consumer behavior theories.
Knowledge in empirical research methods.

Content:

Key topics of the seminar may include:

- Current issues in sustainable consumption
- Current issues in consumers and digitalization
- Current issues in consumer research

Intended Learning Outcomes:

After successful participation in the module students will have in-depth knowledge on the tackled focus of the module. Students will be able to (1) write a scientific research paper, (2) procure relevant literature and (3) structure a topic. Additionally, students will be able to (4) present their research findings in front of seminar participants, (5) answer their questions and (6) moderate a following discussion.

Teaching and Learning Methods:

The module is a seminar, in which the students will be assigned state-of-the-art research papers from the recent literature. They are expected to prepare high-quality presentations and write-ups, reflecting their analyses, understanding and insights from reading the papers and related literature. The lecturer will provide guidance and advice all along, from the choice of the initial topic, to tips on reading original literature, on scientific writing, and on giving successful presentations.

Media:

Slides, books, scientific papers

Reading List:

Ethridge, D. (2004). Research Methodology in Applied Economics, 2nd Edition. Ames: Blackwell Publishing.

Reisch, L. (2015). Handbook of research on sustainable consumption. Cheltenham: Elgar.

Relevant literature will be selected and communicated specifically.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

AdvSem-OSCM: Advanced Seminar Operations & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management

Module Description

MGT001350: Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

Within this seminar, groups of students study a variety of problems with real-world applications. A supervisor with relevant research background guides each group through every step of their progress, from understanding the state-of-the-art literature to the final implementation of their extensions. Using selected scientific publications, the students will understand problems relevant to different industries and investigate various modeling and solution techniques to solve these problems.

Within this process, students develop a wide spectrum of skills, which ultimately prepares them for carrying out a thesis with high academic value.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the seminar focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides
Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Operations & Supply Chain Management (MGT001350): Production & Supply Chain Management (Seminar, 4 SWS)

Grunow M [L], Grunow M, Pahr A, Schömig-Beißner M, Fatemianaraki S

For further information in this module, please click campus.tum.de or [here](#).

Elective Modules in Management | Wahlfächer in Management

WahlKat-EE: Catalogue of Elective Modules: Economics & Econometrics | Wahlkatalog: Economics & Econometrics

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of existing process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given research questions, which process measures can be collected with the methods, and how to interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:**Reading List:**

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelsen, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001353: Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking | Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Seminarteilnehmer:innen bearbeiten in Teams aus je zwei Studiernedne selbständig ein Thema zur Ökonomie der Zentralbanken. Die Prüfungsleistung besteht aus zwei Teilen:

- 1) Präsentation des vom jeweiligen Teilnehmer ausgewählten Themas inkl. anschließender Diskussion.
- 2) Seminararbeit zum behandelten Thema (max. 12 Seiten)

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Principles of Micro- and Macroeconomics

Content:

This module provides students with an in-depth insight into the various tasks and objectives of national and supranational central banks. The focus is in particular on the Deutsche Bundesbank and its business areas and tasks. The seminar is divided into three thematic blocks: (1) Monetary Policy (2) Financial Stability and (3) Money & Non-Cash Payments.

Intended Learning Outcomes:

After participation in the module event, the students are able to understand both the theoretical and the applied view of the role of central banks in the general economy and are able to discuss them before the background of current topics. Students can therefore (1) identify and (2) conceptualize various important issues related to central banking. Students will be able to (3) identify gaps in understanding of the focus topic and (4) develop suggestions to improve understanding of the field.

In addition, they will be able to improve their presentation skills by presenting their topic to their fellow students (5) and their scientific writing skills by writing the seminar research paper (6). By working in groups, (6) students will also improve on their teamwork skills.

The aim of the seminar is also to build a bridge to the research project "Effects of the EBA stress tests on the assignment of credit ratings to European banks", which is currently being carried out in cooperation with the Deutsche Bundesbank. The seminar will help to transfer the theoretical and empirical research findings to teaching and will possibly serve as a basis for possible future final theses or research work.

Teaching and Learning Methods:

The seminar consists of several lecture dates (on selected practical topics by employees from the Deutsche Bundesbank). These serve as the basis for the subsequent analysis, presentation and creation of a seminar paper by the seminar participants (in teams of two/group work) on a self-selected topic on the economics of central banks. The examination consists of the seminar presentation and the seminar paper.

Media:

Slides, presentation, literature

Reading List:

Mayes, Siklos, Jan-Egbert Sturm (2019). The Oxford Handbook of the Economics of Central Banking. Oxford University Press

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (MGT001353): The Economics of Central Banking (Limited places) (Seminar, 4 SWS)

Hottenrott H, Gschnaidtner C, Römer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

POL62200: Energy Transformation | Energy Transformation

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

For this module, evaluations will be based on written work and a presentation. The written assignment for the module will be of a length of approximately 20-25 pages. The topic of the module paper is to be developed in consultation with the seminar leaders and will deal with a specific topic of the seminar (energy transformation) and its technological, political, and social dimensions. The paper will be introduced with a precise question and then analyzed in depth. The methodology of research needs to be indicated and a comprehensive bibliography included. Students will be expected to prepare and give a presentation of at least 20 minutes tied to a session topic. Group presentations of up to three students are possible as long as individual contributions are discernible.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Ring lecture „Politics & Technology“

Content:

For a variety of reasons, including energy security, environment and climate concerns, and the potential to develop new technologies and processes, cities, countries and entire regions are pursuing low-carbon energy transitions. Understandings of what the best approach to a low carbon energy transition is, however, vary widely. The extent to which energy transitions are occurring in various sectors (power, heating/cooling, transportation) differs significantly. Why is this the case? What factors support or inhibit the scaling-up of policy solutions? What are the challenges associated with large scale energy system transformations? How similar or different are energy system transformations to other major transformations which have occurred in the past or which may need to occur in the future? This module will consider these and other questions in the context of Germany, at the European level and internationally.

Intended Learning Outcomes:

After participating in this module, students will understand the arguments underpinning decisions to pursue low carbon energy transitions, how low carbon energy transitions are affected by broader economic, technological, and political factors, and the ways in which actors at the local, national, or international level may act to promote or inhibit change. They will have gained insights into system transformation thinking, understand aspects of the production, distribution and utilization of energy and their interplay; apply methods of comparative policy analysis to energy policy in different political systems; be able to identify challenges of policy-making in national politics and the European multi-level system; to critically analyze energy policy in Germany, Europe, and internationally (for example in China, Japan, India, the United States as well as at the global level); to analyze the factors determining German, European, and international energy politics, and to evaluate the effects of different energy policy governance instruments (like legal regulation, planning, incentive design, taxes, subsidies, etc.).

Teaching and Learning Methods:

The module is offered in the form of two seminars, each dealing with different, but complementary thematic areas. One will be focused more on the transition of the energy systems in Germany and Europe while the other will concentrate more on the international and global level. To obtain a deeper understanding of the module's topics a combination of independent work and general discussion will be used in the seminar. Seminars will include both direct input from the instructor and a wide variety of active learning methods. During the seminars, there will be in-depth discussions and inputs by students. Concrete examples will be used to practice, analyze, and evaluate the material which has been presented. Both the technical and scientific aspects of issues as well as their political and social implications will be discussed. The presentations developed and given by the students and ensuing discussions will contribute to the students' understanding of the seminar materials and instructor's inputs.

Media:

Online-Reader, PowerPoint

Reading List:

Moe, Espin. 2015. Renewable Energy Transformation or Fossil Fuel Backlash: Vested Interests in the Political Economy. Palgrave MacMillan.

Araújo, K., ed. 2022. Routledge Handbook of Energy Transitions. Routledge.

A reader of seminar texts with up-to-date and cutting edge scientific literature will be made available at the start of the semester.

Responsible for Module:

Schreurs, Miranda; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

(POL62200) Energy Transformation (Seminar 1 + 2) (Seminar, 4 SWS)

Cetkovic S (Mohammed N)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000258: Empirical Research in Economics and Management | Empirical Research in Economics and Management

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final written exam (120 minutes) is a means to assess students' understanding of the basic and advanced theories of empirical research in economics and management research. Students have to show that they understand different research designs. They have to prove that they are familiar with the basic concepts of different empirical methods, therefore they have to analyze data as well as to interpret the results of these different methods.

The exam is 100% based on multiple choice questions.

Students may use a non-programmable calculator and a non-electronic dictionary for the exam.

Students have the possibility to improve their final grade by taking a voluntarily midterm assignment. The final grade can be improved by 0,3. The midterm assignment consists of handing in two practice sheets. The completion of the practice sheets is not mandatory, but highly recommended. The exercise sheets are a means to assess students' understanding learning progress of the basic theories of empirical research for the further course of the module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

This module prepares students for qualitative and quantitative research (e.g. for their Master's Thesis) by introducing them to basic and advanced topics of empirical research.

Amongst others, the topics are:

- Experiment design
- Correlation analysis
- Linear and multiple regression models

- Qualitative methods
- Factor- and cluster analysis
- Conjoint analysis

The acquired skills are important for students' Master's Thesis but are equally important to understand and analyze data and statistics in their future career and everyday life.

Intended Learning Outcomes:

After the successful participation in the module Empirical Research in Economics and Management, students will be able to understand the most important methods of empirical research, covering basic as well as advanced aspects of research design, data collection, data analysis, and interpretation. Students will learn how to understand and analyze academic empirical research and be in a position to critically question in-press reports which refer to empirical studies. Students will learn to apply basic methods of empirical research. Students will learn the basics of how to plan, set up, and conduct an empirical research project themselves (e.g., for their seminar paper or their final thesis). Finally, students will learn to interpret empirical research results.

Teaching and Learning Methods:

The module consists of lectures and integrated exercises (both will be recorded on Lecturio - but active participation is recommended).

The lectures serve to build a thorough theoretical understanding of the related scientific concepts and methods.

In the exercises students learn to apply the methods, they have learned in the lectures, in concrete analyses and interpretations. In addition to the examples of the integrated exercises, two practice sheets are provided on which the student can practice individually. The practice sheets include various topics, such as regression analysis, factor analysis, cluster analysis, and conjoint analysis, which are relevant for the exam. Both practice sheets will be discussed in detail during the tutorial sessions.

Media:

Lecture slides are available via Moodle.

Reading List:

- Eisenhardt, K (1989). Building Theory from Case Study Research. The Academy of Management Review, 14(4), 532-550.
- Singleton Jr, R., Straits, B. C., Straits, M. M., & McAllister, R. J. (2010). Approaches to social research. Oxford University Press.
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 10: Regression with Panel Data,
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 14: Introduction to Time Series Regression and Forecasting.

Responsible for Module:

Hirsch, Stefan; Prof. Dr. agr.

Courses (Type of course, Weekly hours per semester), Instructor:

Empirical Research in Economics and Management - Exercise (WIHN0258) (MiM Campus Heilbronn) (Übung, 2 SWS)

Förderer J

Empirical Research in Economics and Management - Lecture (WIHN0258) (MiM Campus Heilbronn) (Vorlesung, 2 SWS)

Förderer J, Kircher T

Empirical Research in Management and Economics (WI000258) (Vorlesung, 2 SWS)

Pachur T, Erben A

Empirical Research in Management and Economics (WI000258) - Exercise (Übung, 2 SWS)

Pachur T, Zilker V, Hof L, Erben A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more seriously. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-EM: Catalogue of Elective Modules: Modules Energy Markets | Wahlkatalog: Energy Markets

Module Description

MGT001365: Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective | Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on the presentation, which counts with 30%, and the report, assigned 70%.

Case study report: The final study team-report, written in English, should consist of max. 15 pages (excl. references and the title page). Students' work may be theoretical/analytical, empirical, or a literature survey but should include own thoughts and suggestions on the proposed solution. Giving a short (intro)overview regarding the relevant (and topical) literature is always required.

Final presentation: 30 minutes per presentation, 15-20 for a talk and 10 minutes for class-wide discussion.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Students learn the problematics and frameworks for the energy transition analysis, considering challenges and solutions for individual firms across various industries, e.g. steel, power, O&G.

Intended Learning Outcomes:

The aim of this seminar is to

1. Introduce and provide the understanding of: the decarbonisation; its associated challenges and problems (technical, economic, financial) faced by companies; and investment and market opportunities emerging in Germany and internationally;
2. Explain the scope 1, 2, 3 emissions, emission calculation, standards, and introduce possible decarbonization frameworks through examples;
3. Equip the students with the analytical tools and facts critical in making energy transition decisions and allow them to test their learned skills on the real-world problems.

Teaching and Learning Methods:

Project examples, Intro on analytical tools and important facts, Interactive workshop discussing case studies, Hand-on session about decarbonization modeling approaches, analysis frameworks, solution discussion, In-progress consultation

Media:

Reading List:

- Dejuán, Ó., Lenzen, M., & Cadarso, M. Á. (Eds.). (2017). Environmental and economic impacts of decarbonization: Input-output studies on the consequences of the 2015 Paris Agreements. Routledge.
- Johnston, R. J., Blakemore, R., & Bell, R. (2020). The role of oil and gas companies in the energy transition. Atlantic Council.
- Lenox, M., & Duff, R. (2021). The Decarbonization Imperative: Transforming the Global Economy by 2050. Stanford University Press.
- Peszko, G., Van Der Mensbrugghe, D., Golub, A., Ward, J., Marijs, C., Schopp, A., ... & Midgley, A. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. World Bank Publications.
- Harvey, H., Orvis, R., & Rissman, J. (2018). Designing climate solutions: a policy guide for low-carbon energy. Island Press.
- Ghosh, N., & Gupta, D. (2022). Decarbonization strategy of businesses, stock return performance and investment styles: a systematic review. Benchmarking: An International Journal.
- Jenkins, J. D., Luke, M., & Thernstrom, S. (2018). Getting to zero carbon emissions in the electric power sector. Joule, 2(12), 2498-2510.
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2021). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. Review of International Political Economy, 1-28.
- De Cian, E., Dasgupta, S., Hof, A. F., van Sluisveld, M. A., Köhler, J., Pfluger, B., & van Vuuren, D. P. (2020). Actors, decision-making, and institutions in quantitative system modelling. Technological Forecasting and Social Change, 151, 119480.
- Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow III, W. R., Zhou, N., ... & Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. Applied Energy, 266, 114848.

- Eckerle, K., Whelan, T., DeNeve, B., Bhojani, S., Platko, J., & Wisniewski, R. (2020). Using the Return on Sustainability Investment (ROSI) Framework to Value Accelerated Decarbonization. *Journal of Applied Corporate Finance*, 32(2), 100-107.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Peñasco, C., Anadón, L. D., & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, 11(3), 257-265.
- Skoczkowski, T., Verdolini, E., Bielecki, S., Kocharński, M., Korczak, K., & Węglarz, A. (2020). Technology innovation system analysis of decarbonisation options in the EU steel industry. *Energy*, 212, 118688.

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective (MGT001365) Limited places (Seminar, 4 SWS)
Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-FA: Catalogue of Elective Modules: Finance and Accounting | Wahlkatalog: Finance & Accounting

Module Description

MGT001352: Applied Sustainability Reporting | Angewandte Nachhaltigkeitsberichterstattung

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung besteht aus einer Übungsleistung. Diese besteht aus drei Bestandteilen: (1) einem 60minütigen schriftlichen Test (50%), (2) einer Präsentation der empirischen Analyse (25%) sowie einem dazugehörigen Executive Summary (25%). Im schriftlichen Test zeigen die Studierenden ihre Kenntnisse zu Sustainability Reporting sowie dem regulatorischen Umfeld auf sowie, dass sie in der Lage sind Sustainability Reporting Standards sowie deren Anwendung zu analysieren und konzeptionell-normativ zu beurteilen. Im Rahmen der empirischen Analyse demonstrieren die Studierenden ihre Fähigkeiten zur empirische Analyse von Sustainability Reports anhand ausgewählter Unternehmen. Die Studierenden werden ihre Ergebnisse im Rahmen einer 15minütigen Präsentation mit anschließender Diskussion vorstellen sowie ein schriftliches Executive Summary zu ihren Forschungsergebnissen erstellen.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

keine

Content:

Das Seminar führt in die aktuellen Entwicklungen der Nachhaltigkeitsberichterstattung ein und behandelt insbesondere folgende Themengebiete:

- aktuelle Sustainability Challenges sowie deren Effekte
- Regulatorische Rahmenbedingungen (z.B. European Green Deal)
- aktuelle Forschungsergebnisse zur Nachhaltigkeitsberichterstattung

- aktuelle Entwicklungen im Bereich der Sustainability Reporting Standards und Frameworks
- Nachhaltigkeitsberichterstattung nach den weltweit verbreiteten Standards der Global Reporting Initiative (GRI), den Standards/Entwürfen des International Sustainability Standards Board (ISSB) sowie den Standards/Entwürfen der Europäischen Union
- Empirische Analyse der Nachhaltigkeitsberichterstattung ausgewählter Unternehmen

Intended Learning Outcomes:

Nach dem Besuch der Lehrveranstaltung sind die Studierenden in der Lage

- die wichtigsten sozialen und ökologischen Sustainability Challenges sowie deren Effekte auf globaler, nationaler und regionaler Ebene zu beschreiben und einzuordnen
- aktuelle Entwicklungen im Bereich Sustainability Reporting zu erläutern sowie diese in das übergeordnete regulatorische Umfeld einzuordnen
- die Effekte von Sustainability Reporting auf Basis aktueller Forschungsergebnisse zu beurteilen
- verschiedene Standards und Frameworks zu Sustainability Reporting zu beschreiben und wesentliche Unterschiede aufzuzeigen
- Sustainability Reporting Standards konzeptionell-normativ zu analysieren und zu beurteilen
- Nachhaltigkeitsberichte empirisch zu analysieren und kritisch zu vergleichen
- die Anwendung von Sustainability Reporting Standards zu analysieren und zu beurteilen

Teaching and Learning Methods:

Der Kurs beinhaltet ein interaktives Seminar zu Sustainability Reporting bei dem das gemeinsame Erarbeiten von Kenntnissen und Fähigkeiten sowie die gemeinsame Diskussion und Erörterung im Vordergrund stehen. Hierbei werden die Studierenden in Einzel- und Gruppenarbeiten sowie gemeinsam im Plenum die zentralen Konzepte und Fähigkeiten zur konzeptionell-normativen Analyse von Sustainability Reporting Standards erarbeiten und anwenden. Im Rahmen der empirischen Analyse werden die Studierenden unter Anleitung die Nachhaltigkeitsberichterstattung ausgewählter Unternehmen empirisch analysieren und anschließend präsentieren, wobei eine aktive Diskussion der Ergebnisse mit allen Teilnehmenden erfolgt.

Media:

Moodle; Folien; Flipchart; Berichterstattungsnormen; Übungen; Fallstudien.

Reading List:

- European Financial Reporting Advisory Group. 2022. Sustainability Reporting Standards. Online available at: <https://www.efrag.org/lab3#subtitle1>
- International Sustainability Standards Boards. 2022. Sustainability related disclosures. Online available at: <https://www.ifrs.org/projects/work-plan/#sustainability>
- Global Reporting Initiative. 2021. The global standards for sustainability Reporting. Online available at: <https://www.globalreporting.org/standards>

Responsible for Module:

Ernstberger, Jürgen; Prof. Dr. rer. pol. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Applied Sustainability Reporting (MGT001352) (Seminar, 2 SWS)

Keiling M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001356: Managing Challenges in the BioTech Industry | Managing Challenges in the BioTech Industry

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written exam (60 minutes) with open questions. The exam serves to assess whether students (1) understand causes and the relevance of problems faced by firms in practice, (2) are able to compare and evaluate different approaches for solving these problems, and (3) can apply basic concepts and theories to solve these problems. There are no aids permitted in the exam.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Specialization/ Major in Finance & Accounting

Content:

The chair for Management Accounting offers different courses for "Advanced Topics in Finance & Accounting" which are mainly offered in cooperation with companies or guest lecturers with a long standing experience in management positions. The courses cover problems and questions which are highly relevant in practice. Topics of each individual course will be announced at the beginning of the semester and can change from semester to semester. This cover will broadly cover challenges for successful management, particularly with regard to R&D budgets, effective boards, and corporate social responsibility. In addition, it will highlight the special features of automation and innovation in a BioTech company.

Intended Learning Outcomes:

At the end of the module, students will have thorough knowledge of the topics covered by the chosen seminar. Students understand daily challenges of firms, the relevance as well as causes of problems faced by firms in practice. They are able to apply basic concepts and theories in practice.

to solve these problems and to compare and evaluate different approaches for solving these problems. These concepts and theories consider processes and analyses of the firm as well as increases in firm value.

Teaching and Learning Methods:

Experienced lectures discuss practical topics and challenges. They provide basic theories that help to overcome these challenges. Presentations based on PowerPoint and further lecture notes help for the understanding.

Media:

Presentations, lecture notes, discussions

Reading List:

Will be announced in the first lecture

Responsible for Module:

Friedl, Gunther; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Managing Challenges in the BioTech Industry (MGT001356) (limited places) (Seminar, 2 SWS)

Pötting S, Schoonjans E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001358: Advanced Seminar Finance & Accounting: Data Science in Finance | Advanced Seminar Finance & Accounting: Data Science in Finance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written report of the final project accounts for 70% of the final grade, and the presentation of the project accounts for 30% of the final grade. The students are required to generate a project idea after consultation with the course instructor and develop it over a period of six to eight weeks. Students are to demonstrate their command of the methodologies covered in the first part of the course.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in application of data science techniques in a finance setting; basic knowledge of python is recommended but not required.

Content:

The main blocks are: 1. Basic semantics of Python 3. 2. Data processing packages and techniques. 3. Data visualisation tools. 4. An Introduction to machine learning. 5. Alternative data sources in finance (NLP based textual analysis, etc.)

Intended Learning Outcomes:

After completion of the course, students should have generated a generic workflow, how upon being confronted with a finance- related topic, to develop a hypothesis, find proper data sources, process the raw data, run statistical instruments on the dataset, and draw conclusions from the outcome. They should also learn how to communicate their ideas and results in an academic manner.

Teaching and Learning Methods:

For the first stage of the course, there will be 6-8 sessions of lectures. The final presentations will be held in a seminar style over one or two days depending on the number of participants.

Media:

Exemplary codes, websites, etc.

Reading List:

Python for Finance - Analyze Big Financial Data by Yves Hilpisch.

Responsible for Module:

Braun, Reiner; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (MGT001358): Data Science in Finance (Limited places)
(Seminar, 4 SWS)

Braun R, Dong Y

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-IE: Catalogue of Elective Modules: Innovation & Entrepreneurship | Wahlkatalog: Innovation & Entrepreneurship

Module Description

SOT10028: Social Entrepreneurship Education at Vocational Schools | Social Entrepreneurship Education an und mit beruflichen Schulen

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Auf Basis der Inhalte der Seminarsitzungen, erstellen die interdisziplinären Studierendengruppen (Projekt-)Unterricht für eine berufliche Schulart zum Themenbereich "Social Entrepreneurship Education". Die konzeptionierten Unterrichtssequenzen werden die Studierenden in ihren Gruppen nach Rücksprache mit den betreuenden Lehrkräften sowie den Dozierenden an der jeweiligen Schule durchführen sowie die Schülergruppen bei ihren eigenen Umsetzungsideen unterstützen. Die Studierenden organisieren gemeinsam mit den jeweiligen Lehrkräften der Schule ein geeignetes Präsentationsformat, um die Schülerergebnisse gekonnt in Szene zu setzen. Weiter wird die Umsetzung an der Schule durch die Schülerinnen und Schüler sowie die Lehrkräfte evaluiert. Die Studierenden weisen in einer (unbewerteten) Zwischenpräsentation den zwischenzeitlichen Arbeitsstand nach und erhalten von ihren Mits Studierenden und den Dozenten Rückmeldung. In einer (Projekt-)Abschlusspräsentation diskutieren die einzelnen Studierendengruppen den Umsetzungsverlauf und gehen reflektiert auf die eigenen Erfahrungen sowie die Ergebnisse an den beruflichen Schulen ein. Im Projektbericht bereiten die Studierenden gemeinsam die einzelnen Phasen der Lehrveranstaltungen nach. Der Projektbericht wird in der jeweiligen Gruppe verfasst und umfasst pro Person 4-6 Seiten. Gemeinsam mit der Abschlusspräsentation wird dann die Endnote des Moduls gebildet.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Die Lehrveranstaltung wird in vier Phasen unterteilt. Die erste Phase befähigt die Studierenden inhaltlich, damit diese nach dem Grundgedanken des Social Entrepreneurship-Ansatzes Unterricht bzw. Veranstaltungen planen, durchführen und evaluieren können. In Phase zwei wird (Projekt-)Unterricht für eine berufliche Schule nach Vorgaben der Schule (Challenge) entwickelt. In diesem Zeitraum werden die Studierenden von den Lehrkräften sowie Dozent*innen betreut und beraten. Die Phase drei ermöglicht es den Studierenden, den selbst entwickelten (Projekt-)Unterricht ein- und umzusetzen sowie Schülerinnen und Schülern bei deren Konzepterstellung als Antwort auf die gestellten schulischen Challenges zu unterstützen und zu beraten. Am Ende dieser Phase präsentieren die Schülerinnen und Schüler im Rahmen einer Konferenz ihre Konzepte und Ergebnisse. In einer Abschlusspräsentation (Phase 4) diskutieren die Studierenden die Umsetzung in der Schule sowie die Evaluationsergebnisse und reflektieren ihre Erfahrungen und die Lernergebnisse der Schülerinnen und Schüler.

Intended Learning Outcomes:

Nach dem erfolgreichen Absolvieren des Moduls sind die Teilnehmer in der Lage, eigenständig im Kontext der Social Entrepreneurship Education Unterricht zu planen, gestalten, durchzuführen und zu evaluieren. Sie können adressatenbezogen die entsprechenden Methoden sowie Sozial- und Aktionsformen auswählen und mit Bezug auf theoretische Hintergründe Handlungsalternativen darstellen. Überdies können sie alleine und im Team sowie unter Einbezug externer Vorgaben Unterricht sowie Curricula qualitativ weiterentwickeln. Sie erkennen die vielfältigen Anforderungen, um den Social Entrepreneurship Education Ansatz an der beruflichen Schule zu implementieren, umzusetzen sowie passende Evaluationen zu entwickeln und anzuwenden. Zuletzt entwickeln die Studierenden ihre Projektmanagementkompetenzen.

Teaching and Learning Methods:

Dozentenvortrag, Seminar, Train-the-Trainer, Präsentation, Challenge-Based-Learning, Methoden- und Medientraining, etc.

Media:

Dozentenvortrag, Skript, Powerpoint, Eigenlektüre, Tafelanschrieb / Whiteboard, Online-Plattformen (z.B. Moodle, Kollaborations-Tools, ...); Lernvideos; Train-The-Trainer-Seminar

Reading List:

wird zu Beginn der Lehrveranstaltung bekannt gegeben

Responsible for Module:

Förster, Manuel; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Social Entrepreneurship Education an und mit beruflichen Schulen (Seminar, 2 SWS)

Förster M, Kiefer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001341: Prototyping Entrepreneurial Ideas in New Technology | Prototyping Entrepreneurial Ideas in New Technology

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a group project (60%) and a presentation (40%) . Please note that dropping the course after topics of group projects have been chosen and announced will have consequences.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

The module consists of lectures, class discussions, groupwork, group project and individual feedback sessions where students share their progress and receive feedback. The students are supervised by the instructors in different stages of the class.

Intended Learning Outcomes:

After completing this module, students should be able to:

- understand the connection between technological features, entrepreneurial opportunities and business ventures in new technologies
- identify and evaluate entrepreneurial ideas in new technologies
- apply concepts and tools to discover customer problems and formulate a solution-based approach using new technologies
- demonstrate a set of skills including, but not limited to analytical skills, critical thinking, planning, building, and presenting a pitch deck
- develop abilities to work in an entrepreneurial team: communication, coordination, continuous improvement, goal management, rapid prototyping

Teaching and Learning Methods:

Action-oriented learning, interactive teaching, group project, group discussions

Media:

PowerPoint, journal articles, videos

Reading List:

Gruber, M., & Tal, S. (2017). Where to Play: 3 steps for discovering your most valuable market opportunities. FT Publishing International

Christensen, C. M., Hall, T., Dillon, K., & Duncan, D. S. (2016). Know your customers' "jobs to be done": is innovation inherently a hit-or-miss endeavor? Not if you understand why customers make the choices they do. Harvard Business Review, 94(9), 54–62.

Mullins, J., & Komisar, R. (2010). A business plan? Or a journey to plan B? MIT Sloan Management Review, 51(3), 1–5.

Responsible for Module:

Zhao, Ding; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Prototyping Entrepreneurial Ideas in New Technologies: Blockchain (MGT001341) (Limited places) (Seminar, 4 SWS)

Shetty S, Zhao D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001346: Impact School | Impact School

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final examination of the project consists of two components. The first is the presentation prepared by the students at the end of the intensive phase. The second is a final report that must be submitted at the end of the semester. Both count for 50% of the grade.

At the end of the intensive phase, the teams present the approaches that they developed for solving the challenges set beforehand. This includes the presentation of a simple prototype, for example a mock-up or a document. The presentation is approximately 10 minutes in length. The students thus show that they are able to translate the information they have received into developing independently a solution and to present it in an appropriate manner. During the intensive phase, they are accompanied and supported by their coaches and the accompanying instructors.

The second part of the grade consists in the report to be submitted at the end of the semester. The report covers the preliminary sessions, the intensive phase as well as the follow-up session. It documents in a structured way how the information received was used to develop the solution. Furthermore, feedback received from the partner who provided the challenge should be considered and incorporated. The report ensures that instead of simply documenting their findings students structure and reflect on them. The final report should not exceed 27,000 characters and must be submitted by the end of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Basic understanding of entrepreneurship and its principles, such as from attending an introductory lecture on the topic, founding experience, or closely following the media on the topic

- Interest in the creation of societal and ecological impact by developing technology-based solutions

Content:

The seminar is divided into several phases. In the course of two preliminary sessions, the students gain basic knowledge about the focused technology and its opportunities and risks based on existing approaches in the field of climate protection, ecology or society. Ethical implications are also discussed at this point. Furthermore, they get to know the concept of impact as well as the first basics for creating an impact logic. With the help of self-learning materials, they deepen this knowledge until the beginning of the intensive phase.

The core of the Impact School is the five-day intensive phase, during which students work in teams on challenges that are provided by cooperation partners. The challenges focus on social and/or ecological problems that are to be solved using technology-based approaches. During the week, the participants learn the practical application of innovation methods as well as the basic principles of business modelling and develop a simple prototype of their solution. They also receive input from experts in the field. Companies, public administration, non-governmental organizations, student organizations and other partner universities and organizations can be involved as cooperation partners. They also contribute by offering thematic inputs, excursions or similar. The participants form teams at the beginning of the intensive phase and each team is accompanied by a coach. The coaches support the application of the tools and methods learned and ensure a healthy feedback and discussion culture within the teams. The intensive phase ends with an event in which the teams present the solutions they have developed.

There will be a follow-up session, which will introduce participants to the opportunities and resources for pursuing start-up projects within TUM. The first part is a short presentation followed by a Q&A session with start-up consultants. Furthermore, an exchange with a tech start-up that focuses on solving a social or ecological problem is planned.

Intended Learning Outcomes:

The goal of the impact school is to enable students to develop practice-oriented solutions to reach the UN Sustainable Development Goals by using technologies of the future. The students will gain knowledge regarding these technologies from an interdisciplinary perspective. They will learn:

- to assess the benefits and risks of technologies with regard to the generation of social and ecological impact
- to understand and apply the concept of impact and its implications
- to implement the entrepreneurial innovation process in interdisciplinary teams in order to generate concrete solutions.

By developing solutions in teams, students improve soft skills such as creativity, perseverance and communication skills. In addition, they get to know the Munich ecosystem for impact/social entrepreneurship as well as TUM's resources and opportunities for implementing their own start-up projects.

Teaching and Learning Methods:

Lectures, discussions, development of challenge-based solutions, excursion, team coaching sessions, feedback discussions, presentations, Q&A session. The variety of methods ensures that the right method is chosen for each learning content to be taught. For example, new material is presented by experts in the field in keynote speeches and then discussed in large or small groups before it is incorporated into the development of solutions. Feedback discussions and team coaching sessions ensure that the tools and methods presented are correctly understood and applied. Furthermore, the teams are supported in working together in a respectful and effective manner and to develop an appreciative feedback culture. The final presentation at the closing event gives the participants the opportunity to practice their communication skills. Through the final report students consolidate the knowledge gained during the seminar and reflect on it. The exchange with start-up consultants and start-ups provides the participants with an impression of how social and ecological impact can be generated in practice through the implementation of their own start-up projects.

Media:

Videos, presentations, online materials, quiz, exercise sheets, Power Point, flip charts, mural boards

Reading List:

Garette, B./ Phelps, C./ Sibony, O. Cracked it!: How to solve big problems and sell solutions like top strategy consultants. Palgrave MacMillan, 2018

Martin, L. Design of Business: Why Design Thinking is the Next Competitive Advantage. Harvard Business Press, 2009

Kurz, B./ Kubek, D.: Social Impact Navigator, Phineo, 2017, verfügbar auf <https://www.social-impact-navigator.org/>

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Impact School (MGT001346) (Seminar, 4 SWS)

Alexy O [L], Alexy O (Krauss J, Vogel C)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001347: Innovation Facilitator | Innovation Facilitator

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 130	Contact Hours: 50

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Combination of group and individual project assignment - the assignment consists of two components: (1) Instructors will observe students' efforts of preparing, executing and postprocessing Innovation Sprints as well as the support of innovation teams through moderating workshops and team sessions, carrying 80% of the final course grade and (2) an individual reflection paper of up to 1,200 words describing the personal learning journey as innovation facilitator, carrying 20% of the final course grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Practical experience in applying Design Thinking and Business Design as well as distinct ability to work in a team and great interest in working with individuals and teams

Content:

In this train-the-trainer format experienced students learn to design and lead innovation sprints and workshops for student participants. As part of their education students will design Innovation Sprints as well as additional workshops and thereby become Innovation Facilitators who provide other students with an innovative mindset and tools that help them to create innovation and shape a sustainable future. Students will cover all aspects of conducting an innovation sprint, from preparing the content, acquiring participants, communicating with partners, creating a fun workshop atmosphere to conducting the workshop sessions and evaluating them. Next to Innovation Sprints, students will also design and facilitate sessions for other student innovation teams who need support, inspiration and methods on their journey. These sessions revolve around synthesis of insights from qualitative research, ideation and prototyping as well as individual consultations with the teams.

The Innovation Facilitators are part of a self-organized, self-responsible team with clear roles and responsibilities. They have a lot of free space to design and organize the workshops and sprints in a way that makes them successful and valuable for the participants.

Throughout the course they themselves participate in workshops and receive intensive support by experienced facilitators who provide input, feedback, impulses and retrospectives. The facilitators start with a train-the-trainer and team building workshop at the beginning of the semester where they learn how to conceptualize trainings and stimulate different motivational types. In weekly roundtables they get impulses and support from experienced facilitators as well as direct feedback during the sprints. After the first sprint they have a retrospective to derive learnings for the next sprint. They also attend a storytelling workshop to improve their training skills. After the second sprint they will get a workshop on how to facilitate sustainability in innovation when working with teams. At the end of the semester they will have a final retrospective to reflect on their individual strengths and team learnings for future projects.

Intended Learning Outcomes:

By the end of the semester students will have gained hands-on experience as a trainer and facilitator and the ability to design and conduct workshops and trainings with the best possible learning outcome for the participants. They will have deepened their methodological knowledge in Design Thinking and sustainable business design and have the ability to apply it in following founding projects or a lead role in an innovation team. At the same time, they will have experienced working in a diverse, self-organized team and they will have learned to actively create a setting in which teams can work together effectively by giving and receiving feedback, moderating discussions, defining project goals and reacting to changes. Students will be able to actively prioritize and delegate tasks and manage the expectations of different stakeholders.

Teaching and Learning Methods:

This module relies on a combination of input sessions, workshops, teamwork, reflection and individual feedback and support. While input sessions will stimulate students' engagement with relevant tools and topics and prepare them to carry out workshops themselves, team discussions and regular reflection sessions will support the implementation of the knowledge with student innovation teams. Live feedback and support during innovation sprints will allow students to directly improve their training skills.

Media:

Presentations, Canvas, handywork

Reading List:

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation Facilitator (MGT001347) (Seminar, 4 SWS)

Alexy O [L], Schuster J (Guttleber S)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001349: How Digital Platforms Compete – Building and Sustaining Competitive Advantage | How Digital Platforms Compete – Building and Sustaining Competitive Advantage

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module is examined via exercises (“Übungsleistung & Testate”), using two elements to assess the different learning goals of this course.

- Oral, individual: 50%. For each session of class, you will be given in advance a set of Assignment Question to prepare for case study discussion. We will assess your contributions to solving these question in class when we discuss the case study to see whether you can define, explain, and apply key elements of the subject matter; describe, compare, and appraise platform business models for a given situation; and build and sustain competitive advantage. Students do not have to be present in every session to achieve full marks; given to-be-defined, legitimate circumstances, such as health matters, and instructor permission, students may also submit written solutions prior to class as a basis of grading. Each student should attend a feedback session around the middle of the term to be informed about their current performance
- Written, individual: 50%. in the last session of class, students will be provided an exercise sheet, in which students will individually highlight in written, condensed form that they understood the key learnings emerging from a synthesis of the class discussions from the entire course

Repeat Examination:

Next semester

(Recommended) Prerequisites:

English proficiency for case preparation and class discussion is critical. Adapting the case specific terminology is necessary for meaningful class discussions. Weekly time budget no less than 5 hours per case (depending on language skills). No specific prior courses necessary. Cases will be provided.

Content:

With the advent of the internet in the early 1990s, digital platforms have become the fastest growing and most valuable businesses of the economy. Based on new high-speed (mobile) telecommunication networks, access to digital platforms has become universal and facilitated opportunities for innovative services, from online searches to social networks, online auctions to music streaming, real-time news distribution to ubiquitous video entertainment, and so on. All corporate entities, or firms, engaged in this market are fairly young and indeed created a different type of 'competitiveness' compared to traditional industries. So 'how digital platforms compete', i.e. how they are building and sustaining competitive advantages, is what we are discussing in this seminar.

Using the Case Study Method, developed by Harvard Business School (HBS) to educate graduate students, we look at one case at a time in the form of a fact-based case description paper, provided to all participants one week prior to class. Each (weekly) class focuses on one digital platform providers' competitive performance and discusses its competitive options at the time of the case, covering three broad topic areas: 1) How successful firms build and sustain competitive advantages; 2) Digital platforms' specific 'network effects' and resulting business models and their economic results; 3) Dependence of digital platforms on facilitating network infrastructures. With about 12 different cases, e.g. on Amazon, Google, Spotify and WhatsApp, the variety/multitude of competitive actions for digital platform firms will become apparent during of the seminar. This shall enable students, when later in life confronted with real-life competitive issues, to apply their judgement based on the experience of the variety/multitude of cases discussed in the classroom. That is how close a classroom discussion can come to the 'real world'. In addition, the active case discussions provide a good exercise of 'disagreeing in an agreeable manner', which is good practice.

Intended Learning Outcomes:

Knowledge-related outcomes

Upon completion of this module, students will be able to:

- Define, explain, and apply in practice key theories related to platforms and platform business models
- Interpret, classify, and assess the conduct and performance of firms trying to establish, actively deploying, or fighting against platform business models
- Describe, compare, and appraise different platform designs for a given situation
- Distinguish the newly learned theories of platforms, platform business models from previously learned perspectives
- Evaluate how environmental change may affect existing platforms and theories around platform (business models)

Skill-related outcomes

- Improve diagnostic and analytical skills (i.e., structured problem-solving)
- Build up critical thinking and interpretation skills
- Enhance verbal and argumentation skills via presentations and group discussions

Teaching and Learning Methods:

The course will mainly draw on the Case Method, most famously used at Harvard Business School. Since the selected cases were not specifically written for this seminar (Strategy, General Management), 'assignment questions' are added to the case preparation in order to provide the specific focus on the seminar theme of competitiveness. There is no objective to 'solve' a case and the aim is to show various options from which to choose a preferred way of action. A 'vote' on the best 'strategy' at the end of a class discussion usually presents the principal options, not 'right' versus 'wrong', rather a 'competition' of the strong against the weak argument presented by the participants.

Media:

The largest share of this course will be co-developed by all of us through discussions of course materials. In each session, we will help facilitate and guide the course discussion by taking notes on whiteboards. We strongly encourage you to take notes yourselves, and to consider not bringing laptops (they are not as bad as phones [NO PHONES!], but will still inhibit your learning). Specific topics and definitions may be introduced using PowerPoint slides. Finally, note how a large share of learning will occur through you preparing individually and in groups for the in-class session. Techniques to do so will be introduced in the first session of class.

Reading List:

An up to date reading list will be distributed around the first session of class each semester.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

How Digital Platforms Compete – Building and Sustaining Competitive Advantage (MGT001349)
(Limited places) (Seminar, 4 SWS)

Alexy O [L], Melcher H

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001351: Yes we can! - Empowerment as composition | Yes we can! - Befähigung als Komposition

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination performance falls into the category of exercises and consists of two parts.

- Written and oral homework (70% of the grade): Students demonstrate their theoretical understanding of the concepts and ideas covered by regularly preparing short written reports and discussing them with the group.
- oral test (30% of the grade) The ability to contextually apply the concepts learned, as well as demonstrating the social skills acquired, such as stress resilience, leadership and analytical skills, will be evidenced by a prepared oral presentation in front of an audience (15 min.)

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- curiosity
- motivation
- (Interest in) thinking out of the box
- Music/instrumental playing not required, but enjoyable

Content:

How many times have we heard this: As future value-driven managers and social entrepreneurs, as servant leaders and social role models, etc., we prudently ensure sustainable innovation and invention, foster meaningful creativity, communicate constructively, work efficiently in balance, negotiate wisely, design clearly, practically and aesthetically,...
yes, we can(could) be those charismatic changemakers, IF!!!!...

To fathom the conditionality behind this auspicious IF, we will make use of the most intense teaching language mankind has used since the beginning: Music. Music like that of J. S Bach

lets us hear the vision of a society striving for perfection and its equivalent economy in its contrapunctus - and at the same time it gives us an idea of how and by what this becomes possible: Why the music by Bach, Mozart, Schubert, etc. is able to do this is revealed in this course, by a look at a wide variety of disciplines - from neurobiology, to quantum mechanics, to philosophy. Here we find amazing answers to questions about how sustainable learning and (re)thinking become possible, why Design Thinking is an important tool for human development, why and how we need to decelerate in order to have more time and power, how relationship and connection/connectedness work in all areas, why without comprehensive (heart) education as the single most important empowerment ever, prosperity as well as political and economic peace will never be possible.

We reflect together, supported by discussion and music, where good leadership begins and what forms it could take. Topics discussed thus include:

- Neural processes and their usefulness/control by a person (embodiment and priming) to maximize efficiency in daily and professional life
- Music composition processes
- Philosophy and ethics of responsible action
- Effective transmission of messages, supported by stage presence and body posture

Can we? Yes we can!

Intended Learning Outcomes:

At the end of the course, students will be able to:

- understand socially competent (self-)leadership and apply it in various situations
- to analyze in a networked manner and to develop sustainable approaches to problem solving for personal, concrete and general economic issues
- to combine economic and ethical aspects
- to use the acquired soft skills (e.g. self-awareness, presentation skills, negotiation skills, personal initiative) for negotiation situations
- apply practical exercises to create a calm and stable work environment and thereby increase performance/efficiency
- deal with stress (resilience)
- to evaluate their entire thinking, perception and actions from different ethical points of view

Teaching and Learning Methods:

The content of the course is designed interactively with the students in groups as well as in individual exercises, e.g. through discussions, piano recitals, presentations. New material and subject areas are also taught through various techniques such as lecture, self-study or flipped classroom. The course usually takes place on two days in units of max. 3h in presence. The location of the course will be announced in time, but will probably be one of the rooms at TUM where a grand piano is available (e.g. at TranslaTUM at Rechts der Isar).

Media:

Presentations, movies and concerts

Reading List:

Stone, Zander: The art of possibility 2002;

Hofstadter: Gödel, Escher, Bach - ein endloses geflochtenes Band 2016;

Muhammad Yunus: Creating a world without poverty 2009;

additional literature when course starts

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Yes we can! - Befähigung als Komposition (MGT001351) (Seminar, 6 SWS)

Alexy O [L], Sonnek (Zeis) C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001354: Artificial Intelligence for Innovation and Entrepreneurship | Artificial Intelligence for Innovation and Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module grade is based on a group presentation. During the seminar, students will ideate their own AI use cases, and assess them in terms of value and ease of implementation. In a group they will prioritize one use case and work on the implementation along the machine learning lifecycle taking into account ethical considerations. The group work has to be presented in the seminar and ends with a written report.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Artificial intelligence (AI) holds tremendous promise to benefit nearly all aspects of our society, including the economy, healthcare, security, the law, transportation, even technology itself. For organizations as well as for entrepreneurs there is no way around this technology, if they want to be and stay competitive. This module covers:

- Introduction to AI, algorithms, and machine learning
- The technology behind AI
- AI for innovation and entrepreneurship
- Ideating, assessing, prioritizing AI use cases
- Introduction to MLOps and building AI along the machine learning lifecycle
- Ethics and human centric design

Intended Learning Outcomes:

Students gain understanding of the state of the art in artificial intelligence and how it is and can be applied in organizations and startups. Students will develop a solid and jargon free understanding of the technology and concepts such as AI, machine learning and which opportunities and challenges it brings to organisations and society. Students gain the ability to ideate and assess their own AI use cases and learn what it takes to implement them bring them into production

Teaching and Learning Methods:

The module is taught as a 2 SWS seminar. New concepts will be presented as lecture and then applied in group work in exercises which prepare students for the group presentation. To build bridges between course work and self-studying blended learning is applied.

Media:

Whiteboard, Slides, Code-Examples, Textbook, journal articles and papers

Reading List:

Agrawal, A., Gans, J., & Goldfarb, A. (2018). Prediction machines: The simple economics of artificial intelligence.

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Artificial Intelligence for Innovation and Entrepreneurship (MGT001354) (Seminar, 2 SWS)

Post T

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001355: Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for this seminar is based on a final written seminar paper (65%), the final presentation of the seminar paper (20%), and feedback on a peer's seminar paper (15%). Please note that dropping the course after topics have been chosen and announced leads to grade 5.0 (failed). While the grade for your final seminar paper (10 / 15 pages +/- 10%) will be determined purely on the last version you hand in before the final submission deadline (see "course outline"), you will also have to iterate on this throughout the class, by writing a draft paper earlier in the semester and giving a 10-15 minutes presentation on this earlier version (worth 15% of your grade).

Please note that we will require you not only to submit your paper to us via Moodle, but also to TurnItIn, for an automated citation check.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

The module consists of an introduction to problematization methods for academic research/ process of scientific writing. Early on in the course, the topics for each student's seminar paper will be decided. Based on their topic students prepare their term paper which they will present at the end of the module.

The module also involves multiple (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Intended Learning Outcomes:

After the successful completion of this module, students are able to:

1. Understand the scientific research process
2. Understanding the steps in writing a scientific seminar paper, including how to evaluate academic literature, engage in an academic debate, and prepare and defend academic arguments.
3. Develop critical thinking and several soft-skills, including but not limited to: analytical skills, presentation, argumentation, storytelling, and synthesis.

Teaching and Learning Methods:

The goal of this module is for students to understand key concepts relevant to academic research on environmental entrepreneurship. This body of research focuses on market-based mechanisms to address environmental problems (e.g. entrepreneurship in the context of sectors such as renewable energy). Through the course they will develop specialist knowledge on their selected topic of interest.

More broadly the seminar work also prepares students for academic work (e.g. Masters Thesis, preview into PhD work). Students will write a seminar paper on a specific topic, present this topic to the class, discuss papers, and be involved in scientific discussions on a variety of topics in class. Students are provided with an overview of important readings and literature. Over the course, students will develop their own research questions and identify relevant readings in advancing their seminar paper.

Media:

Presentations, videos, interactive team-work templates

Reading List:

York, Jeffrey G., and Sankaran Venkataraman. "The entrepreneur–environment nexus: Uncertainty, innovation, and allocation." *Journal of business Venturing* 25.5 (2010): 449-463.

Vedula, Siddharth, et al. "Entrepreneurship for the public good: a review, critique, and path forward for social and environmental entrepreneurship research." *Academy of Management Annals* 16.1 (2022): 391-425.

*A full list of readings will be provided at the course introduction

Responsible for Module:

Vedula, Siddharth; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship (MGT001355)
(Seminar, 4 SWS)

Vedula S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law | Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations | Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001364: Family Businesses | Family Businesses

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module will rely on an exam (100% of the overall mark), asking students questions on the core topics discussed in class. Each question requires a reflective and elaborate response from the students drawing on the course content and showing critical thinking skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This foundation course “Family Businesses” deals with the particularities of family businesses and includes the core topics of succession, finance, governance, entrepreneurship, innovation, and corporate social responsibility.

Students will explore the advantages and disadvantages of family owned enterprises compared to non-family firms. The module will also discuss the definition and prevalence of family firms around the world and help students understand the heterogeneity of family businesses.

The module will draw from theory and practice, as we will rely on both, academic literature and practical insights through case studies and guest lectures.

Intended Learning Outcomes:

After completing the module students will be able to:

- Understand and critically reflect on the role of family firms in Germany and worldwide
- Understand family owners’ non-financial and financial goals that drive decision making in family firms
- Reflect on possible advantages and disadvantages of family firms
- Compare theoretical insights on family firms with practical insights through guest lectures

- Apply the learning of the module on real world case studies
- Evaluate specific family firms' actions to address contemporary and emerging opportunities and challenges

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Berrone P, Cruz C, Gomez-Mejia LR. Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family business review*. 2012;25(3):258-279.

Gomez-Mejia LR, Cruz C, Berrone P, De Castro J. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*. 2011;5(1):653-708.

Kellermanns FW, Eddleston KA, Zellweger TM. Article Commentary: Extending the Socioemotional Wealth Perspective: A Look at the Dark Side. *Entrepreneurship theory and practice*. 2012;36(6):1175-1182.

Richards M, Kammerlander N, Zellweger T. Listening to the Heart or the Head? Exploring the "Willingness Versus Ability" Succession Dilemma. *Family business review*. 2019;32(4):330-353.

Zellweger T. Managing the Family Business#: Theory and Practice.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship
(WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB26995: Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design | Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a seminar paper (65% of grade) and a set of presentations (35% of grade). Drawing on the seminar paper, we will examine the degree to which students are able to engage in an academic discussion in the field of innovation, organization design, or strategic entrepreneurship; define and structure a complex problem from that field, and describe and analyze it academically. Two presentations will further highlight whether students are able to present their findings comprehensively and precise (seminar paper presentation: 15 minutes; 25% of total grade) and whether they are capable of applying and connecting their insights in the form of feedback on another seminar paper (discussion of another paper: 8 minutes; 10% of total grade). Across both presentations, we will further evaluate if students are available to communicate clearly and to perform professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

Introductory courses on research methods (for example, "Empirical Research in Management and Economics").

Content:

The module prepares students for the scientific work in their master theses and provides them with deepening insights into academic literature on innovation, organization design, or strategic entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Accordingly, students in this seminar may choose from a broad range of topics around the development of new and established businesses, the strategies managers devise and execute

including questions of positioning, and the organizational design choices they have to deal with. Potential areas questions of study may include:

- Venture creation: How are new businesses created and how do they evolve?
- Organization design: How do their structures develop and change?
- Growth strategies: Are there different paths to consistent configurations and if yes, how do they differ from each other?
- New forms of organizing: What role do supposedly more novel approaches to conducting business (ecosystems, crowdsourcing, open innovation...) or funding companies (incubators, crowdfunding...) play, when should be used, by whom, and how?
- Role of environmental conditions: How does the business environment influence the decision-making of new or established ventures, such as through membership in categories?

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand academic literature on the topic of innovation, organization design, or strategic entrepreneurship. Furthermore, students are able (3) to create their own academic paper. Additionally, they will be able (4) to present their paper and (5) summarize their findings. Moreover, students learn how (6) to lead a academic discussion. Finally, they (7) understand the process of scientific publication.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing and several sessions about academic problem definition and solving, based on which students may select and continuously refine their topic. The topic choice will further be discussed in individual feedback meetings with the seminar instructors.

Based on their topic, students will prepare their term paper which they will present at the end of the module. The students are continuously supervised by the instructors of the module. The module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The seminar topics may also be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

- Davis, M. S. 1971. That's interesting. *Philosophy of the Social Sciences*, 1(2): 309-344. (Note: the first and last sections are particularly "interesting")
- Sutton, R. I. & Staw, B. M. 1995. What theory is not. *Administrative Science Quarterly*, 40(3): 371-384.(Note: this article has several responses in the same issue of the journal which you may also find helpful.)

Further readings will be detailed in the respective course syllabi before the first session of class.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation and Organization Design (WIB26995) (Limited places) (Seminar, 4 SWS)

Alexy O [L], Reetz D (Huber D)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001141: Principled Entrepreneurial Decisions | Principled Entrepreneurial Decisions [PED]

How to make game-changing decisions

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

(1) presentation of their team values and principles for their company/project (focus in SS) and/or presentation of their principles to empower formal instruments of company/project culture, craft strategy and scale with metrics (focus in WS)
and

(2) written reflection on those principles or role-play exercises

As individuals hand in an exercise on personal values and principles and written reflection on principles or role-play exercises

The seminar is on application

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Application & willingness for active participation

being or becoming part of a Startup or project team

Students who are interested in Venture Capital and decision-making of founders are also welcome

Content:

This course will challenge the next generation of leaders and entrepreneurs to think critically about how their personal values and principles inform the difficult decisions they will have to make as they grow their business. The course will first equip students with frameworks to crystalize their own values and principles. Students will learn to apply their own core values. A selection of readings and case studies will provide students with tangible examples of the challenges other entrepreneurs have faced. Each class will be highly immersive, featuring conversations with entrepreneurial guest speakers and break-out sessions. Through conversations with case

protagonists and each other, students will leave the class more prepared to navigate the ethical dilemmas that they may encounter during their professional lives.

Intended Learning Outcomes:

- 1_ students are able to brave difficult situations in the startup context
- 2_ Enable students to begin to craft their own framework – personal and company
- 3_ Discuss case examples (i.e. Flixbus, Konux, ProGlove, ...) and conduct exercises to help them on their journey

Teaching and Learning Methods:

lectures
group works
role plays
real Start-up cases with the founders in class
discussions

Media:

presentations
founders in class
video

Reading List:

Dalio, R. (2017). Principles: Life and work. New York, NY
Horowitz, B., & Kenerly, K. (2014). The hard thing about hard things: building a business when there are no easy answers. New York, NY: Harper Business.
More literature will be provided in class

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001194: Who is responsible for food and health? Social and cultural perspective on food, health, and technology | Who is responsible for food and health? Social and cultural perspective on food, health, and technology

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading will be based on a presentation (~20 minutes) and a final paper consisting of a 2-page outline and the paper at the end of the term itself. Additionally, students get the opportunity to write comments/responses on the readings as a voluntary midterm assessment. Students will be assessed on their understanding of the course material, their application of relevant social science concepts to real-life events, and discussion of controversies raised by the readings. The topic of the final paper should relate to food and health and questions of responsibility. Students will receive feedback on their outline of their final paper in due time. This will assure students find a feasible topic, and use an appropriate key concept (or concepts) and literature from class. The final paper will be assessed on the incorporation of this key concept(s) and knowledge from the module (3000-4000 words).

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

How to eat and live healthily are important topics and central values within contemporary societies, particularly in industrialized countries. Here, being healthy has become an important goal and source of personal as well as shared identity for many, which people often also define through the types of food that they eat. Health and food are also important governance issues as governments across the world face challenges like rising obesity rates, environmental pollution or the climate crisis. At the same time, techno-scientific reconfigurations of food, such as the

example of genetically modified food, are often very contentious and the source of heavily debated controversies as purported healthier and/or more sustainable solutions. Along the way, different actors, collectives and institutions claim responsibility for themselves or others over who gets to, and should decide on health and (healthy) food. This module explores social and cultural perspectives on food, health and related technologies and innovations to inquire what role the practice, normative approach, and policy of 'responsibility' takes on. We will ask: who is responsible for food and health? Is it the individual, the family, the state, medicine, the market, or all of these actors to different degrees? What is good food and health, anyways? And what role do scientific knowledge and technological innovations play in settling these types of questions? The module foregrounds critical discussions on the ways in which scientific knowledge and technological innovations play a role in how we perceive (healthy) food and our own (healthy) bodies. It traces how and why being healthy has become such a central value particularly in societies of industrialized countries. Health has turned not only into a central source of personal identity, but also into an important object of governance, with states investing in the health of their populations. The module further emphasizes the discussion on how (scientific) knowledge related to questions of food and health is produced but also contested. These issues will be discussed in relation to specific contemporary topics, such as the obesity epidemic, microplastic pollution, agricultural biotechnology, vertical farming or epigenetics. Throughout the course, students get to know relevant social science concepts, such as biopolitics, neoliberal orders and responsabilization, nutritional scientism, healthism, among others, which will enable them to think critically about the social and cultural aspects of food, health, innovation and technology.

Intended Learning Outcomes:

Students will understand and apply a range of key concepts, theoretical frameworks, and analytic tools from the domains of Science and Technology Studies (STS), Sociology, Anthropology, and related social science disciplines (biopolitics, nutritional scientism, healthism, as well as responsabilization and neoliberal orders, technological determinism). They will be able to analyze the complex interactions between food, health and questions of responsibility (e.g. food as a form of health identity; health paradigms in society, policy, research & innovation; food regulation/labeling and notions of health and sustainability). Students will further:

- Discern how food and health relates to questions of social order (gender, religion, state, etc.)
- Gain a critical understanding of techno-scientific innovation in what comes to be understood as 'healthy,' and how this relates to wider political, economic and other social orders
- Comprehend how regulatory systems (policy, food and drug labeling, etc.) shape our understanding of what counts as "healthy" (food)
- Research interdisciplinary literature and write a paper on a health- and/or food-related issue that inquires who is considered responsible (state, industry, researchers, consumer activists, etc.)

Teaching and Learning Methods:

Students will receive input and benefit from the expertise of six university teachers who will individually or in teams present specific topics and key concepts. Students will also engage in extensive in-class discussions based on the reading, and do practical mini-workshops with their peers to learn how to reflect and position themselves with regard to these issues. Seminar sessions and discussions are based on assigned readings provided in the syllabus at the

beginning of the term. A key part of instruction is the close reading of weekly assigned texts and reflections of key arguments and concepts. Moreover, the course will use regular exercises to achieve learning progress and practice the application of course content to real-life cases.

Media:

Reader (literature provided in course moodle); power point presentations; flipcharts; video clips; newspaper articles

Reading List:

Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., & Fishman, J. R. (2003). Biomedicalization: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine. *American Sociological Review*, 68(2), 161-194.

Crawford, R. (1980). Healthism and the Medicalization of Everyday Life. *International Journal of Health Services*, 10(3), 365-388.

Nettleton, S. (1997). Governing the Risky Self: How to Become Healthy, Wealthy and Wise. In A. Petersen & R. Bunton (Eds.), *Foucault, Health and Medicine* (pp. 207-222). London/New York: Routledge.

Rose, N. (2006). *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-first Century*. Princeton, NJ: Princeton University Press.

Scrinis, G. (2008). On the Ideology of Nutritionism. *Gastronomica: The Journal of Critical Food Studies*, 8(1), 39.

Responsible for Module:

Penkler, Michael; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more seriously. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-LSMP: Catalogue of Elective Modules: Life Sciences Management & Policy | Wahlkatalog: Life Sciences Management & Policy

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of existing process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given

research questions, which process measures can be collected with the methods, and how to interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:**Reading List:**

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelse, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

-European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

-Exploratory and Qualitative research methods

-Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-MM: Catalogue of Elective Modules: Management & Marketing | Wahlkatalog: Management & Marketing

Module Description

MGT001310: Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy | Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework focuses on the preparation of a full research-based marketing plan. Such an output is made up of two interrelated parts: the initial academic-research part and the latter practical business-like part. The research part requires the use of updated qualitative and quantitative methodologies. The business-like part demonstrates the understanding of international marketing strategy and advanced marketing as a whole. The group seminar paper is based on an extensive presentation (20 to 30 slides), in accordance with the guidelines provided during this advanced seminar. The group written assignment represents 100% of the seminar's evaluation. However, selected students receive an extra grade as a bonus for their proven "in-class attitude". Detailed information that well defines "in-class attitude" is provided during the opening session of the seminar.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Introducing Marketing Strategy in an international context, the role of marketing in a company, the meaning of marketing management, the required elements of marketing research, the

transformation of marketing analysis into marketing strategy and objectives. If time allows, it's planned to tackle the deliverables of a marketing plan being an action plan and control standards.

Intended Learning Outcomes:

At the end of the seminar students will be able to understand the dynamics of marketing strategy in an international business | to realize the role of marketing strategy as a liaison between the company's vision and its tactics | to be able to address objectives based on marketing research | to address "strategic planning" in an international context for an existing company | to improve presentation skills.

Teaching and Learning Methods:

Frontal lectures, in-class discussions, group work, self-made case studies

Media:

Frontal lectures, online supervision

Reading List:

Donnelly, J. H. & Peter J. P. (2012). Preface to Marketing Management. 13th edition, McGraw-Hill.
Lehmann, D. R. & Winer, R. S. (2009). Analysis for Marketing Planning. 7th edition, McGraw-Hill.

Responsible for Module:

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management: International Marketing Strategy (MGT001310) (Limited places) (Seminar, 4 SWS)

Abramovich D, Octavianus E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001335: Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms | Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each seminar participant will work individually on a specific topic in the field of CSR and sustainability of family firms.

Each student will write an academic essay (80% of the overall grade), based on existing literature on CSR and sustainability of family firms as well as on interview insights collected by the student. Each student will conduct a 1-hour interview with a family business owner of a medium sized family firm on sustainability and CSR topics. Students should demonstrate that:

- They are able to conduct semi-structured interviews to a high academic standard
- They can evaluate their interview insights in light of existing research on the topics of CSR and sustainability
- They can draw conclusions and identify opportunities for future research
- They are able to write a paper that follows a clear logic and is based on academic literature

Each student will present their work (20% of the overall grade) to an academic audience. Each student should demonstrate that they are able to answer questions to the empirical and theoretical part of their work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This module will explore actions towards a sustainable economy and ways to improve the social responsibility of businesses. In particular, it will assess how family firms' entrepreneurial and social activities and their unique culture affect CSR and sustainability. Topics covered in the module are:

- Contemporary environmental and social issues for organizations
- The non-financial goals of family firms and their consequences
- Family firms and environmental performance
- Family firms and external stakeholders
- Family firms and internal stakeholders
- Family firms and reporting
- Family firms and philanthropy
- Family firms and social entrepreneurship

Intended Learning Outcomes:

After completing the seminar students should understand how family business owners tackle pressing social and environmental issues. After completing the module students will be able to:

- Understand and critically reflect on the role of family ownership for CSR and sustainability
- Understand family owners' non-financial incentives to engage in CSR and sustainability
- Reflect on possible barriers to promote CSR and sustainability through the family firm
- Compare existing knowledge of CSR and sustainability with their own first-hand experience interviewing medium sized family firms in the region
- Evaluate a specific family firm's actions to promote CSR and sustainability
- Explore how family businesses can exploit sustainable opportunities

Moreover, students will be able to

- Search, understand, synthesize, analyze and apply academic literature
- Present and discuss their findings and conclusions to an academic audience

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, in which the instructor provides the theoretical foundations of family and social enterprises
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-life input will be given through multi-media resources and case studies

- Next to in-class discussions student interaction is also ensured through online technology, such as online polls.
- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor
- In a final presentation, students present the results of their seminar essays

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle):

- Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. 2010. Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly*, 55(1): 82-113.
- Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family business review*, 25(3), 258-279.
- Campopiano, G., De Massis, A. 2014. Corporate social responsibility reporting: a content analysis in family and non-family firms, *Journal of Business Ethics*, 1-24
- Campopiano, G., De Massis, A. & Chirico F. 2014. Firm Philanthropy in Small- and Medium-Sized Family Firms: The Effects of Family Involvement in Ownership and Management. *Family Business Review*, 27: 244-257
- Cruz, C.; Larraza-Kintana, M. Garcés-Galdeano, L. Berrone, P. 2014. Are family firms really more socially responsible? *Entrepreneurship Theory and Practice* 38(6), 1295–1316
- Deephouse, D. L., & Jaskiewicz, P. 2013. Do family firms have better reputations than nonfamily firms? An integration of socioemotional wealth and social identity theories. *Journal of management Studies*, 50(3), 337-360.
- Dyer, W., & Whetten, D. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory & Practice*, 30(6): 785-802.
- Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. 2011. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*, 5(1): 653-707.
- Kellermanns, F. W., Eddleston, K. A., and Zellweger, T. M. 2012. Extending the socioemotional wealth perspective: A look at the dark side. *Entrepreneurship Theory and Practice*, 36(6): 1175-1182.
- Le Breton-Miller, I., & Miller, D. 2016. Family firms and practices of sustainability: A contingency view. *Journal of Family Business Strategy*, 7(1), 26-33.
- Miller, D., & Le Breton-Miller, I. 2005. *Managing for the long run: Lessons in competitive advantage from great family businesses*: Harvard Business Press.
- Richards, M. 2022. When do Non-financial Goals Benefit Stakeholders? Theorizing on Care and Power in Family Firms. *Journal of Business Ethics*, 1-19.

- Richards, M., Zellweger, T., & Gond, J. P. 2017. Maintaining moral legitimacy through worlds and words: an explanation of firms' investment in sustainability certification. *Journal of Management Studies*, 54(5), 676-710.
- Spence, L. J. 2016. Small business social responsibility: Expanding core CSR theory. *Business & Society*, 55(1), 23-55.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001335): CSR and Sustainability in Family Firms (Limited places) (Seminar, 4 SWS)

Richards M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001339: Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management | Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Conceptual foundations of reputation management
- Topic 2. Reputation protection mechanisms
- Topic 3. Methods of reputation forming and maintaining
- Topic 4. Methods of crisis reputation management
- Topic 5. Methods of corporate reputation assessing

Intended Learning Outcomes:

- ability to increase the level of competitiveness of organizations as socio-economic systems taking into account the specifics of interpersonal competition in the trade environment

- identify actions that harm the information security of the trade organization, be able to apply methods to ensure it;
- to determine and implement a set of actions for the organization of e-commerce and goods and services promotion by means of Internet marketing.

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Eric B. Shiraev, Jennifer Keohane, Martijn Icks, Sergei A. Samoilenko. Character Assassination and Reputation Management: Theory and Applications. Routledge. 2021. 283.

John Doorley, Helio Fred Garcia. Reputation Management: The Key to Successful Public Relations and Corporate Communications. Routledge. 2006. 458.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001339): HR Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001340: Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management | Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Structure and functions of the human resources departments
- Topic 2. Competence approach in human resource management
- Topic 3. Planning of work with personnel in the organization
- Topic 4. Staff recruitment and staff selection processes
- Topic 5. Adaptation of staff in the organization
- Topic 6. Personnel evaluation and staff motivation
- Topic 7. Team cohesion and social development of staff
- Topic 8. Innovations in HR management

Intended Learning Outcomes:

- ability to organize the effective work of human resources according to the specifics of organization business objectives;
- ability to provide efficient activity of human resources services for solving human resource management tasks using different types of resources and labour instruments;
- ability to form an effective system of performance evaluation in different categories of work positions in the organization by using modern methods;
- ability to analyse the indicators of personnel movement in the organization and developing measures to stabilize the work of labour collective;

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Noe Raymond, Hollenbeck John, Gerhart Barry, Wright Patrick. Fundamentals of Human Resource Management. McGraw-Hill, 2019. 406.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001340): Reputation Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001342: Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI | Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20 minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Participants will develop a basic understanding of useful applications of AI in the area of strategic management. They learn how companies can strategically apply AI for gaining competitive advantage in different industries. Students will also improve their project management and teamwork skills, as they are required to elaborate a complex project topic on their own. They will create basic skills of academic writing and literature search, too. Furthermore, they strengthen their communication skills while presenting their results in front of the class.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterwards, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Presentation, discussion, academic literature, group work

Reading List:

- Russell, S. J. and Norvig, P. (2021): Artificial intelligence: A modern approach. Pearson Publishing
- Grant, R. M. (2019): Contemporary strategy analysis (10th ed.). John Wiley & Sons, Inc.
- Wodecki, A. (2019): Artificial Intelligence in value creation - Improving competitive advantage. Palgrave Macmillan

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001342): Gaining Competitive Advantage with AI (Seminar, 4 SWS)

Hutzschenreuter T, Lämmermann T, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001343: Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process | Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate on the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20-minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None, except an interest in AI and strategic management.

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining a competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Die Teilnehmer werden die Potentiale und Grenzen von KI für den Strategieprozess verstehen und lernen, wie Strategen innovative KI-Anwendungen für die Strategieentwicklung nutzen können, um einen Wettbewerbsvorteil zu erzielen. Die Studierenden verbessern auch ihre Projektmanagement- und Teamwork-Fähigkeiten, da sie ein komplexes Projektthema selbständig erarbeiten müssen. Sie erwerben auch grundlegende Fähigkeiten im wissenschaftlichen Schreiben und in der Literaturrecherche. Außerdem stärken sie ihre Kommunikationsfähigkeiten, indem sie ihre Ergebnisse vor der Gruppe präsentieren.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterward, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Präsentation, Diskussion, wissenschaftliche Literatur, Gruppenarbeit

Reading List:

- Russel, S. & Norvig, P., 2021. Artificial Intelligence. A Modern Approach. 4th edition. Hoboken: Pearson
- Johnson, G. et al., 2017. Exploring Strategy Text and Cases. 11th Edition. Edinburgh: Pearson Education
- Grant, R. M., 2019. Contemporary Strategy Analysis. 10th Edition. Hoboken: Wiley & Sons

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001343): AI and the Strategizing Process (Seminar, 4 SWS)

Hutzschenreuter T, Perkhofer F, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law | Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations | Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001367: Introduction to R for Data Science | Introduction to R for Data Science

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments and solving the exercises. In addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None. This is an introductory course. It is suitable for beginners without any notable knowledge of programming or data analysis.

Content:

Generating insight from raw data is an essential skill across various scientific disciplines and applied fields. Among the core competencies of a data scientist are structuring projects and workflows, importing, preparing and transforming data sets, common programming methods (such as iteration, functions, conditionals), visualizing and modeling data, and communicating the results in a comprehensible and insightful manner. The module equips students with a solid foundation of such common methods in the field of data science. These methods are demonstrated and practiced using the open source programming language R, associated packages (especially the "tidyverse"), as well as the graphical user interface RStudio.

Intended Learning Outcomes:

At the end of the module students will know and understand commonly applied methods in the field of data science. They are capable of applying these methods to novel data sets and problems, and know how to independently structure and implement data-analytic projects. They are familiar with

the open source programming language R, the graphical user interface RStudio, as well as with common packages and their applications.

Teaching and Learning Methods:

Based on the suggested literature students will give short presentations, introducing the class to methods of programming, data wrangling and data analysis. The students are asked to integrate interactive elements and concrete demonstrations in these presentations. In exercises (solved in small groups or individually) the class practices and consolidates the implementation of the introduced methods by applying them to concrete data sets.

Media:

Reading List:

Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. O'Reilly Media, Inc.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Introduction to R for Data Science (MGT001367) (Limited places) (Seminar, 2 SWS)
Zilker V

Introduction to R for Data Science - Exercise (MGT001367) (Limited places) (Übung, 2 SWS)
Zilker V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001376: Digital Marketing & Text Analytics | Digital Marketing & Text Analytics

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written report consisting of 10 PPT content slides (90%) and in-class participation (10%). The written report will be in the format of a management-style presentation, focusing on the main insights and supported by appropriate visualizations and tables. Thereby, the examination tests the students' ability to translate the results from applying different text analytics methods into managerially relevant insights in a clear, concise, and compelling manner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic experience with R and/or Python is recommended (e.g., loading and exploring datasets, generating variables, creating visualizations, running regression analyses).

Content:

The module will cover the following topics:

- Trends in Digital Marketing & Text Analytics
- Text Analytics Methods (Lexicons, Machine Learning, Deep Learning)
- Sentiment Analysis
- Challenges of Natural Language Processing
- Ethical Considerations of Text Analytics

Intended Learning Outcomes:

Upon successful completion of the module, students will be able to:

- understand how text analytics can inform data-driven decision making
- apply diverse text analytics methods using R and/or Python to digital marketing problems
- evaluate which text analytics methods are appropriate contingent on the application context

- develop an end-to-end solution from unstructured data to structured insights

Teaching and Learning Methods:

The module will be held in the form of a seminar. The first block of the seminar is a lecture-style introductory session to applied text analytics in marketing. The seminar will put emphasis on in-class discussions, interactive materials, practical relevance, research-based, interdisciplinary teaching, and code examples (in R and Python). The seminar will offer an engaging learning environment, complemented by remote and in-class coaching opportunities. To apply the knowledge learned and gain first-hand experience in implementing different text analytics methods, the students will work on an individual case study that they submit by the end of the seminar.

Media:

Slides, research articles, textbooks, interactive websites, programming code (in R and Python)

Reading List:

Berger, J., Humphreys, A., Ludwig, S., Moe, W. W., Netzer, O., & Schweidel, D. A. (2020). Uniting the tribes: Using text for marketing insight. *Journal of Marketing*, 84(1), 1-25.
Hartmann, J., Heitmann, M., Siebert, C., & Schamp, C. (2022). More than a Feeling: Accuracy and Application of Sentiment Analysis. *International Journal of Research in Marketing*. Forthcoming.
Hartmann, J. & Netzer, O. (2022). Natural Language Processing in Marketing. *Review of Marketing Research*. Special Issue: Artificial Intelligence and Marketing. Forthcoming.
Additional references will be provided in the course.

Responsible for Module:

Hartmann, Jochen; Prof. Dr.: jochen.hartmann@tum.de

Courses (Type of course, Weekly hours per semester), Instructor:

Digital Marketing & Text Analytics (MGT001376) (Seminar, 2 SWS)

Hartmann J

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000997: Marketing Entrepreneurship Lab | Marketing Entrepreneurship Lab

Version of module description: Gültig ab summerterm 2013

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a presentation and a reflection paper.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Learn from Max Wittrock, marketing expert and co-founder of jokolade and mymuesli, practical marketing and business knowledge and apply your marketing skills to real world Start-ups. At the Marketing Entrepreneurship Lab students get the opportunity to improve their marketing knowledge and apply it to a real world challenge. Support a Start-up of your choice with a course-related project in the areas of strategic marketing, market research, product launch, etc (also possible as a team). The following topics are covered among others in the course:

- How do you create a marketing plan and decide on a strategy?
- How do you measure marketing effectiveness?
- The basics of Public Relations, Storytelling, and Social Media Marketing
- How to plan a Start-up market entry?
- How to balance budget and goals?
- The correlation of startup business models and marketing

Intended Learning Outcomes:

Have better understanding of marketing challenges and tools. Enable students to apply their theoretical knowledge about marketing and gain new capabilities in a professional and more practical direction by relating to real life startup marketing challenges.

Equip student with practical skills beyond the traditional marketing curriculum and thus close bridge students with startup founders to better equip them for working in a startup.

Teaching and Learning Methods:

lectures
group works
project-based learning
real Start-up cases

Media:

hybrid format, blocked seminar, presentation, discussion, clinic

Reading List:

will be presented at the start of the seminar

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001179: Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption | Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written seminar paper (~15 pages, 50 % of the grade), whereas the results and conclusions of the seminar paper need to be presented (20 min, 50 % of the grade) in front of the class. The seminar paper as well as the presentation in front of the class demonstrate that students are able to reproduce and summarize their acquired knowledge about the respective research topic. Furthermore, the seminar paper and the related presentation show that the students are able to critically analyze the key aspects regarding their research question. By presenting their findings in front of the class, students prove that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics/consumer economics and/or consumer behavior theories.
Knowledge in empirical research methods.

Content:

Key topics of the seminar may include:

- Current issues in sustainable consumption
- Current issues in consumers and digitalization
- Current issues in consumer research

Intended Learning Outcomes:

After successful participation in the module students will have in-depth knowledge on the tackled focus of the module. Students will be able to (1) write a scientific research paper, (2) procure relevant literature and (3) structure a topic. Additionally, students will be able to (4) present their research findings in front of seminar participants, (5) answer their questions and (6) moderate a following discussion.

Teaching and Learning Methods:

The module is a seminar, in which the students will be assigned state-of-the-art research papers from the recent literature. They are expected to prepare high-quality presentations and write-ups, reflecting their analyses, understanding and insights from reading the papers and related literature. The lecturer will provide guidance and advice all along, from the choice of the initial topic, to tips on reading original literature, on scientific writing, and on giving successful presentations.

Media:

Slides, books, scientific papers

Reading List:

Ethridge, D. (2004). Research Methodology in Applied Economics, 2nd Edition. Ames: Blackwell Publishing.

Reisch, L. (2015). Handbook of research on sustainable consumption. Cheltenham: Elgar.

Relevant literature will be selected and communicated specifically.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-OSCM: Catalogue of Elective Modules: Operations & Supply Chain Management | Wahlkatalog: Operations & Supply Chain Management

Module Description

MGT001350: Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

Within this seminar, groups of students study a variety of problems with real-world applications. A supervisor with relevant research background guides each group through every step of their progress, from understanding the state-of-the-art literature to the final implementation of their extensions. Using selected scientific publications, the students will understand problems relevant to different industries and investigate various modeling and solution techniques to solve these problems.

Within this process, students develop a wide spectrum of skills, which ultimately prepares them for carrying out a thesis with high academic value.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the seminar focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides

Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Operations & Supply Chain Management (MGT001350): Production & Supply Chain Management (Seminar, 4 SWS)

Grunow M [L], Grunow M, Pahr A, Schömig-Beißner M, Fatemianaraki S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001370: Designing Manufacturing Systems | Designing Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The students demonstrate that they can create appropriate designs for different production systems using the approaches introduced in the lecture. Furthermore, students show that they are able to explain the fundamentals of the different design approaches and evaluate them. At the end of the lecture students will have a good understanding of the design of production systems and layouts, like job shops, flow lines, single flow rows, production centers, and flexible assembly layouts.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to designing of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these

decisions by applying various quantitative methods in application areas such as assembly systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Job shops
- Traditional assembly lines
- Flexible assembly lines
- Single flow row
- Center production

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in designing production systems.
- Distinguish the most important production layout types (job shop, flow lines and production centers). Analyze the layout types advantages and disadvantages, decide for practical layout problems, which type to choose.
- Apply rough and exact planning approaches for the most important layout types, including the application of heuristics and the formulation and adaption of mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the design problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Designing Manufacturing Systems(MGT001370) (Limited places) (Vorlesung, 4 SWS)

Grunow M, Okumusoglu B, Schömig-Beißner M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001371: Scheduling Manufacturing Systems | Scheduling Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The focus is on scheduling short term operations on the different manufacturing layout types.

The students have to show that for different production systems they are able to apply suitable scheduling approaches taught in the lecture. Furthermore, the students demonstrate that they are able to explain the fundamentals of the different scheduling approaches and evaluate them.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to scheduling of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these decisions by applying various quantitative methods in application areas such as assembly

systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Introduction to scheduling
- Job shops
- Flexible assembly systems
- Economic lot scheduling, block planning
- Scheduling AGV's in centers (online vs. offline scheduling)

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in scheduling production systems.
- Give an overview of the scheduling objectives and requirements in manufacturing.
- Evaluate and apply different planning procedures (shifting bottleneck, scheduling of flexible assembly systems, economic lot scheduling, block planning and online vs. offline scheduling) to develop production schedules for different types of systems such as assembly lines, food processing systems and AGVs in flexible assembly layouts and production centers.
- Apply heuristics and formulate and solve mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the scheduling problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001088: Advanced Modeling, Optimization, and Simulation in Operations Management | Advanced Modeling, Optimization, and Simulation in Operations Management [AMOS]

Version of module description: Gültig ab summerterm 2016

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The offered module is composed of the sections optimization and simulation. In both sections, basic knowledge and skills for designing and evaluating service and production processes are taught. The solution of analyzed problems is gained either through the application of optimization methods or through simulation. Due to the different problem-solving approaches (and the use of different software packages), both sections are thought separately. To facilitate the learning success, the learning outcomes are examined directly at the end of each section. At the end of the optimization section, there is a written exam on modeling linear optimization problems. In addition to theoretical knowledge, the students' skills in modeling with OPL and IBM ILOG CPLEX are tested. At the end of the simulation section, there is also a written exam, in which the learning outcomes in discrete-event simulation, using the software AnyLogic are tested. Both exams evaluate the individual performance of the acquired theoretical and practical skills, requiring own calculations and argumentative answers. Exams are worth 60 points each and noncumulative. To pass the course, students need to pass both exams individually. The final grade of the module is the truncated average of the exam grades. Both exams take 60 minutes each. In the exams, no aids are allowed. In addition, students can achieve a 0.3/0.4-grade bonus (according to APSO/FPSO midterm) in each section through the successful participation in the respective homework assignments.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Management Science, Basic course in Statistics, Basic Course in Mathematics, Production and Logistics

Content:

The acquired skills are used in the field of operations management to understand, redesign, control and optimize the production of goods and services. The students learn quantitative methods for the analysis of decision problems in operations management, and therefore, the basis for all subsequent lectures at the Department of Operations & Supply Chain Management. The presented methods can be subdivided into two distinct study sections: optimization and simulation.

Optimization section:

- Introduction to linear programming, CPLEX Studio IDE, and IBM ILOG OPL
- LP formulations, e.g. production planning problems
- Model building with OPL, e.g. generic modeling, model testing with instances, scripting for pre- and post-processing
- Interpreting and using the solution of a LP model
- Spreadsheet input/output with OPL

Simulation section:

- Introduction to simulation, AnyLogic
- System; event; model; steps in a simulation study
- Data collection, statistical analyse and input modeling
- Fundamental simulation concepts in AnyLogic
- Simulation of simple systems together with verification, calibration, and validation
- Statistical simulation data output analysis having regard to different scenarios

Intended Learning Outcomes:

At the end of the module, students will be able to create mixed integer linear programming formulations, and discrete event simulation models of simple problems in production and operations management.

Furthermore, students will be able to solve MILP formulations in OPL and IBM ILOG Script, and implement discrete event simulation models in AnyLogic. The students also learn, how to evaluate and compare the calculated problem solutions.

Teaching and Learning Methods:

The weekly sessions consist of a lecture with an integrated exercise class. During the lecture, the content is presented and discussed. The students are invited to improve the acquired knowledge by studying the suggested literature. In the exercise, the students apply the acquired knowledge by solving and implementing given problems. The homework assignments allow students to individually improve their skills, by answering theoretical questions and implementing problems, using the respective software. After each homework assignment, the students are free to discuss their solutions and open questions in a Q&A session.

Media:

PowerPoint, Exercise sheets, Whiteboard

Reading List:

Optimization

- Williams, H. P. (1999): Model Building in Mathematical Programming. 4th edition.

Supplementary reading materials about optimization and linear programming

- Domschke, W. and Drexl, A. (2005): Einführung in Operations Research. 6th edition, Springer.
- Domschke, W., Scholl, A. and Voss, S. (1997): Produktionsplanung. 2nd edition, Springer.
- Hillier, F. S. and Lieberman, G. J. (2004): Introduction to Operations Research. 8th edition, McGraw-Hill.
- Klein, R. and Scholl, A. (2004): Planung und Entscheidung. Vahlen.
- Winston, W. L. (2004): Operations Research. 5th edition, Thomson.

Simulation:

- Kelton, W. D., Sadowski, R. P. and Sturrock, D. T. (2010): Simulation with ARENA. 5th edition, Boston: McGraw-Hill.

Supplementary reading materials about simulation and statistics

- Banks J., Carson J. S., Nelson, B. L. and Nicol. D. M. (2009): Discrete-Event System Simulation. 5th edition, Upper-Saddle-River: Prentice Hall.
- Law, A.M. (2007): Simulation modeling and analysis. 4th edition, McGraw-Hill, New York
- Bley Müller, J., Gehlert, G., Gülicher, H. (2008): Statistik für Wirtschaftswissenschaftler. 15th edition, München: Verlag Vahlen.

Responsible for Module:

Kolisch, Rainer; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Simulation in Operations Management (WI001088) (Limited places) (Seminar, 2 SWS)
Jost C, Pahr A

Advanced Modeling and Optimization in Operations Management (WI001088) (Limited places)
(Seminar, 2 SWS)
Jost C, Pahr A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001135: Stochastic Optimization | Stochastische Optimierung

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on of a final exam (60%), written presentation of the results obtained for the homework (40%), and bonus points are awarded for participation in discussions in the lecture and the lab. With this voluntary mid-term assignment students can improve their module grade. The homework during the semester serves to assess the ability to apply stochastic optimization to real world problems. By this method, the students continually reflect about the theory presented in class and learn to translate theoretical knowledge into practical solutions. The in-depth knowledge of the theory of stochastic optimization and the critical reflection of its limitations are assessed in a final written exam focussing on the theoretical knowledge. Moreover, the students can prove their ability to relate these theoretical results to real world problems. The presentation and discussion of the homework in the lab sessions measure students' ability to structure and present their results, connect them with state-of-the-art methods and theories, and present them in a scientific way.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Knowledge of basic linear optimization and basic probability theory would be an advantage. The required theory is reviewed in the class.

Content:

In this module students learn about the theory and the methods of stochastic optimization. The theory is complemented by a range of real-world examples with a focus on applications in energy trading and finance. Along with the examples an introduction to software tools is given that enables students to solve stochastic optimization problems. The required mathematical tools will be introduced along the way.

The module contents span the theory of stochastic optimization (two-stage and multi-stage), numerical solution methods, the treatment of risk via risk measures in stochastic optimization, as well as sampling based approaches.

In particular, topics of the course include but are not limited to

- What is stochastic optimization
- Two-stage linear stochastic optimization with recourse
- Computational methods
- Monte-Carlo methods
- Multi-stage models
- Risk measures in stochastic optimization

Intended Learning Outcomes:

After the successful completion of this module, students are able (1) to understand the basic theory of stochastic optimization, (2) to critically reflect the limitations of the theory, (3) to implement solution approaches for stochastic optimization using MATLAB in combination with numerical solvers, (4) to model real-world problems under uncertainty as stochastic optimization problems that can be treated with the methods introduced in the course, (5) to communicate the results to a scientific audience.

Teaching and Learning Methods:

The module combines several learning methods.

To facilitate a better understanding of the subject the course is divided into lectures and a lab (exercise). In the lectures theory is presented which is subsequently applied by students in homework assignments using MATLAB. The solutions are handed in and students can volunteer to present their solutions in the lab. In private reading, students complement the knowledge from the lecture with additional methods relevant for solving the cases. Students reflect on the theory and their applicability in class and during class discussion. By working on real world stochastic optimization problems, handling actual data, and designing numerical solution approaches as well as engaging in discussions of their homework solutions, participants get in-depth knowledge about the basics of stochastic optimization.

Media:

Lecture notes, presentations, scientific literature

Reading List:

Birge, J. and Louveaux, F. Introduction to Stochastic Programming. Springer Series in Operations Research and Financial Engineering, 2011 (second edition).

Shapiro, A. and Dentcheva, D. and Ruszczyński, A. Lectures on Stochastic Programming: Modeling and Theory. MOS-SIAM Series on Optimization. 2014 (second edition).

Responsible for Module:

Wozabal, David; Prof. Dr. rer. soc.

Courses (Type of course, Weekly hours per semester), Instructor:

Stochastic Optimization, Lecture, 2 SWS

Stochastic Optimization, Exercise, 2 SWS

Prof. Dr. David Wozabal

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology | Technik-Schwerpunkt

Every student must select an engineering / natural sciences specialization and successfully complete modules for a total of 30 credits. The regulations are specific to the selected engineering / natural sciences subject. The following is an example of such a catalog.

Specialization in Technology: Mechanical Engineering (minor) | Technik-Schwerpunkt: Maschinenwesen Basismodule (minor)

Module Description

BV350007: Materials in Mechanical Engineering | Werkstoffe im Maschinenwesen [Materials in mechanical engineering]

Version of module description: Gültig ab summerterm 2021

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Students are assessed in a 90-minute written examination. In the written examination students are required to demonstrate their ability to describe concisely, general basic technical knowledge of materials, the specific properties of metals, polymers and ceramic materials and are able to transfer them into practice, as well as the ability to solve arithmetic problems concerning important material-specific properties under time pressure. Apart from a non-programmable pocket calculator, no aids are allowed.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The lecture teaches about the chemical and physical principles of materials. The materials concerned are steel, non-ferrous metals, thermoplastics, duroplastics, elastomers, ceramics, glass, cement and concrete. Furthermore, the topics of load-dependent and load-independent deformation properties, stress-strain diagrams and strengths in general are discussed. Apart from the mechanical material properties, the production and durability of the materials are also covered. One focal aspect is the topic of material corrosion.

Intended Learning Outcomes:

At the end of the module the students are able to describe the most important materials and to differentiate between them by way of their characteristic properties. They are able to link the material properties to the elementary structure of the materials. They are also able to select a suitable material for a given requirements profile.

Students also acquire competence in describing and selecting relevant tests for the material properties and depending on the material property to be examined as well as analysing test results statistically and evaluating them on the basis of the material requirements.

Targeted case studies should strengthen student's abstraction ability and their skill in transferring that which they have learned to a new problem area.

Teaching and Learning Methods:

In this course the main teaching content is basically taught in the form of a classic lecture with continuous support in the form of a PowerPoint presentation. Particular detailed aspects or aspects important for overall understanding are derived gradually by writing on the board and are explained graphically. This procedure enables students to receive clear and clearly legible presentation of the content and promotes concentrated listening, and therefore the understanding of the students, as they are not diverted by having to continuously write down what is written on the board. The lecture material is examined in greater depth through regular, brief exercises adjusted to the progress of the lecture, which enables optimum implementation of the lecture content.

Media:

PowerPoint-presentation, overheadprojector, board, experiments, video

Reading List:

- Roos, E; Maile, K.: Werkstoffkunde für Ingenieure. Springer 2005
- Reissner, J.: Werkstoffkunde für Bachelors. Hanser Verlag 2010
- Schneider, J.: Sicherheit und Zuverlässigkeit im Bauwesen. www.vdf.ethz.ch
- Henning/Knöfel: Baustoffchemie. Verlag Bauwesen 2002
- Skriptum zu Vorlesung Baustoffkenngrößen, Bauchemie, Konstruktionswerkstoffe Teil III

Responsible for Module:

Gehlen, Christoph; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED150010: Sustainable Mobile Drivetrains | Nachhaltige Mobile Antriebssysteme

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung erfolgt in Form einer schriftlichen Klausur (Prüfungsdauer: 90 min). Die Studierenden sollen in begrenzter Zeit die Konzepte nachhaltiger mobiler Antriebssysteme auf verschiedene Frage- und Problemstellungen anwenden. Damit soll z. B. überprüft werden, ob die Studierenden bewerten können, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann oder ob die Studierenden die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren, elektrischen Antriebssträngen und von Antriebssträngen mit Brennstoffzelle verstehen.

Als Hilfsmittel zugelassen sind: Schreibutensilien, Lineal und ein nicht programmierbarer Taschenrechner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

Themenschwerpunkte:

- * Nachhaltigkeit und Klimaschutz
- * Gestaltung nachhaltiger Mobilität
- * Grundlagen der Fahrzeugtechnik
- * Grundlagen der Fahrzeugantriebe
- * Verbrennungsmotoren mit nachhaltigen Kraftstoffen
- * Elektrische Antriebssysteme (Batterie, Inverter, e-Motor)
- * Antriebssysteme mit Brennstoffzellen
- * Energie und Mobilität

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul "Nachhaltige Mobile Antriebssysteme" sind die Studierenden in der Lage...

- ... zu verstehen, wie und warum der Klimawandel eine Transformation hin zu nachhaltiger Mobilität erfordert
- ... einzuordnen, wie sich diese Transformation auf die traditionellen Verkehrsmittel und ihre Antriebe auswirken wird
- ... zu bewerten, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann
- ... die wichtigsten mobilen Antriebssysteme nach ihren jeweiligen Vorteilen, Nachteilen und Einsatzgebieten zu beurteilen
- ... die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren zu verstehen
- ... die Grundlagen der Funktionsweise und des Aufbaus elektrischer Antriebsstränge zu verstehen
- ... die Grundlagen der Funktionsweise und des Aufbaus von Antriebssträngen mit Brennstoffzelle zu verstehen
- ... einzuordnen, welches Antriebssystem für eine gegebene Anwendung am besten geeignet ist
- ... zu bewerten, welchen Einfluss die Rolle des Energieträgers auf die Nachhaltigkeit des gesamten Antriebssystems ausübt
- ... grundlegende Zusammenhänge zwischen Energie, Mobilität und Antriebssystem kritisch zu hinterfragen
- ... einfache aber wirkungsvolle Grobabschätzungen der wichtigsten Eigenschaften moderner Antriebssysteme vorzunehmen

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen nachhaltiger mobiler Antriebssysteme anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von einfachen Rechenbeispielen gefestigt. Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet.

Damit sollen die Studierenden beispielsweise lernen, zu bewerten, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann sowie die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren, elektrischer Antriebsstränge und von Antriebssträngen mit Brennstoffzelle zu verstehen.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. Sprechstunden werden flexibel angeboten.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer
- * Online-Lehrmaterialien

Reading List:

Zapf, Martin: Kosteneffiziente und nachhaltige Automobile. 2. Auflage. Wiesbaden: Springer Vieweg, 2021.

Doppelbauer, Martin: Grundlagen der Elektromobilität. Wiesbaden: Springer Vieweg, 2020.
Schreiner, Klaus: Verbrennungsmotor - kurz und bündig. Wiesbaden: Springer Vieweg, 2017.
Klell, Manfred: Wasserstoff in der Fahrzeugtechnik. 4. Auflage. Wiesbaden: Springer Vieweg, 2018.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Nachhaltige Mobile Antriebssysteme (Vorlesung, 3 SWS)

Jaensch M [L], Jaensch M, Sonntag C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED160007: Lithium-Ion Battery Production | Lithium-Ionen-Batterieproduktion [VLBP]

Lithium-ion battery production

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination takes place in the form of a written exam (examination duration 90 minutes). By means of comprehension questions, calculation tasks and transfer tasks, the students should prove that they have an understanding of the basic processes of lithium-ion battery production and that they can apply this understanding. The content of the exam consists of comprehension questions from the lecture as well as various tasks, some of which are more advanced, based on the content of the exercises accompanying the lecture. Only a non-programmable calculator is allowed as an aid.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Prior experience in electrical energy storage and production engineering is recommended. Prior knowledge in chemistry and process engineering is not required but helpful.

Content:

The lecture provides an insight into all process steps in the production of lithium-ion batteries. The focus is on the holistic view of the process chain, including important process parameters and influencing factors.

Detailed content:

- Structure of the lithium-ion cell, electrochemical and electro-technical fundamentals, energy storage methods
- Material and cell systems on component level, process chains of battery production, safety aspects, production environment
- Mixing processes for anodes and cathodes (stirring, mixing)

- Coating processes for anodes and cathodes (slot die, doctor blade, cascade die) and process variants
- Calendering processes (porosity analysis, defect patterns)
- Packaging and assembling (cell formats, application areas)
- Packaging and contacting (ultrasonic welding, friction stir welding, laser welding)
- Filling and wetting (electrolyte properties, electrochemical impedance spectroscopy)
- Formation and aging (passivation layer, charge/discharge rate and lifetime test)
- Electrochemical characterization, cost models, quality criteria
- Recycling (material recycling, second life of the battery cell)
- Innovative process steps (laser patterning, mechanical prelithiation) and alternative lithium-ion battery technologies (solid-state batteries, sodium-ion battery)

Intended Learning Outcomes:

After participating in the module, students will be able to understand basic interrelationships of lithium-ion battery production and to evaluate them.

After successful participation in the module, students will be able to:

- Demonstrate a basic understanding of the material systems processed
- Evaluate the mode of operation of a lithium-ion battery on the basis of measurement characteristics
- Know, analyze and classify all process steps in lithium-ion battery production and their variants
- Understand basic interrelationships in lithium-ion battery production
- To develop requirements for the respective processes and suitable plant technology
- Evaluate typical fault patterns and assess their possible causes and consequences for the product
- Characterize the properties of a battery cell using cell tests and correlate them with the manufacturing processes
- Know, understand and apply important methods of quality assurance
- Understand future technologies and their special features with regard to the product and be able to recognize and classify trends

Teaching and Learning Methods:

In the lecture, the theoretical basics of lithium-ion battery production are taught by means of lecture and presentation. With the explanations from the lecture and corresponding self-study, the students learn to understand, evaluate and develop all process steps of lithium-ion battery production. Students supplement the course material by studying the recommended literature on battery production and related areas.

Students independently solve questions and tasks related to the content of the course using practical examples. In the exercise, sample tasks are calculated, discussed and debated together with the students. This is intended to ensure that the students can independently acquire the learning outcomes and transfer performance.

Media:

Presentations, videos and other illustrative material are used for visualization. Via the eLearning portal, the participants receive all exercise documents for preparation, which are then discussed

in the exercises. Furthermore, the lecture materials from the lecture are made available to the participants.

Reading List:

Recommended basic literature:

Korthauer, Reiner (Hrsg.): Handbuch Lithium-Ionen-Batterien. Springer-Verlag Berlin Heidelberg 2013. ISBN: 978-3-642-30653-2

Gulbinska, Malgorzata K. (Hrsg.): Lithium-ion Battery Materials and Engineering. Springer-Verlag 2014. ISBN: 1447165470

Julien, Christian (Hrsg.): Lithium Batteries, Science and Technology. Springer International Publishing 2015. ISBN: 9783319191089

In addition, further literature references are recommended in the individual lectures for in-depth study.

Responsible for Module:

Daub, Rüdiger; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Lithium-Ionen-Batterieproduktion (Übung, 1 SWS)

Daub R [L], Daub R, Keilhofer J

Lithium-Ionen-Batterieproduktion (Vorlesung, 2 SWS)

Daub R [L], Daub R, Stock S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED160017: Sustainable Manufacturing | Nachhaltige Produktion [SuM]

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination is held as a written exam (90 min) in order to be able to check the learning outcomes achieved by means of short and comprehension questions as well as complex application examples and calculation tasks. A non-programmable calculator can be used as an aid. The students calculate, among other things, various technically and economically relevant sustainability variables and parameters on the basis of given practical examples.

Thus the learning outcomes examined include basic aspects on awareness of the need for sustainable production, sustainability in the context of production, the holistic view of sustainability, manufacturing engineering measures, as well as assessment and measurement and standardisation of sustainability in production. In addition, the topics of sustainable design and use of products, energy and resource efficiency in production, social sustainability in production, data-based sustainability assessment in production and industrial circular economy are examined.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge of the basics of production and related areas (logistics, product development, etc.) is recommended but not mandatory.

Content:

The module covers all relevant aspects regarding the topic “sustainable manufacturing” including a general overview, ways of assessing sustainability and methods to improve sustainability in an industrial context.

Lecture units:

- Sense of urgency: Why do we need to act now?
- Sustainability in the context of manufacturing
- Thinking sustainability holistically

- Manufacturing technology measures
- Evaluate, measure and standardize sustainability in manufacturing
- Sustainable design and use of products
- Energy and resource efficiency in production
- Social sustainability in production
- Data-based sustainability assessment for manufacturing
- Industrial circular economy

The module also includes exercise units, e.g. how to conduct an LCA, how to follow ISO 14001 for sustainability assessments, practical exercise on system thinking, group activity (develop suggestions for improvement of sustainability for an exemplary company).

Intended Learning Outcomes:

After attending the module, students can understand the importance of addressing the topic of sustainability, understand the fundamentals of sustainable manufacturing, evaluate the possible technical lever in a production that can be addressed to increase sustainability, analyze products regarding the potentials for being produced more sustainably, apply the concept of system thinking on sustainable manufacturing, and apply methods to measure sustainability.

Teaching and Learning Methods:

The module takes place in the form of a lecture and an exercise. In the lecture, the basics of sustainable production are explained using PowerPoint presentations. The basics of sustainable production are deepened by means of use cases, expert presentations and practical application examples. In this way, participants learn, for example, how to carry out a life cycle assessment, how to follow the standards of ISO 14001 for sustainability assessments, or how to use systems thinking to find solutions. The lecture is rounded off by guest lectures from industry in order to give students an insight into current industrial issues relating to sustainability in production.

In the exercise, the methods and concepts learned in the lecture are applied to concrete examples. The participants can create solution concepts directly with the exercise instructor and thus apply what they have learned directly to industrial or academic practical examples. They thus learn, for example, how energy and resource efficiency in production can be increased, how social sustainability in production can be integrated into production management, or which measures need to be taken for data-based sustainability assessment in production.

Media:

Presentations, Videos, Additional Literature

Reading List:

- Neugebauer (2014): Handbuch Ressourcenorientierte Produktion. Hanser. ISBN: 978-3-446-43008-2
- Garbie (2016): Sustainability in Manufacturing Enterprises. Springer. ISBN: 978-3-319-29304-2
- Stark et al. (2017): Sustainable Manufacturing. Challenges, Solutions and Implementation Perspectives. Springer. ISBN: 978-3-319-48513-3
- Meadows (2008): Thinking in Systems. Chelsea Green. ISBN: 978-1603580557

- DIN EN ISO 14040: Umweltmanagement – Ökobilanz – Grundsätze und Rahmenbedingungen
- DIN EN ISO 14001: Umweltmanagementsysteme – Anforderungen mit Anleitung zur Anwendung

Responsible for Module:

Zäh, Michael; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Sustainable Manufacturing - Exercise (Übung, 1 SWS)

Zäh M, Paul M, Schneider D

Sustainable Manufacturing (Vorlesung, 2 SWS)

Zäh M, Paul M, Schneider D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW0066: Piston Engines 1 | Kolbenmotoren 1 [Piston Engines I]

Piston Engine Fundamentals and Mechanics

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Prüfung (90 min) sind die Kenntnisse der Grundlagen und Mechanik von Kolbenmotoren auf verschiedene Frage- und Problemstellungen anzuwenden.

So soll überprüft werden, ob die Studierenden in der Lage sind, die grundlegende Funktion und die möglichen Bauformen von Kolbenmotoren zu verstehen und deren Entwicklungsmöglichkeiten und Anwendungen zu bewerten.

Als Hilfsmittel zugelassen sind Geodreieck, Lineal und Zirkel.

(Stifte dokumentenecht, Bleistifte oder Stifte in roter oder grüner Farbe sind nicht erlaubt). Nicht zugelassen sind Formelsammlungen, Taschenrechner und weitere schriftliche oder elektronische Unterlagen.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine.

Content:

- * Aktuelle und zukünftige Bedeutung des Kolbenmotors
- * Anwendungsnahe Kenngrößen
- * Grundsätzliche thermodynamische Überlegungen und Kreisprozesse
- * Mechanischer Aufbau von Kolbenmotoren: Kurbeltrieb, Ventiltrieb, Nebenaggregate
- * Schwingungen aus Massenkräften und pulsierender Leistungsabgabe: Ursachen und Vermeidung
- * Konventionelle und nachhaltige Kraftstoffe
- * Entflammung und Verbrennung: vorgemischte und nicht-vorgemischte Verfahren
- * Ladungswechsel und Steuerorgane

- * Otto- und Dieserverfahren: Vor- und Nachteile, Unterschiede und Gemeinsamkeiten
- * Abgasemissionen: Anforderungen des Umweltschutzes und Vermeidungsstrategien

Intended Learning Outcomes:

Nach der erfolgreichen Teilnahme am Modul Kolbenmotoren I sind die Studierenden in der Lage...

- ... Verbrennungsmotoren durch Anwenden der wichtigsten Kenngrößen zu bewerten.
- ... sich an die wichtigsten Bauteile des Verbrennungsmotors zu erinnern und die wichtigsten Anforderungen, die an Verbrennungsmotoren gestellt werden, zu verstehen.
- ... verschiedene Kraftstoffe, die im Verbrennungsmotor eingesetzt werden, aufzulisten und diese nach ihren Vor- und Nachteilen zu analysieren. Weiterhin verstehen die Studenten die Entflammung von Kohlenwasserstoffen und den Unterschied zwischen vorgemischten und nicht-vorgemischten Flammen.
- ... die thermodynamischen Zusammenhänge von Verbrennungsmotoren durch Vergleichsprozesse zu analysieren und den Verbrennungsmotor hinsichtlich des Wirkungsgrades zu bewerten.
- ... die wichtigsten Merkmale der konventionellen Brennverfahren des Otto- und des Dieselprozesses zu verstehen.
- ... die Schadstoffentstehung bei Verbrennungsmotoren zu verstehen und die entsprechenden Abgasnachbehandlungssysteme zu bewerten.
- ... die Kräfte und Momente sowie die resultierenden Bewegungen und Schwingungen der Bauteile in Triebwerk und Steuertrieb eines Verbrennungsmotors einzuschätzen und ihren Einfluss auf Betriebssicherheit und Wirtschaftlichkeit des Gesamtsystems zu bewerten.
- ... das Vorgehen bei der Auslegung und Berechnung von Motorkomponenten wie Kolbenringen, Nocken, Ventilen und Ventilsfedern nachzuvollziehen und kritische Beanspruchungssituationen zu erkennen.
- ... die Einflussgrößen auf die motorischen Reibungsverluste zu verstehen und dadurch Ansatzpunkte für die Senkung des spezifischen Kraftstoffverbrauchs herzuleiten.
- ... praxisnahe Methoden zur Ermittlung der im Kolbenmotor wirkenden Massenkkräfte zu verstehen und bei der Auslegung von Bauteilen zu berücksichtigen.

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen und Mechanik von Kolbenmotoren anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von Rechenbeispielen gefestigt, Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet.

So sollen die Studierenden beispielsweise lernen, die grundlegende Funktion und die möglichen Bauformen von Kolbenmotoren zu verstehen und deren Entwicklungsmöglichkeiten und Anwendungen zu bewerten.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. Sprechstunden werden flexibel angeboten.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer

- * Online-Lehrmaterialien
- * Skripten

Reading List:

Köhler, Flierl: Verbrennungsmotoren. Vieweg ATZ/ MTZ-Fachbuch, 2006.

van Basshuysen: Handbuch Verbrennungsmotor - Grundlagen, Komponenten, Systeme, Perspektiven. 4. Auflage. Wiesbaden: Vieweg, 2007.

Merker, Günter: Verbrennungsmotoren - Simulation der Verbrennung und Schadstoffbildung. 3. Auflage. Wiesbaden: Teubner, 2006.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Kolbenmotoren I (Vorlesung, 3 SWS)

Härtl M [L], Dürrholder W, Härtl M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1108: Engineering Mechanics for Technology Management | Technische Mechanik für TUM-BWL

Version of module description: Gültig ab winterterm 2017/18

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a 120-minute written examination, the understanding of the imparted principles and techniques of engineering mechanics is tested by application of them on various problems. These calculation problems are similar in the style to the exercises, where the students are intended to analyse, to systematically tackle and to solve the tasks included.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Good knowledge in applied mathematics. Recommended courses: "Mathematische Behandlung der Natur- und Wirtschaftswissenschaften 1+2" or "Höhere Mathematik"

Content:

Basic principles of statics, elastostatics and kinetics: force, moment (torque), equilibrium, method of sections, center of mass, energy and stability, stress and strain, elastic constitutive law, Mohr's circle, (Euler-Bernoulli) beam theory, area moments of inertia, kinematics and kinetics of particles, impact, vibrations.

Intended Learning Outcomes:

After successful participation the students are able to

- apply terminology, principles and techniques of engineering mechanics
- analyse, tackle and solve new problems out of the covered fields
- create self-dependently particular knowledge in the field of engineering mechanics on the basis of the conveyed fundamentals
- understand subsequent lectures at the faculty of mechanical engineering
- create a level of communication with engineers in their daily professional life.

Teaching and Learning Methods:

The module consists of a lecture including exercises as well as a tutorial in small groups on a weekly basis. The lecture includes several teaching methods such as presentations, animations, short films and the usage of a blackboard. The current subject matter is repeated in tutorials and further examples are exercised. All teaching and exercise material as well as proposals for solutions and further information can be downloaded from the E-Learning platform.

Media:

Presentations, blackboard.

Documents via E-Learning platform.

Reading List:

Gross - Hauger - Schnell: Technische Mechanik 1, Springer Verlag

Gross - Hauger - Schröder - Wall: Technische Mechanik 2, Springer Verlag

Hauger - Schnell - Gross: Technische Mechanik 3, Springer Verlag

Wriggers - Nackenhorst - Beuermann - Spiess - Löhnert: Technische Mechanik kompakt, Springer-Vieweg-Verlag

Responsible for Module:

Werner, Ewald; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Technische Mechanik für TUM-BWL (Übung, 1 SWS)

Krempaszky C [L], Krempaszky C (Jahn Y)

Technische Mechanik für TUM-BWL - Vertiefungsübung (Übung, 2 SWS)

Krempaszky C [L], Krempaszky C (Jahn Y)

Technische Mechanik für TUM-BWL (Vorlesung, 2 SWS)

Krempaszky C [L], Krempaszky C (Jahn Y)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1694: Machine Elements - Basics, Manufacturing, Application | Maschinenelemente - Grundlagen, Fertigung, Anwendung [ME-BMA]

Version of module description: Gültig ab winterterm 2018/19

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 7	Total Hours: 210	Self-study Hours: 135	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung findet in Form einer schriftlichen Klausur (Bearbeitungsdauer 120 Minuten) statt. Anhand von Verständnisfragen, konstruktiven Zeichnungen und Rechenaufgaben sollen die Studierenden nachweisen, dass sie Verständnis für die grundlegenden Elemente von Maschinen besitzen und dieses auch anwenden können. Sie sollen beispielsweise nachweisen, dass sie Normen anwenden, Toleranzen und Passungen entwickeln, Oberflächengüten bewerten, statische Festigkeitsberechnungen anwenden, stoffschlüssige Verbindungen, wie z. B. Schweißen, Löten, Kleben und Nieten bewerten, Schraub- und Welle-Nabe-Verbindungen entwickeln und Gestaltungsrichtlinien in der Konstruktion anwenden können. Weiterhin kann überprüft werden, ob Paarungen und Lager analysiert und Getriebe verstanden werden können. Schmierungen und Dichtungen sollen erinnert werden.

Als Hilfsmittel zur Prüfung wird eine vom Lehrstuhl erstellte Formelsammlung ausgegeben. Des Weiteren sind nicht programmierbare Taschenrechner zugelassen.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundlagen der Produktion, Maschinenzeichnen und elastostatische Mechanik

Content:

Intended Learning Outcomes:

Nach der Teilnahme am Modul sind die Studierenden in der Lage grundlegende Zusammenhänge von Maschinenelementen zu verstehen und zu bewerten.

Sie können:

- Normen anwenden, Toleranzen und Passungen entwickeln sowie Oberflächengüten bewerten

- Statische Festigkeitsnachweise anwenden
- Stoffschlüssige Verbindungen, wie z.B. Schweißen, Löten, Kleben und Nieten) bewerten.
- Schraub- und Welle-Nabe-Verbindungen entwickeln
- Gestaltungsrichtlinien in der Konstruktion anwenden
- Paarungen und Lager analysieren
- Getriebe verstehen
- Schmierungen und Dichtungen erinnern

Teaching and Learning Methods:

In der Vorlesung werden die theoretischen Grundlagen zu Maschinenelementen mittels Vortrag und Präsentation vermittelt. Den Studierenden wird dazu ein Skript zur Verfügung gestellt, in dem sie die Theorie durch eigene Notizen ergänzen können. Mit den Erläuterungen aus der Vorlesung und entsprechendem Eigenstudium lernen die Studierenden, Normen anzuwenden, Toleranzen und Passungen zu entwickeln, Oberflächengüten zu bewerten, statische Festigkeitsberechnungen anzuwenden, stoffschlüssige Verbindungen, wie z.B. Schweißen, Löten, Kleben und Nieten zu bewerten, Schraub- und Welle-Nabe-Verbindungen zu entwickeln und Gestaltungsrichtlinien in der Konstruktion anzuwenden. Paarungen und Lager sollen analysiert und Getriebe verstanden werden können. Schmierungen und Dichtungen sollen erinnert werden.

In der Übung werden Beispielaufgaben gemeinsam mit den Studierenden berechnet, besprochen und diskutiert. Damit soll erreicht werden, dass die Studierenden sich selbstständig die Lernergebnisse aneignen sowie Transferleistungen erbringen können.

Media:

Präsentation, Filme

Reading List:

Niemann, Gustav; Höhn, Bernd-Robert; Winter, Hans (2005): Maschinenelemente. Entwerfen, Berechnen und Gestalten im Maschinenbau ; ein Lehr- und Arbeitsbuch. 4., bearb. Berlin [u.a.]: Springer.

Responsible for Module:

Stahl, Karsten; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Maschinenelemente - Grundlagen, Fertigung, Anwendung Übung (MW1694) (Übung, 3 SWS)
Stahl K [L], Rommel S, Stahl K, Schnetzer P, Wenig A

Maschinenelemente - Grundlagen, Fertigung, Anwendung (MW1694) (Vorlesung, 2 SWS)

Stahl K [L], Stahl K, Rommel S, Schnetzer P, Wenig A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1903: Bioprocess Engineering | Bioverfahrenstechnik

Version of module description: Gültig ab summerterm 2013

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Klausur (Bearbeitungsdauer 90 min, zugelassenes Hilfsmittel: Taschenrechner) sind die vermittelten Inhalte zu den Grundlagen der Bioverfahrenstechnik auf entsprechende Problemstellungen anzuwenden und auf weiterführende Aufgabenstellungen zu übertragen. Dadurch weisen die Studierenden nach, dass sie die Eigenschaften biotechnischer Verfahren verstehen und bewerten können wie beispielsweise die zu Grunde liegende Formalkinetik oder die Aufteilung biotechnologischer Prozesse in verschiedene Schritte.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Empfohlene Kenntnisse sind Grundlagen der Mathematik, Chemie und Biologie, wie sie in Bachelorstudiengängen an deutschen Hochschulen vermittelt werden.

Content:

In diesem Modul werden die physikalischen, chemischen, biochemischen, biologischen und thermodynamischen Grundlagen biologischer Stoffumwandlungen für Ingenieure vermittelt.

1. Einführung und Grundlegendes über die Bioverfahrenstechnik, 2. physikochemische Eigenschaften des Wassers, 3. Biophysikalische Eigenschaften von Zellen, 4: Biochemische Reaktionssysteme, 5. Bioreaktionstechnik I – Enzymkinetik, 6. Bioreaktionstechnik II – Metabolische Modelle, 7. Bioreaktionstechnik III – Wachstumskinetik, 8. Steril-Verfahrenstechnik, 9. Aufarbeitung von Bioprodukten, 10. Bioprozessanalytik, 11. Industrielle Biotechnologie

Intended Learning Outcomes:

Nach der Teilnahme an dieser Modulveranstaltung haben die Studierenden grundlegende Kenntnisse der Bioverfahrenstechnik erworben und sind in der Lage, die wesentlichen Eigenschaften biotechnologischer Verfahren zu verstehen und zu bewerten. Die Studierenden sind

in der Lage die der Bioreaktionstechnik zu Grunde liegende Formalkinetik zu erkennen und diese auf exemplarische Problemstellung anzuwenden. Ebenfalls sind die Studierenden in der Lage, zu erkennen, dass ein biotechnologischer Prozess mit Enzymen und Zellen aus einer Vielzahl verschiedener Schritte (Stoffumwandlung, Aufarbeitung, Steriltechnik, Analytik) besteht.

Teaching and Learning Methods:

In der Vorlesung werden mittels PowerPoint Folien die theoretischen Grundlagen der Bioverfahrenstechnik vermittelt. Wichtige Inhalte werden wiederholt aufgegriffen, um das Verständnis und die Bewertung der Eigenschaften biotechnologischer Verfahren zu stärken. Die Vorlesungsunterlagen werden den Studierenden auf geeignete Weise zur Verfügung gestellt. In der (zeitlich daran anschließenden) Übung werden Übungsaufgaben vorgerechnet und die Musterlösungen den Studierenden ebenfalls zur Verfügung gestellt. Damit und durch gezielte Fragen an den Übungsleiter haben die Studierenden die Möglichkeit ihr Verständnis zu vertiefen, um beispielsweise die der Bioreaktionstechnik zu Grunde liegende Formalkinetik sowie die Aufteilung biotechnologischer Prozesse in verschiedene Schritte zu erkennen.

Zur Verfügung gestellt werden Powerpoint-Folien (via Beamer) als Vorlesungs- und Übungsunterlagen und Musterlösungen zu den Übungsaufgaben.

Media:

Die in der Vorlesung verwendeten Folien werden den Studierenden in geeigneter Form rechtzeitig zugänglich gemacht. Übungsaufgaben werden regelmäßig verteilt und in der Regel werden die Musterlösungen eine Woche später ausgegeben und mit den Studierenden diskutiert.

Reading List:

Es ist kein Lehrbuch zu allen Inhalten dieses Moduls verfügbar. Als Einführung empfiehlt sich: Horst Chmiele: Bioprozesstechnik. Elsevier GmbH, München.

Responsible for Module:

Weuster-Botz, Dirk; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Bioverfahrenstechnik (MW1903) (Vorlesung, 3 SWS)

Weuster-Botz D [L], Weuster-Botz D, Benner P, Caballero Cerbon D, Heins A, Oppelt A, Sampaio de Oliveira L, Thurn A

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Mechanical Engineering (major) | Technik-Schwerpunkt: Maschinenwesen Vertiefungsmodule (major)

Module Description

ED150011: Hydrogen Mobility | Wasserstoffmobilität [H2Mobil]

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung erfolgt in Form einer schriftlichen Klausur (Prüfungsdauer: 90 min). Die Studierenden sollen in begrenzter Zeit die Konzepte der Wasserstoffmobilität auf verschiedene Frage- und Problemstellungen anwenden. So soll überprüft werden, ob sie beispielsweise bewerten können, welche Energiewandler mit Wasserstoff in der Antriebstechnik sinnvoll eingesetzt werden können und ob sie verstehen wie verschiedene Brennstoffzellen und Verbrennungsmotoren mit Wasserstoff betrieben werden können.

Als Hilfsmittel zugelassen sind: Schreibutensilien, Lineal und ein nicht programmierbarer Taschenrechner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Nachhaltige Mobile Antriebssysteme [ED150010]

Content:

Themenschwerpunkte:

- * Energie und Mobilität auf Basis von Wasserstoff und Wasserstoffträgern
- * Erzeugung von Wasserstoff
- * Speicherung und Transport von Wasserstoff
- * Grundlagen der Fahrzeugantriebe
- * Wasserstoff-Verbrennungsmotoren
- * Antriebssysteme mit Brennstoffzellen und E-Antrieb
- * Energie und Mobilität auf Basis von Wasserstoff und Wasserstoffträgern

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul "Wasserstoffmobilität" sind die Studierenden in der Lage...
... zu verstehen, wie und warum Wasserstoff für eine Transformation hin zu nachhaltiger Mobilität sinnvoll ist.

... die wichtigsten Erzeugungsmethoden von Wasserstoff nach ihren jeweiligen Vorteilen zu beurteilen

... die Grundlagen der Funktionsweise einer Wasserstoffversorgungsinfrastruktur zu verstehen

... zu bewerten, welche Energiewandler Wasserstoff in die Antriebstechnik sinnvoll einsetzen können

... zu verstehen wie verschiedene Brennstoffzellen mit Wasserstoff betrieben werden können

... zu verstehen wie Verbrennungsmotoren mit Wasserstoff betrieben werden können

... einzuordnen, welche Herausforderungen bei der Energiewandlung von Wasserstoff auftreten können

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen und Konzepte der Wasserstoffmobilität anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von einfachen Rechenbeispielen gefestigt. Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet. So sollen die Studierenden beispielsweise lernen, zu bewerten, welche Energiewandler mit Wasserstoff in der Antriebstechnik sinnvoll eingesetzt werden können und lernen zu verstehen wie verschiedene Brennstoffzellen und Verbrennungsmotoren mit Wasserstoff betrieben werden können.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer
- * Online-Lehrmaterialien

Reading List:

Zapf, Martin: Kosteneffiziente und nachhaltige Automobile. 2. Auflage. Wiesbaden: Springer Vieweg, 2021.

Kurzweil, Peter: Brennstoffzellentechnik. 3. Auflage, Wiesbaden, Springer Vieweg, 2016

Schreiner, Klaus: Verbrennungsmotor - kurz und bündig. Wiesbaden: Springer Vieweg, 2017.

Klell, Manfred: Wasserstoff in der Fahrzeugtechnik. 4. Auflage. Wiesbaden: Springer Vieweg, 2018.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Wasserstoffmobilität (Vorlesung, 3 SWS)

Prager M [L], Armbruster F, Prager M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW0036: Factory Planning | Fabrikplanung

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In the written examination (90 min) students have to remember learned concepts as well as apply and analyse tools and methods without any helping material. In order to answer the questions it is necessary to partly use own words as well as partly solving calculation tasks. The written examination consists of short comprehension questions and calculations. The same number of points can be reached in both examination parts, so that the weight assigned to part 1 and part 2 is 50% each.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The lecture covers the following aspects of factory planning:

- Objectives of factory planning projects
- Choice of location
- Factory structure and factory layout planning
- Production and assembly planning
- Logistics planning
- Lean production philosophy and methods
- Assessment of factory planning projects
- Digital tools for factory planning

Intended Learning Outcomes:

Participating students are enabled to

- ... remember the historical development of facility planning and bring the according planning process in line with corporate planning.
- ... identify the circumstances that necessitate the redesign respectively retrofit of a factory and name possible according objectives.
- ... to conduct a location planning with the aim of inducing a location decision.
- ... develop factory layouts as well as logistics, production and assembly systems based on the taught methods.
- ... remember the fundamentals of the development and introduction of lean production and improve production systems by applying the according methods.
- ... apply the methods to assess the cost effectiveness of production concepts.

Teaching and Learning Methods:

- Presentation by lecturer
- Industrial presentation by guest lecturer

Media:

- Lecture script
- Lecture slides
- Case-oriented exercises

Reading List:

Wiendahl, H.-P.; Reichardt, J.; Nyhuis, P.: Handbuch Fabrikplanung: Konzepte, Gestaltung und Umsetzung wandlungsfähiger Produktionsstätten; München: Carl Hanser Verlag, 2009

Grundig, C.-G.: Fabrikplanung: Planungssystematik, Methoden, Anwendung; München: Carl Hanser Verlag, 2009

Womack, J. P.; Jones D. T.: Lean Thinking; Ballast abwerfen, Unternehmensgewinne steigern; Campus-Verlag, 2004

Responsible for Module:

Zäh, Michael; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Vorlesung, Fabrikplanung, 2SWS

Übung, Übung zu Fabrikplanung, 1SWS

Gunther Reinhart (gunther.reinhart@mytum.de)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW0101: Product Ergonomics | Produktergonomie

Version of module description: Gültig ab summerterm 2016

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Lecture material, presented examples and use-cases, calculations as well as possible industrial talks of guest lecturers will be relevant for the exam. Usually a written essay exam (90 minutes) will take place. However, in some exceptions for all students of one study course an oral exam can be offered, e.g. ERASMUS.

It is allowed to use a non-programmable calculator.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

A former visit of the lectures "Ergonomics" is recommended

Content:

The success of products highly depends on the ability to fulfill the comfort requirements of potential users. Three essential aspects determine a comfortable product: The first one is the so called environmental comfort which includes acoustics, vibrations and climate. The second one refers to the geometry of the product: the spatial properties and the necessary forces have to be adapted to the human body. This is summed up by the term: anthropometric design. The third one is about the information flow between man and machine (compatibility, coding of displays and handles), the so called HMI design. In this context one strives for a simple, intuitive controlling, unambiguous feedback and a low error probability. Using the presented databases, methods, (digital) human models and simulation procedures effects for various persons can be predicted.

Intended Learning Outcomes:

At the end of the module students are able to

- understand the different dimensions of ergonomic product design,

- understand the processes of human information processing (perception, response selection, response execution),
- remember relevant standards of product design,
- analyse products in terms of anthropometric and system ergonomical design maxims
- understand the involvement of ergonomists in the product emergence process
- evaluate the design of control elements

Teaching and Learning Methods:

Die Vorlesung erfolgt anhand einer Präsentation, in der die theoretischen Grundlagen behandelt werden. Zur Vorstellung aktueller Entwicklungen aus der Industrie werden auch Experten zu Fachvorträgen eingeladen. In fünf Übungsstunden werden gemeinsam realitätsnahe Fallstudien und Rechenbeispiele bearbeitet. Zur selbständigen Nachbereitung und Vertiefung wird die angegebene Literatur empfohlen und wichtige Themen diskutiert.

Media:

powerpoint presentations, literature in a library with free access

Reading List:

Schmidtke, Heinz; Bernotat, Rainer (Hg.) (1993): Ergonomie. München [u.a.]: Hanser.

Further reading is included in the lecture notes

Responsible for Module:

Bengler, Klaus; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Produktergonomie Übung (Übung, 1 SWS)

Steckhan L [L], Bengler K, Boos A, Steckhan L

Produktergonomie (MW0101) (Vorlesung, 2 SWS)

Steckhan L [L], Bengler K, Boos A, Steckhan L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1909: Sustainable Energy Systems | Nachhaltige Energiesysteme

Version of module description: Gültig ab summerterm 2020

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination takes place in the form of a written exam (processing time 90 min, permitted aid is a pocket calculator). The examination is divided into a short question section (comprehension questions, no aids allowed) and a calculation section. The students should demonstrate that they can technically evaluate, for example, the regenerative, fossil and nuclear options for energy conversion, calculate the process steps in energy conversion and place them within an economic and socio-economic framework.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basics in Thermodynamics, Heat and Mass Transfer

Content:

Introduction to energy technology and its challenges (climate change, energy consumption and reserves, future studies, merit order), thermal energy conversion, energy sources (fossil and regenerative), renewable (non-thermal) energy conversion, heat supply, energy storage, economic viability

Intended Learning Outcomes:

After participation in the module, the students will be able to evaluate different energy conversion methods (thermal and alternative) with regard to their properties, as well as to classify the most common fossil, nuclear and regenerative energy sources with regard to economics, environmental and social sustainability. Furthermore, students will be able to calculate the process and conversion steps in thermal and alternative energy conversion.

Teaching and Learning Methods:

The module is divided into a lecture and an exercise. The lecture is held in the classical lecture style using PowerPoint slides and, if necessary, a supplementary blackboard to explain the theoretical principles of sustainable energy systems. The students are provided with an accompanying script that they can supplement with their own notes. The exercise is carried out interactively with the students as a combination of independent work on the exercises provided and finding a solution together with the trainer. In this way the students should learn to technically evaluate the regenerative, fossil and also nuclear options of energy conversion, to calculate the process steps in energy conversion and to place them within an economic and socio-economic framework.

Media:

Lecture, presentation (script), blackboard, exercises

Reading List:

Baehr, H. D.: Thermodynamik - Grundlagen und technische Anwendungen. Springer-Verlag, Berlin, Heidelberg, New York, 2004

Thomas, H.-J.: Thermische Kraftanlagen - Grundlagen, Technik, Probleme. Springer-Verlag, Berlin, Heidelberg, New York, Tokyo, 1985

Responsible for Module:

Spliethoff, Hartmut; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW2277: Energy Carriers for mobile Applications | Energieträger für mobile Anwendungen

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Klausur (60 min) sind die vermittelten Kompetenzen auf verschiedene Frage- und Problemstellungen anzuwenden.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Verbrennungsmotoren (MW0137)

Content:

- Kraftstoffe als Energiespeicher
- Mobile Nutzung elektrischer Energie: E-Fuels vs. Batteriespeicher
- Klimaschutz durch Biokraftstoffe und synthetische Kraftstoffe
- Sub-Zero-Emissionen mit alternativen Kraftstoffen
- Kraftstoffkennzahlen und ihre Anwendung für Ingenieure
- Rechtliche Aspekte: Klimaziele und ihre Umsetzung im EU-Rahmen
- Chemische Grundlagen
- Zukünftige Herstellung konventioneller und synthetischer Kraftstoffe
- Aktuelle Forschungsansätze im Kraftstoffbereich
- Energiewende: Dekarbonisierung vs. Defossilisierung?

Intended Learning Outcomes:

Nach der Teilnahme an der Modulveranstaltung Energieträger für mobile Anwendungen sind die Studierenden in der Lage...

... die technischen Optionen zur Speicherung von Energie hinsichtlich ihrer Leistungsfähigkeit, ihrer Energiedichte und ihres technologischen Reifegrads einzuschätzen.

... aktuelle Entwicklungen im Bereich der Kraftstoffe hinsichtlich ihrer Wechselwirkungen mit Umwelt und gesetzlichen Vorgaben zu beurteilen.

... die Relevanz üblicher Bewertungskriterien für die Eigenschaften von Kraftstoffen kompetent einzuschätzen und diese anzuwenden.

... chemisches Grundwissen auf Kraftstoffe anzuwenden und diese dadurch hinsichtlich ihrer technologischen Einsatzmöglichkeiten zu bewerten.

... die Zusammenhänge zwischen motorischen Brennverfahren und den Eigenschaften dafür geeigneter Kraftstoffe herzustellen.

Teaching and Learning Methods:

In der Vorlesung werden die Lehrinhalte anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von Praxisbeispielen gefestigt, Erfahrungen und Probleme aus der Praxis werden vorgestellt und diskutiert.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. In den Assistentensprechstunden kann individuelle Hilfe gegeben werden.

Media:

- Vortrag
- Präsentation
- Tablet-PC mit Beamer
- Online-Lehrmaterialien

Reading List:

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Informatics (minor) | Technik-Schwerpunkt: Informatik Basismodule (minor)

Module Description

CIT3230000: Advanced Concepts of Programming Languages | Advanced Concepts of Programming Languages

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments assess in how far students are able to reproduce the complex semantical behaviors of small example programs. Their knowledge and practical skills concerning programming constructs is further assessed by assignments, which ask to simulate programming language constructs of one kind by programming language constructs of another kind.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics,
IN0002 Fundamentals of Programming (Exercises & Laboratory),
IN0003 Functional Programming and Verification,
at least one programming language

Content:

This is not a beginners programming course – Instead, this lecture focusses on the semantics of various programming language concepts, and their implementation from the point of view of a compiler engineer. Topics may include, among others:

- Relaxed Memory Models
- Wait-/Lock-free Programming
- Locks, Monitors & Condition Variables
- Transactional Memory

- Gotos, Co-Routines and Continuations
- Single/Multi-Dispatching
- (Multiple-) Inheritance
- Delegation and Prototype Based Programming
- Aspect Oriented Programming
- Meta programming

Intended Learning Outcomes:

After successful completion of this module, students are familiar with an assortment of programming language constructs from popular programming languages. They understand the semantics of these constructs as well as the implementation consequences, that they inflict on the implementation as well as the runtime behavior of compiler and runtime system. They are able to analyze and compare different language based approaches, to discuss their relative merits and potential workarounds in case certain language features are missing. By means of this knowledge, they are able to extend existing compilers to handle the aforementioned constructs as well as able to re-encode concepts from one language by means of another language.

Teaching and Learning Methods:

By means of pre-recorded lesson videos of around 15 minutes each, students can prepare the lecture content at their own pace. In the classroom, students can open discussion on unclear parts of the lesson videos. Additionally, illustrating examples and live programming enhance and deepen the student's insights into the topics. Selected problems that are then solved by the joined effort of the audience and the lecturer further illustrate the lessons with hands-on experiences.

In the additionally offered exercise course (2h), accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, train students to apply the learnt concepts in implementations and develop the skill to simulate the effect of missing language features by others.

Media:

Pre-recorded lesson videos, in-class programming experiments, quizzes, collaborative shared whiteboard, programming assignments

Reading List:

Selected literature of the area and appropriate conference or journal papers

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Concepts of Programming Languages (CIT3230000) (Vorlesung, 3 SWS)

Seidl H [L], Petter M

Exercise - Advanced Concepts of Programming Languages (CIT3230000) (Übung, 2 SWS)

Tilscher S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN0001: Introduction to Informatics | Einführung in die Informatik

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type of Assessment: exam (120 minutes)

The exam takes the form of 120 minutes written test. Questions allow to assess acquaintance with concepts of Informatics and programming, small programming tasks assess the ability to conceive appropriate algorithmic solutions and realize concurrent applications.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Participants should attend IN0002 "Fundamentals of Programming (Exercises & Laboratory)" at the same time.

Content:

The module IN0001 is concerned with topics such as:

- Introduction
- ++ Basic notions: Problem - algorithm - program
- ++ Imperative programming constructs
- Syntax and semantics
- ++ Syntax of programming languages: regular expressions and contextfree grammars
- ++ Semantics of programs: control-flow graphs
- Basic data structures I
- ++ Numbers, strings, arrays
- ++ Insertion sort
- Recursion
- ++ Binary search
- ++ Patterns of recursion

- Basic data structures II
- ++ Objects, classes, methods
- ++ Lists, stacks, queues
- Object-oriented programming
- ++ Inheritance
- ++ Abstract classes and interfaces
- ++ Polymorphism
- Programming in the large (perspectives)
- Concurrency and Threads

Intended Learning Outcomes:

Upon successful completion of the module participants understand the essential concepts of computer science on a fundamental, practice-oriented, but scientific level.

Concepts of this kind are for example: Algorithms, syntax and semantics, as well as efficiency in terms of memory consumption or time.

Participants are then able to solve well-posed algorithmic problems and to implement basic distributed and concurrent applications in Java or a similar object-oriented language. They understand the underlying concepts and models and are therefore able to acquire skills in other imperative and object-oriented programming languages on their own.

Teaching and Learning Methods:

Lecture, combined with experimental assessment of examples at the computer and evaluation of further readings

Media:

Slide show, blackboard, online programming experiments, animations, lecture recording

Reading List:

Heinisch, Müller-Hofmann, Goll: Java als erste Programmiersprache, Teubner, 2007

Deitel, Harvey / Deitel, Paul: How to program Java Prentice-Hall, 2002

Flanagan, David: Java in a Nutshell O'Reilly, 2002

Bishop, Judith: Java gently Prentice-Hall, 2001

Eckel, Bruce: Thinking in Java Prentice-Hall, 2002

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Einführung in die Informatik (IN0001) (Vorlesung, 4 SWS)

Westermann R

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN0008: Fundamentals of Databases | Grundlagen: Datenbanken

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The academic assessment will be done by a 90 minutes written exam. Assignments checking knowledge verify the familiarity with the main concepts of relational database systems. Transfer assignments and small scenarios check the ability to apply and evaluate these concepts systematically and in a qualified manner.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0015 Discrete Structures, IN0001 Introduction to Informatics 1

Content:

SQL, data integrity, theory of relational database design, physical data organisation (storage structures, index structures), query processing, transaction management, main features of error handling (recovery, backup) and multi-user synchronisation, security aspects (authorization), XML data modeling (optional); in the exercise the content is practiced along concrete examples

Intended Learning Outcomes:

Students are able to apply the essential concepts of relational database systems and can use and evaluate them systematically and in a qualified manner.

The students have the expertise to systematically use a database system starting from the conceptual design to the implementation design to the physical design. They are able to formulate even complex queries in SQL and have a basic understanding of logical and physical optimization based on relational algebra. Furthermore they know how to safe-guard a database application with respect to recovery, concurrency control and authorization.

Teaching and Learning Methods:

Lecture, exercises, problems for individual study, web interface to the data base system HyPer for actively testing SQL queries and self-study of query plans.

Media:

Lecture with animated slides, web interface for SQL, Database Normalizer (check relation definitions for compliance with normal forms), tool Interactive Relational Algebra

Reading List:

- Alfons Kemper, André Eickler: Datenbanksysteme. Eine Einführung. 8., aktualisierte und erweiterte Auflage, Oldenbourg Verlag, 2011
- A. Kemper, M. Wimmer: Übungsbuch: Datenbanksysteme. 3. Auflage Oldenbourg Verlag, 2012
- A. Silberschatz, H. F. Korth, S. Sudarshan: Database System Concepts. Sixth Edition, McGraw-Hill, 2010

Responsible for Module:

Kemper, Alfons; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Grundlagen: Datenbanken (IN0008) (Vorlesung, 3 SWS)

Kemper A, Jungmair M, Lehner S, Sichert M, Vogel L

Übungen zu Grundlagen: Datenbanken (IN0008) Gruppen 1-25 (Übung, 2 SWS)

Kemper A [L], Jungmair M, Lehner S, Sichert M, Vogel L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN0042: IT Security | IT-Sicherheit

Version of module description: Gültig ab winterterm 2021/22

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 60	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination performance is provided in the form of a 90-minute written exam. Knowledge questions test familiarity with basic concepts and methodical procedures for securing components and systems as well as familiarity with basic protocols. Smaller tasks test the ability to apply security concepts in a targeted and correct manner, or to recognize security efficiencies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics and IN004 Introduction to Computer Organization and Technology - Computer Architecture

Content:

- Basic concepts of IT security,
- Selected security problems of today's systems and selected attacks,
- Basics and practical methods of applied cryptography
- Basic concepts and protocols for identification/authentication, access control and system security
- Fundamentals of network security: firewall concepts and practice-relevant protocols for network security
- Methods of operational IT risk and security management (ISM)

Intended Learning Outcomes:

After successful participation in this module, participants understand the basic concepts, methods and protocols for protecting data and systems from manipulation and misuse at a fundamental, practice-oriented, scientific level. They understand the causes of security problems in today's systems, can reproduce the relationships between protection mechanisms and the problems they

address and apply them to case studies. They also master basic methods of operational IT security management.

Teaching and Learning Methods:

Lecture supplemented by exercise with practical parts to gain a detailed understanding of conceptual and technical issues by means of concrete tasks, including simple practical programming tasks.

Media:

Lecture slides

Reading List:

- IT-Sicherheit: Konzepte, Verfahren, Protokolle, Claudia Eckert, 10. Auflage, De Gruyter, 2018.
- Understanding Cryptography, C. Paar und J. Pelzl, 2. Auflage Springer, 2010.

Responsible for Module:

Eckert, Claudia; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

IT Sicherheit (IN0042) (Vorlesung, 2 SWS)

Eckert C [L], Eckert C, Franzen F

Übung zu IT Sicherheit - Gruppen Mi, Do, Fr (IN0042) (Übung, 2 SWS)

Eckert C [L], Franzen F

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Informatics (major) | Technik-Schwerpunkt: Informatik Vertiefungsmodule (major)

Module Description

CIT4230000: Strategic IT Management | Strategic IT Management

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 4	Total Hours: 120	Self-study Hours: 75	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination will be in the form of a written exam (90 minutes) in which the students' ability to describe, evaluate and apply models, methods, key figures, visualizations and tools of strategic IT management to given problems in a context-dependent manner will be tested. Successful participation in a voluntary case study or a workshop throughout the exercise can be included as a bonus in the assessment of the exam. The exact regulations for this will be announced in time at the beginning of the module.

Repeat Examination:

(Recommended) Prerequisites:

Bachelor in Informatics or Information Systems, specifically:

- Fundamentals of Business Information Systems
- Databases
- Software Engineering
- Business Process Management

Content:

1. IT Strategy and IT Management Frameworks
2. IT Governance and IT Organisation
3. Enterprise Architecture Management
 - 3.1 Schools of EAM
 - 3.2 Foundations of EAM
 - 3.3 Capability Based Planning

3.4 Agile EAM and EAM Patterns

4. Large-scale Agile Software Development

4.1 Foundations and Frameworks of LSAD

4.2 Selected Topics of LSAD

5. Case Studies

Intended Learning Outcomes:

After participating in the module, students will be able to understand the key challenges, concepts, methods and decision areas of strategic IT management and their interactions. Furthermore, students will understand the relationship between strategic IT management, enterprise architecture management, scaled agile software development and IT governance. Moreover, after participating in the module, students have in-depth knowledge of patterns and frameworks of enterprise architecture management and scaled agile software development in the areas of models, methods, metrics and visualizations, among others.

Teaching and Learning Methods:

With the help of a slide presentation, the lecture introduces the fundamental concepts of strategic IT management. Furthermore, the understanding of the basic concepts of strategic IT management is deepened in the lectures with the help of appropriate tasks and examples. Through exercises during the lecture and the work on a separate case study, special modeling techniques from enterprise architecture management and from scaled agile software development are explained and practiced. In addition, self-study assignments are provided.

Media:

Slide presentation, teamwork

Reading List:

Hanschke, I. (2013). Strategisches Management der IT-Landschaft: Ein praktischer Leitfaden für das Enterprise Architecture Management. Carl Hanser Verlag GmbH Co KG.

Kaplan, J. D. (2005). Strategic IT portfolio management: governing enterprise transformation. PRTM.

Buckl, S., Ernst, A. M., Matthes, F., Ramacher, R., & Schweda, C. M. (2009, September). Using enterprise architecture management patterns to complement TOGAF. In 2009 IEEE International Enterprise Distributed Object Computing Conference (pp. 34-41). IEEE.

Buckl, S., Ernst, J., Lankes, A. M., Matthes (2008).

Enterprise architecture management pattern catalog (version 1.0, february 2008)

Sandkuhl, K., Fill, H. G., Hoppenbrouwers, S., Krogstie, J., Matthes, F., Opdahl, A., ... & Winter, R. (2018). From expert discipline to common practice: a vision and research agenda for extending the reach of enterprise modeling. Business & Information Systems Engineering, 60(1), 69-80. Chicago

Uludag, O#, Kleehaus, M., Caprano, C., & Matthes, F. (2018, October). Identifying and structuring challenges in large-scale agile development based on a structured literature review. In 2018 IEEE 22nd International Enterprise Distributed Object Computing Conference (EDOC) (pp. 191-197). IEEE.

Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. *Journal of Systems and Software*, 119, 87-108.

Paasivaara, M., Behm, B., Lassenius, C., & Hallikainen, M. (2018). Large-scale agile transformation at Ericsson: a case study. *Empirical Software Engineering*, 23(5), 2550-2596. Chicago

Responsible for Module:

Matthes, Florian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Strategisches IT-Management (CIT4230000) (Vorlesung, 3 SWS)

Matthes F [L], Matthes F, Tobisch F, Philipp P, Schneider P

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN0010: Introduction to Computer Networking and Distributed Systems | Grundlagen: Rechnernetze und Verteilte Systeme

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The exam takes the form of a 90 minutes written test. Comprehension questions and calculation tasks allow to assess acquaintance with the technologies and methods of computer networks and distributed systems, and the understanding obtained by implementation of protocol mechanisms. Calculation tasks also allow to assess the ability to determine the performance of selected computer networks and distributed applications.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics 1, IN0003 Introduction to Informatics 2 - since WiSe 2018/19 Functional Programming and Verification, IN0002 Fundamentals of Programming (Exercises & Laboratory)

Content:

- Computer networking
- ++ Overview: Computer networking and the Internet
- +++ components (router, switches, clients, server)
- +++ design (topology, routing, packets vs. virtual circuits)
- +++ layered system structure (OSI and Internet)
- +++ historical background
- ++ concepts used by multiple layers (covered within the appropriate layers):
- +++ Addressing
- +++ Error detection
- +++ Coding and modulation
- +++ Media access protocols

- +++ Flow control
- +++ Connection management
- +++ Packet vs. virtual circuit switching
- ++ Layers:
 - +++ Application layer: application protocols and applications
 - ++++ Tasks and interface
 - ++++ Examples: HTTP, DNS, SMTP (Mail), Peer-to-Peer protocols
 - +++ Transport layer
 - ++++ Tasks and interface
 - ++++ Examples: TCP and UDP
 - +++ Network layer
 - ++++ Tasks and interface
 - ++++ Routing: link state vs. distance vector protocols
 - ++++ Addressing: IP Addresses
 - ++++ Examples: IP, Routing in the Internet
 - +++ Link layer
 - ++++ Tasks and interface
 - ++++ Examples: Ethernet, Wireless LAN
 - +++ Physical layer
 - ++++ Tasks and interface
 - ++++ Examples
- Distributed systems:
 - ++ Middleware, e.g. RPC
 - ++ Web Services
- General tasks:
 - ++ Network management
 - ++ IT security
 - +++ Basics of cryptography
 - +++ Authentication, privacy, integrity
 - +++ Protocols with security mechanisms, e.g.: IPsec, PGP, Kerberos, SSL, SSH, ...
 - +++ Firewalls, intrusion detection

Content of the Exercises:

The exercises cover comprehension questions and calculation tasks and target determination of performance of protocols and mechanisms of specific layers (Physical Layer, Data Link Layer, Network Layer, Transport Layer). Programming exercises address implementation of specific protocol mechanisms.

Intended Learning Outcomes:

After successful completion of the module, participants understand the key concepts of technologies and methods of computer networks and distributed systems and are able to use key layered network architecture protocols to explain what protocol mechanisms are used in each layer and how they work. They understand the architecture of distributed applications like the World Wide Web based on Internet protocols, and the architecture of computer networks.

Participants can determine the performance of selected networks and distributed applications, and can implement specific protocol mechanisms.

Teaching and Learning Methods:

The interactive lecture with slide presentations, animations, demonstrations and live programming presents the basic knowledge of computer networks and distributed systems and explains them using examples. Quizzes help students to recognize whether they have understood the basic concepts and essential contexts. Homework enables students to deepen their knowledge in self-study. Accompanying exercises deepen the understanding of the contents of the lecture by means of suitable tasks and show the application of the various methods on the basis of manageable problems. The presentation of the own solution in the accompanying exercise improves the communication skills and allows to compare the own learning progress with that of other students. Programming tasks allow computer-aided deepening and application of conceptual knowledge to practical problems.

Media:

Lecture slides, exercise sheets, demonstrations

Reading List:

Literature is specified at the web presence of the course and in the lecture slides.

Standard publications are among others:

1. James F. Kurose, Keith W. Ross
Computernetzwerke
Pearson Studium; 5. aktualisierte Auflage, 2012
2. Andrew S. Tanenbaum / Prof. David J. Wetherall
Computernetzwerke
Pearson Studium, 5. aktualisierte Auflage, 2012

Responsible for Module:

Carle, Georg; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2040: Virtual Machines | Virtuelle Maschinen

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments ask to apply the learnt translation schemes to small example programs. By that, the exam assesses how well the student is acquainted with various programming constructs and whether she or he is able to translate these into machine code. Further assignments reflect on the concept of virtual machines itself by proposing extra language concepts for which translation schemes should be provided. The successful completion of homework assignments may contribute to the grade as a bonus. The exact details for this are announced timely at the begin of the lecture.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

At least rudimentary knowledge of different programming languages.

Content:

While trying to produce code for a programming language like Prolog, one quickly realizes that one would like to use certain instructions during the translation which are not already available on concrete machines. On the other hand, instruction sets of modern computers are changing so quickly that it doesn't seem useful for the compiler to depend on some arbitrarily chosen instructions. Such a dependance would mean that in a few years one would feel obliged to rewrite the compiler anew.

With the implementation of the first Pascal compilers, one already arrived at the idea of first generating code for a slightly idealized machine, each of whose instructions then only need to be implemented on different target machines. Translation of modern programming languages like Prolog, Haskell or Java are also based on this principle. On one hand this facilitates portability of the compiler. On the other hand this also simplifies the translation itself since one can choose a

suitable instruction set according to the programming language to be translated. In particular, we consider:

- the translation of C;
- the translation of a functional language;
- the translation of Prolog;
- the translation of a concurrent dialect of C.

Intended Learning Outcomes:

Participants are acquainted with virtual machines for imperative, functional, logical and object-oriented programming languages. They know the principles by which various programming language concepts are translated into sequences of machine code. For sections of programs, they are able to generate code of some virtual machine, and they are able to apply the learnt principles to provide new translation schemes for given language constructs on their own.

Teaching and Learning Methods:

By means of a presentation, either by slides or whiteboard, the lecture presents schemata for the translation of various language constructs and illustrates these by means of small examples. Accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, and train students to apply the learnt schemata for the translation and to develop new schemata for selected language constructs.

Media:

Slide show, blackboard, possibly online programming and/or animations

Reading List:

Seidl, wilhelm: Compiler Design. Virtual Machines. Springer, 2010

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2406: Fundamentals of Artificial Intelligence | Fundamentals of Artificial Intelligence

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam at the end of the semester lasting 90min. The questions will cover most of the learned material and are typically shorter than the problems solved in the exercise, but similar in difficulty.

As an incentive to create artificial intelligence oneself, we provide programming challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Previous attendance of

- IN0007 Fundamentals of Algorithms and Data Structures
- IN0015 Discrete Structures
- IN0018 Discrete Probability Theory

is beneficial. However, all content is taught from ground up and the listed lectures are not essential. Students who have not attended these lectures will have to invest additional time.

Content:

- Task environments and the structure of intelligent agents.
- Solving problems by searching: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening search, greedy best-first search, A* search.
- Constraint satisfaction problems: defining constraint satisfaction problems, backtracking search for constraint satisfaction problems, heuristics for backtracking search, interleaving search and inference, the structure of constraint satisfaction problems.

- Logical agents: propositional logic, propositional theorem proving, syntax and semantics of first-order logic, using first-order logic, knowledge engineering in first-order logic, reducing first-order inference to propositional inference, unification and lifting, forward chaining, backward chaining, resolution.
- Bayesian networks: acting under uncertainty, basics of probability theory, Bayesian networks, inference in Bayesian networks, approximate inference in Bayesian networks.
- Hidden Markov models: time and uncertainty, inference in hidden Markov models (filtering, prediction, smoothing, most likely explanation), approximate inference in hidden Markov models.
- Rational decisions: introduction to utility theory, utility functions, decision networks, the value of information, Markov decision processes, value iteration, policy iteration, partially observable Markov decision processes.
- Learning: types of learning, supervised learning, learning decision trees, reinforcement learning.
- Introduction to robotics: robot hardware, robotic perception, path planning, planning uncertain movements, control of movements, application domains.

Intended Learning Outcomes:

After attending the module, you are able to create artificial intelligence on a basic level using search techniques, logics, probability theory and decision theory. Your learned abilities will be the foundation for more advanced topics in artificial intelligence. In particular, you will acquire the following skills:

- You can analyze problems of artificial intelligence and judge how difficult it is to solve them.
- You can recall the basic concepts of intelligent agents and know possible task environments.
- You can formalize, apply, and understand search problems.
- You understand the difference between constraint satisfaction and classical search problems as well as apply and evaluate various constraint satisfaction approaches.
- You can critically assess the advantages and disadvantages of logics in artificial intelligence.
- You can formalize problems using propositional and first-order logic.
- You can apply automatic reasoning techniques in propositional and first-order logic.
- You understand the advantages and disadvantages of probabilistic and logic-based reasoning.
- You can apply and critically assess methods for probabilistic reasoning with Bayesian networks and Hidden Markov Models.
- You understand and know how to compute rational decisions.
- You have a basic understanding on how a machine learns.
- You know the basic areas and concepts in robotics.

Teaching and Learning Methods:

The module consists of a lecture and exercise classes. The content of the lecture is presented via slides, which are completed during the lecture using the blackboard and/or an electronic writing pad. Students are encouraged to additionally study the relevant literature. In the exercise classes, the learned content is applied to practical examples to consolidate the content of the lecture. Students should ideally have tried to solve the problems before they attend the exercise. To encourage more participation, students are regularly asked questions or encouraged to participate in online polls. As an incentive to create artificial intelligence oneself, we provide programming

challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Media:

Slides, blackboard, electronic writing pad, exercise sheets;

Reading List:

- P. Norvig and S. Russell: Artificial Intelligence: A Modern Approach, Prentice Hall, 4th edition. (English version)
- P. Norvig and S. Russell: Künstliche Intelligenz: Ein moderner Ansatz, Pearson Studium, 4. Auflage. (German version)
- W. Ertel: Grundkurs Künstliche Intelligenz: Eine praxisorientierte Einführung, Springer, 4. Auflage.
- P. Zöller-Greer: Künstliche Intelligenz: Grundlagen und Anwendungen, composia, 2. Auflage.
- D. L. Poole and A. K. Mackworth: Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.
- P. C. Jackson Jr: Introduction to Artificial Intelligence, Dover Publications.

Responsible for Module:

Althoff, Matthias; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Fundamentals of Artificial Intelligence (IN2406) (Vorlesung mit integrierten Übungen, 5 SWS)

Althoff M [L], Althoff M, Gaßner J, Kulmburg A, Meyer E, Würsching G

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Chemistry (minor) | Technik-Schwerpunkt: Chemie Basismodule (minor)

Required Modules | Pflichtbereich

Module Description

CH1090: Introduction to Organic Chemistry | Einführung in die Organische Chemie

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Eine Prüfungsleistung wird in Form einer Klausur (90 Minuten) erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit und ohne Hilfsmittel ein Problem erkannt wird und Wege zu einer Lösung gefunden werden können. Dabei sollen die Studierenden zeigen, dass sie die organische Chemie wichtiger Verbindungen aus Natur und Technik bewerten können. Sie verstehen Aufbauprinzipien und Eigenschaften der grundlegenden Naturstoffklassen. Die Studierenden sind vertraut mit den grundlegenden Reaktionsweisen organischer Verbindungen und können diese wiedergeben. Die Prüfungsfragen gehen über den gesamten Modulstoff. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Lectures in Basic and inorganic chemistry.

Content:

Introduction:

What is Organic Chemistry ? Structural units, alkyl chains, functional groups, structural principles, isomerism, geometry, chirality

Hydrocarbons:

Alkanes, cycloalkanes, alkenes, alkynes, aromaticity, aromatics

Oxygen compounds :

Polar bond, alcohols, ethers, aldehydes, ketones, carboxylic acids, esters

Petroleum, petrochemicals, fuels, triglycerides:

Petroleum and petrochemicals, fats, oils, triglycerides, fatty acids, modern fuels, bioethanol, biodiesel, synthetic fuels

Water and organic molecules:

The structure of water, entropy, hydrophilicity, hydrophobicity, polar and non-polar solvents, surfactants, fat hydrolysis, phospholipids

Organic dyes and pigments:

Creation and perception of light and color, chromophores, natural organic dyes indigo and madder, triphenylmethane-, tar-, azodyes, phthalocyanines, modern high-performance pigments, optical brighteners

Carbohydrates:

Glucose and isomeric sugar, hemiacetal formation and pyranoses, mono-, di-, and polysaccharides, starch, cellulose

Proteins:

Amino acids and peptide bond, peptides, proteins, primary, secondary, tertiary structure, the key - lock principle, fibrous proteins: keratins, collagen

Plastics:

Thermoplastics, elastomers and thermosets, polymer types, polymerization and the polymerisates, polycondensation and polycondensates , polyaddition and polyadducts

In-depth knowledge:

Industrial organic chemistry: pharmaceuticals, evaluation of chemical reactions: yield and atom economy, terpenes, DNA and RNA

Intended Learning Outcomes:

After participating in the module, the students are able to evaluate the organic chemistry of important compounds in nature and technology. They understand structural principles and properties of the basic classes of natural products. Students are familiar with the basic modes of reaction of organic compounds.

Teaching and Learning Methods:

The module consists of a lecture with accompanying exercises. The contents are taught in lecture and through presentations. Students should be encouraged to substantive discussion of the issues

and to study advanced literature. Exercises are given in correlation to the lecture progress and will be discussed centrally after a given processing time.

Media:

Script, presentation, exercise sheets.

Reading List:

H. Beyer, W. Francke, W. Walter, "Lehrbuch der Organischen Chemie", lecture script

Responsible for Module:

Fontain, Eric; PD Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH1091: Basic Principles of Physical Chemistry 1 | Grundlagen der Physikalischen Chemie 1

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination is done in the form of a written exam (90 minutes). In this, it should be demonstrated that in limited time and without aids a problem is identified and ways to a solution can be found. To demonstrate the learning outcomes achieved, students should recognize the statistical nature of thermodynamics and kinetics and remember the Gibbsian formalism. The students understand the role of state functions and their function in thermochemistry, equilibrium and kinetics and can explain this. Furthermore, the students show that they can apply the solved equations to concrete problems of thermodynamics and kinetics. They know standard phenomena of thermodynamics and kinetics and can formally analyze them. The exam questions go over the entire module material. The answers partly require own calculations and phrasing, partly ticking of predetermined multiple answers.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Introduction to General chemistry

Content:

- 1) Equations of state for ideal and real gases (intermolecular interactions, van der Waals equation, and virial development) .
- 2) Kinetic theory of gases , specific heat, translational, rotational and vibrational degrees of freedom, Boltzmann and Maxwell distribution (including basic statistical considerations).
- 3) 1 Law: Internal energy and enthalpy as a state function, isothermal and adiabatic processes, Joule-Thomson effect, Thermochemistry: set of Hess, Kirchhoff's sentence, Haber-Born cycle.
- 4) 2 Law: reversible and irreversible processes, Carnot cycle, entropy, 3. Law , phase transition and Trouton'sche rule, efficiency, heat pump, free energy / free enthalpy (maximum work).

- 5) Equilibrium: partial molar quantities, chemical potential, Henry's and Raoult law, law of mass action, thermodynamic and other equilibrium constants, pressure dependence, Le Chatelier, van't Hoff equation, activity.
- 6) Formal kinetics, first and second order, parallel and consecutive reactions, pseudo first order, enzyme kinetics, relaxation to equilibrium, steady state.
- 7) Theoretical treatment of kinetics: Arrhenius law, theory of the transition state.

Intended Learning Outcomes:

After attending this module, students should be able to: 1) recognize the statistical nature of thermodynamics and kinetics, and to remember the Gibbs formalism. 2) understand and explain the importance of state functions and its function in the thermochemistry, the equilibrium and kinetics. 3) apply and solve the developed equations to concrete problems of thermodynamics and kinetics. 4) analyze formally standard phenomena of thermodynamics and kinetics.

Teaching and Learning Methods:

The module consists of a lecture (3 SWS) and an accompanying exercise (1 SWS). The contents of the course will be taught in lecture and through presentations and animation, whereby the relationship between formal tool, microscopic theory and diversity is explained. Practice sheets containing specific Problems are distributed weekly for self study. In the practice sessions the self found solutions are discussed and the tasks are solved and commented afterwards. Detailed solutions can be found on the internet and include: 1) a sketch of the solution approach, 2) a complete solution with all steps of calculation and references to typical failures, 3) advanced information material to stimulate self-study.

Media:

Presentation on blackboard and projector, script

Reading List:

P.W. Atkins u. J. de Paula, Physikalische Chemie, WILEY-VCH Verlag, 2006.

P.W. Atkins, C.A. Trapp, M.P. Cady, P. Marshall, C. Giunta. Arbeitsbuch Physikalische Chemie, WILEY-VCH Verlag, 2007.

J. Tinoco Jr., K. Sauer, J.C. Wang, Physical Chemistry, Prentice Hall (1995).

Responsible for Module:

Bachmann, Annett; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Grundlagen der Physikalischen Chemie 1 (CH1091/CH7201 bzw. CH6000/CH0144) (Vorlesung, 3 SWS)

Bachmann A

Grundlagen der Physikalischen Chemie 1, Übung (CH1091/CH7201 bzw. CH6000/CH0144) (Übung, 1 SWS)

Bachmann A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH6202: General and Inorganic Chemistry | Allgemeine und Anorganische Chemie

Version of module description: Gültig ab winterterm 2020/21

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird schriftlich, in Form einer 90-minütigen Klausur erbracht. In dieser sollen die Studierenden nachweisen, dass sie in begrenzter Zeit und ohne Hilfsmittel konkrete Fragestellungen der Allgemeinen und Anorganischen Chemie (beispielsweise pH-Wert-Berechnung oder stoffchemisches Wissen) erkennen und diese lösen können. Die Prüfungsfragen gehen über den gesamten Modulstoff. Die Antworten erfordern entweder das im Modul erlernte Wissen oder daraus abgeleitete Berechnungen.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Keine Voraussetzungen notwendig.

Content:

In diesem Modul werden die grundlegenden Begriffe der Allgemeinen Chemie (Einheiten und Stoffgrößen der Chemie) behandelt. Nachfolgend erlernen die Studierenden, nach welchen Prinzipien und Methoden chemische Reaktionen, Rechnungen und Fragestellungen zu bearbeiten sind. Hierbei behandelt das Modul beispielsweise das Aufstellen von Reaktionsgleichungen, die Berechnungen von pH-Werten, von Einwaagen, von Konzentrationen sowie die Grundlagen der Elektrochemie. Neben den allgemeinen Aspekten der Chemie steht weiterhin die Anorganische Stoffchemie im Vordergrund des Moduls. Dabei werden überwiegend die Hauptgruppenelemente des Periodensystems behandelt. Den Studierenden wird stoffspezifisch das unterschiedliche Verhalten der Elemente vermittelt (Reaktivität von Elementen und Verbindungen). Es werden von jedem Element wichtige und anwendungsrelevante Verbindungen besprochen. Hierbei wird auch auf wichtige Teilaspekte für die Studierenden des Umweltingenieurwesens näher eingegangen (z. B. Treibhaus- und Umweltproblematik verschiedener Stoffe, Wasserchemie, etc).

Intended Learning Outcomes:

Nach der Teilnahme am Modul "Allgemeine und Anorganische Chemie" sind die Studierenden in der Lage, die grundlegenden Fachbegriffe der Chemie zu nennen und die wichtigsten Einheiten und Stoffgrößen zu erkennen, zu verstehen und selber anzuwenden. Weiterhin sind die Studierenden in der Lage, chemische Reaktionsgleichungen aufzustellen und mögliche Probleme in der Reaktivität der Stoffe zu erkennen und zu benennen und zugehörige Rechnungen (pH-Wert, Konzentration oder Löslichkeit) zu lösen. Die Studierenden verstehen die Grundlagen der Elektrochemie und sind mit der Stoffchemie der Hauptgruppenelemente des Periodensystems vertraut. Die Studierenden wissen, dass Elemente unterschiedliche Eigenschaften besitzen und, in Verbindungen, unterschiedlich reagieren. Darüber hinaus sind die Studierenden nach der Teilnahme am Modul in der Lage, die Prinzipien und Methoden der Chemie, welche sich überwiegend in den analytischen Denkweisen und den angewandten Rechnungen widerspiegeln, zu verstehen und anzuwenden. Weiterhin entwickeln die Studierenden einen analytischen Blick für aktuelle umweltpolitische Probleme (z. B. Treibhaus- und Umweltproblematik verschiedener Stoffe, Wasserchemie, etc).

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (2 SWS) mit begleitender Übung (1 SWS). Die Inhalte des Moduls werden in der Vorlesung im Vortrag und durch Präsentationen vermittelt. Hierbei werden die Studierenden über die Grundlagen der Chemie zu weiterführenden Inhalten herangeführt. Der Lernstoff wird stufenweise vermittelt, sodass die Studierenden auf dem zuvor erlerntem Wissen aufbauen können. Zur Festigung der Lernergebnisse werden in der begleitenden Übung Aufgaben bearbeitet, die zeitgleich zur inhaltlichen Auseinandersetzung mit den Themen und zum Studium weiterführender Literatur anregen sollen. Des Weiteren dienen ausgegebene Hausaufgabe zur freiwilligen Festigung des Lernstoffs, bzw. zur erweiterten Übung der Modulinhalte.

Media:

Vortrag, Präsentationen, Tafelanschrieb, Übungsaufgaben

Reading List:

Mortimer/Mu#ller: Chemie, Das Basiswissen der Chemie, 13. Auflage, 2019 (Thieme)
Riedl/Meyer: Allgemeine und Anorganische Chemie, 12. Auflage, 2018 (de Gruyter)

Responsible for Module:

Gädt, Torben; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Allgemeine und Anorganische Chemie für UIW und GEO (CH6202a) (Vorlesung, 2 SWS)
Gädt T (Rindle O)

Allgemeine und Anorganische Chemie für UIW und GEO, Übung (CH6202b) (Übung, 1 SWS)
Gädt T, Rindle O

For further information in this module, please click campus.tum.de or [here](#).

Electives | Wahlbereich

Module Description

CH4117: Biochemistry | Biochemie

Version of module description: Gültig ab winterterm 2018/19

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird schriftlich in Form einer 90 minütigen Klausur erbracht. In dieser soll nachgewiesen werden, dass biochemische Stoffwechselwege für den Metabolismus von organischen Verbindungen zur Umsetzung von ATP im Detail verstanden worden sind. Ferner soll das Verständnis über den Aufbau von Biomolekülen (z.B. allgemeine Enzymklassen, Kohlenhydrate, Lipide, Protein, Nukleinsäuren) und die Eigenschaften ihrer Reaktivitäten geprüft werden. In der Klausur sind darüber hinaus Fragestellungen zur Biosynthese, Reaktivität und Stabilität Stoffwechselmetaboliten zu bearbeiten. Die Prüfungsfragen gehen über den gesamten Modulstoff. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten. Es sind keine Hilfsmittel erlaubt.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Hilfreich: "Aufbau und Struktur organischer Verbindungen"; "Reaktivität organischer Verbindungen" und "Grundlagen der Physikalischen Chemie".
Dringend empfohlen: "Biologie für Chemiker".

Content:

Generell behandelt das Modul alle grundlegenden biochemischen zellulären Stoffwechselwege. Der detaillierte Fokus liegt auf dem Verständnis der enzymatischen Grundprinzipien zur Umsetzung von Biomolekülen. Die chemischen Reaktionswege des stoffwechsels werden im Detail besprochen, wie oxidoreduktionen, Ligationen, Isomerisierungen, Transferreaktionen, Hydrolysereaktionen, Addition/Eliminierung, etc.. Die organisch-chemischen Grundlagen unterschiedlicher Funktionalitäten sowie die individuellen Co-Enzyme mit deren Besonderheiten

werden im Kontext der zellulären Anforderungen molekularbiologisch diskutiert. Ein weiterer fundamentaler Aspekt ist die Bedeutung des Energiestoffwechsels hinsichtlich des Umsatzes von ATP.

Einzelne Inhalte sind:

Einleitung: Enzyme und die molekularen Aspekte ihrer Wirkung

1. Glykolyse
2. Pentosephosphatweg
3. Zitronensäurezyklus
4. Aminosäureabbau
5. Fettsäuremetabolismus
6. Nukleotidstoffwechsel
7. Atmungskette
8. Photosynthese
9. Vernetzung der unterschiedlichen Stoffwechselwege in der Zelle.

Intended Learning Outcomes:

Nach der Teilnahme am Modul "Biochemie" verstehen die Studierenden die chemischen Grundlagen der metabolischen Stoffwechselwege und deren zelluläre Vernetzung. Des Weiteren sind sie in der Lage, organisch-chemische Reaktionen für biochemische Prozesse auswerten und interpretieren zu können. Sie können tiefgreifende enzymatische Strategien verstehen und anwenden um metabolische Konversionen zu erreichen. Durch die Verknüpfung der molekularen Aspekte der Enzymfunktion und der chemischen Grundlagen von primären Stoffwechselmetaboliten können die Studierenden die Logik von biologischen Problemen nachvollziehen.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (2 SWS) und einer begleitenden Übung (1 SWS). Die Inhalte der Vorlesung werden im Vortrag und Präsentationen behandelt. Begleitend sollen die Studierenden ein Lehrbuch durcharbeiten, welches zur weiteren Vertiefung auch durch weitere Literatur ergänzt werden kann. In der Übung werden die Inhalte der Vorlesung in anschaulichen Beispielen rekapituliert.

Das Modul dient der Vorbereitung der Studierenden auf die Vertiefungsfächer im Masterstudium, wie z.B. Molekulare Medizin, Bioanorganische Chemie, Biologische Chemie, Naturstoffsynthese.

Media:

Die in der Vorlesung verwendeten Medien setzen sich aus Präsentationen und Tafelaufschrieben zusammen, um den Studierenden Kenntnisse der Biochemie zu vermitteln. Die Übung dient der Anwendung und Vertiefung der erlernten Kenntnisse der Biochemie. Es wird ein Aufgabenblatt für die Übung zum Vorlesungsstoff zum Herunterladen hinterlegt. Die Musterlösung wird in einer eigenen Übungsstunde an der Tafel vorgeführt. Die Studierenden sollen zum Studium der Literatur und der inhaltlichen Auseinandersetzung mit den Themen angeregt werden.

Reading List:

Als Lehrbuch begleitend zur Vorlesung:

Berg JM, Tymoczko JL, Stryer L: Biochemie, 7. Aufl., Springer Spektrum Verlag 2012, ISBN 3827429889.

Voet D, Voet JG, Pratt CW: Lehrbuch der Biochemie, 2. Aufl., Wiley VCH, Weinheim, ISBN 9783527326679.

Responsible for Module:

Groll, Michael; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Biochemie (CH4117) (Vorlesung, 2 SWS)

Groll M, Hagn F

Biochemie, Übung (CH4117) (Übung, 1 SWS)

Hagn F, Huber E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH0106: Biology for Chemists | Biologie für Chemiker

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 4	Total Hours: 120	Self-study Hours: 75	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird schriftlich in Form von einer 90-minütigen Klausur erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit und ohne Hilfsmittel die Lernergebnisse des Moduls (z.B. die Grundstruktur von Biomolekülen und der Zellaufbau; wichtige biochemische Vorgänge innerhalb einer Zelle; Beziehung zwischen der chemischen Struktur und der (biologisch / biochemischen) Wirkung von organischen Molekülen; Protein-Biosynthese sowie die Grundlagen der Evolution deren molekulare Grundlagen) wiedergegeben und Fragestellungen zum Inhalt des Moduls eigenständig bearbeitet werden können. Die Prüfungsfragen gehen über den gesamten Modulstoff. Die Antworten erfordern eigene Berechnungen und Formulierungen und können teilweise die Auswahl von vorgegebenen Mehrfachantworten beinhalten.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine

Content:

Der Inhalt des Moduls umfasst die Grundlagen der Biochemie: Chemische Grundlagen; Moleküle des Lebens (Stoffklassen: Kohlenhydrate, Lipide, Nukleinsäuren, Aminosäuren); Grundlagen von Leben; Energie; genetische Information; DNA; Genom; Replikation; Transkription; Translation; Zellaufbau (Zytologie); Zytoskelett; Zell-Zell-Interaktionen (Gewebe); Zellzyklus; Fortpflanzung; Vererbung und Evolution; chemische Evolution; Ökologie; Immunologische Grundlagen; Grundlagen der DNA-Rekombinationstechnik.

Intended Learning Outcomes:

Nach der erfolgreichen Teilnahme am Modul verstehen die Studierenden den Aufbau von organischen Verbindungen und die wichtigsten biochemischen Vorgänge innerhalb einer Zelle.

Die Studierenden erinnern sich an den Aufbau von Zellen sowie an den Aufbau der für die Biochemie und organischen Chemie relevanten Stoffklassen und die chemischen funktionellen Gruppen. Die Studierenden verstehen die Beziehung zwischen der chemischen Struktur und der (biologisch/biochemischen) Wirkung von organischen Molekülen. Die Studierenden erinnern sich an die Protein-Biosynthese sowie die Grundlagen der Evolution und verstehen deren molekulare Grundlagen. Insgesamt haben die Studierenden nach der erfolgreichen Teilnahme am Modul einen Überblick über die strukturellen und funktionellen Grundzüge von Biomolekülen.

Teaching and Learning Methods:

Das Modul besteht aus der Vorlesung Biologie für Chemiker (2 SWS) und einer begleitenden Übungsveranstaltung (1 SWS). Die Inhalte der Vorlesung werden im Vortrag, Präsentationen und Tafelanschriften vermittelt. Begleitend sollen die Studierenden die behandelten Inhalte durch Durchsicht eines geeigneten Lehrbuchs weiter vertiefen. In der Übung werden die Inhalte der Vorlesung durch die Bearbeitung eines Fragenkatalogs ebenfalls weiter vertieft.

Media:

Vortrag mittels PowerPoint, Tafelanschrift, Skriptum, Übungsaufgabensammlung, Filme

Reading List:

Als Lehrbuch begleitend zum Modul: Campell/Reece, Biologie, Pearson Education und Alberts/Johnson/Lewis/Raff/Roberts/Walter, Molekularbiologie der Zelle, Wiley VCH.

Responsible for Module:

Buchner, Johannes; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Biologie für Chemiker (CH0106) (Vorlesung mit integrierten Übungen, 3 SWS)

Buchner J [L], Haslbeck M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH0107: Analytical Chemistry | Analytische Chemie

Version of module description: Gültig ab winterterm 2021/22

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer Klausur (60 Minuten) erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit und ohne Hilfsmittel die verschiedenen Schritte moderner Analytik von der Probenahme bis zur Auswertung erkannt und gängige instrumentelle Analyseverfahren erinnert werden können. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Grundwissen in Chemie und Physik.

Content:

Der Analytische Prozess: Probennahme, Probenvorbereitung, Detektions- und Bestimmungsverfahren, Validierung der Ergebnisse, Qualitätssicherung. Instrumentelle Analytik, u.a. AAS, OES, RFA, MS, Kopplungstechniken. Illustrative Beispiele moderner Elementanalytik.

Intended Learning Outcomes:

Nach der Teilnahme am Modul sind die Studierenden in der Lage, die einzelnen Schritte einer chemischen Analyse von Probenahme, Probenaufbereitung, Messung, Auswertung und Validierung zu erinnern und deren Eigenheiten und Wichtigkeit zu verstehen und anzuwenden. Sie können verschiedene moderne Analyseverfahren wie AAS, OES, RFA, MS und Kopplungsverfahren benennen und erklären.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung deren Inhalt im Vortrag und durch Präsentationen vermittelt wird. Studierende werden zur inhaltlichen Auseinandersetzung mit der Thematik und zum Studium der Literatur angeregt.

Media:

Bücher, Online-Skript

Reading List:

Skoog, Douglas A., Holler, F. James, Crouch, Stanley R. Niessner, R. (Hrsg.), Instrumentelle Analytik Grundlagen - Geräte Anwendungen. Springer 2013, 6. Auflage.

Harris, Daniel C., Werner, Gerhard, Werner, Tobias (Hrsg.), Lehrbuch der Quantitativen Analyse. Springer 2014, 8. Auflage.

Responsible for Module:

Strittmatter, Nicole; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Analytische Chemie (CH0107) (Vorlesung, 2 SWS)

Strittmatter N (Ivleva N)

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Chemistry (major) | Technik-Schwerpunkt: Chemie Vertiefungsmodule (major)

Module Description

CH4117: Biochemistry | Biochemie

Version of module description: Gültig ab winterterm 2018/19

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird schriftlich in Form einer 90 minütigen Klausur erbracht. In dieser soll nachgewiesen werden, dass biochemische Stoffwechselwege für den Metabolismus von organischen Verbindungen zur Umsetzung von ATP im Detail verstanden worden sind. Ferner soll das Verständnis über den Aufbau von Biomolekülen (z.B. allgemeine Enzymklassen, Kohlenhydrate, Lipide, Protein, Nukleinsäuren) und die Eigenschaften ihrer Reaktivitäten geprüft werden. In der Klausur sind darüber hinaus Fragestellungen zur Biosynthese, Reaktivität und Stabilität Stoffwechselmetaboliten zu bearbeiten. Die Prüfungsfragen gehen über den gesamten Modulstoff. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten. Es sind keine Hilfsmittel erlaubt.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Hilfreich: "Aufbau und Struktur organischer Verbindungen"; "Reaktivität organischer Verbindungen" und "Grundlagen der Physikalischen Chemie".

Dringend empfohlen: "Biologie für Chemiker".

Content:

Generell behandelt das Modul alle grundlegenden biochemischen zellulären Stoffwechselwege. Der detaillierte Fokus liegt auf dem Verständnis der enzymatischen Grundprinzipien zur Umsetzung von Biomolekülen. Die chemischen Reaktionswege des stoffwechsels werden im Detail besprochen, wie oxidoreduktionen, Ligationen, Isomerisierungen, Transferreaktionen, Hydrolysereaktionen, Addition/Eliminierung, etc.. Die organisch-chemischen Grundlagen

unterschiedlicher Funktionalitäten sowie die individuellen Co-Enzyme mit deren Besonderheiten werden im Kontext der zellulären Anforderungen molekularbiologisch diskutiert. Ein weiterer fundamentaler Aspekt ist die Bedeutung des Energiestoffwechsels hinsichtlich des Umsatzes von ATP.

Einzelne Inhalte sind:

Einleitung: Enzyme und die molekularen Aspekte ihrer Wirkung

1. Glykolyse
2. Pentosephosphatweg
3. Zitronensäurezyklus
4. Aminosäureabbau
5. Fettsäuremetabolismus
6. Nukleotidstoffwechsel
7. Atmungskette
8. Photosynthese
9. Vernetzung der unterschiedlichen Stoffwechselwege in der Zelle.

Intended Learning Outcomes:

Nach der Teilnahme am Modul "Biochemie" verstehen die Studierenden die chemischen Grundlagen der metabolischen Stoffwechselwege und deren zelluläre Vernetzung. Des Weiteren sind sie in der Lage, organisch-chemische Reaktionen für biochemische Prozesse auswerten und interpretieren zu können. Sie können tiefgreifende enzymatische Strategien verstehen und anwenden um metabolische Konversionen zu erreichen. Durch die Verknüpfung der molekularen Aspekte der Enzymfunktion und der chemischen Grundlagen von primären Stoffwechselmetaboliten können die Studierenden die Logik von biologischen Problemen nachvollziehen.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (2 SWS) und einer begleitenden Übung (1 SWS). Die Inhalte der Vorlesung werden im Vortrag und Präsentationen behandelt. Begleitend sollen die Studierenden ein Lehrbuch durcharbeiten, welches zur weiteren Vertiefung auch durch weitere Literatur ergänzt werden kann. In der Übung werden die Inhalte der Vorlesung in anschaulichen Beispielen rekapituliert.

Das Modul dient der Vorbereitung der Studierenden auf die Vertiefungsfächer im Masterstudium, wie z.B. Molekulare Medizin, Bioanorganische Chemie, Biologische Chemie, Naturstoffsynthese.

Media:

Die in der Vorlesung verwendeten Medien setzen sich aus Präsentationen und Tafelaufschrieben zusammen, um den Studierenden Kenntnisse der Biochemie zu vermitteln. Die Übung dient der Anwendung und Vertiefung der erlernten Kenntnisse der Biochemie. Es wird ein Aufgabenblatt für die Übung zum Vorlesungsstoff zum Herunterladen hinterlegt. Die Musterlösung wird in einer eigenen Übungsstunde an der Tafel vorgeführt. Die Studierenden sollen zum Studium der Literatur und der inhaltlichen Auseinandersetzung mit den Themen angeregt werden.

Reading List:

Als Lehrbuch begleitend zur Vorlesung:

Berg JM, Tymoczko JL, Stryer L: Biochemie, 7. Aufl., Springer Spektrum Verlag 2012, ISBN 3827429889.

Voet D, Voet JG, Pratt CW: Lehrbuch der Biochemie, 2. Aufl., Wiley VCH, Weinheim, ISBN 9783527326679.

Responsible for Module:

Groll, Michael; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Biochemie (CH4117) (Vorlesung, 2 SWS)

Groll M, Hagn F

Biochemie, Übung (CH4117) (Übung, 1 SWS)

Hagn F, Huber E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH0226: Molecular Medicine | Molekulare Medizin

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer 90-minütigen Klausur erbracht. Zum Nachweis der erworbenen Lernergebnisse beantworten die Studierenden auf Basis ihrer erworbenen Fachkompetenzen komplexe Problemstellungen aus dem Bereich der molekularen Medizin (z.B. molekulare Prozesse bei der Entstehung von Krankheiten und deren Therapieansätzen). Dabei wird das Verständnis der Vorgänge in Zellen auf molekularer Ebene (z.B. chemische Reaktionen ausgelöst durch Therapeutika oder Fehlreaktionen von Enzymen nach Mutation) überprüft. Hierbei zeigen die Studierenden, dass sie die theoretischen molekularen Grundlagen, die enzymatischen und chemischen Reaktionsmechanismen, sowie deren Modulation durch Therapeutika wiedergeben, erklären und bewerten können.

Die Aufgabenstellungen der Klausur beinhalten beispielsweise das Aufzeichnen chemischer Strukturformeln, die Darstellung chemischer und enzymatischer Reaktionen, das Erklären von Anwendungsbeispielen für die spezifischen Therapeutika zum Angriff von Biomolekülen oder auch das Erkennen möglicher, abgeleiteter wissenschaftlicher Anwendungen.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundkenntnisse auf Bachelor-Niveau in Biochemie.

Content:

Vermittlung von fortgeschrittenen Kenntnissen über molekulare Entstehungs- und Funktionsprozessen von Krankheiten. Inhalte sind u.a.:

- Überblick über Krankheitsbilder und deren auslösende, molekularen Mechanismen;
- Entstehung von Krankheitserregern, Strategien zur Medikamentenentwicklung;
- Proteasen als Zielmoleküle zur Entwicklung von Medikamenten;
- Wirkstoffdesign;

- Identifizierung von molekularen Zielmolekülen;
- Feinregulation der Immunantwort;
- Epigenetik;
- Molekulare Onkologie;
- Gentherapie.

Der Fokus liegt in allen Themenbereichen auf dem detaillierten Verständnis des molekularen, mechanistischen Zusammenspiels und der Interaktion und Dynamik von Wirkstoff und Zielmolekül.

Intended Learning Outcomes:

Nach der Teilnahme am Modul sind die Studierenden in der Lage, detailliert die molekularen Prozesse in der Entstehung und Therapie von ausgewählten Krankheitsbildern zu verstehen. Darüber hinaus sind sie in der Lage, aktuelle Forschungsergebnisse im Bereich der molekularen Medizin (z.B. Wirkstoffdesign gegen Proteasen, molekulare Prozesse von Gentherapeutischen Ansätzen oder epigenetische Veränderungen) zu verstehen, wiederzugeben und detailliert zu erklären. Die Studierenden können auch ihr erlerntes theoretische Verständnis und Fachwissen auf aktuelle Problemstellungen aus dem Bereich der molekularen Medizin übertragen und Forschungsergebnisse qualitativ interpretieren und bewerten.

Teaching and Learning Methods:

Das Modul wird als Vorlesung (2 SWS) mit begleitendem Seminar (1 SWS) abgehalten. Im Seminar werden Teile der angesprochenen Thematiken an konkreten Beispielen vertieft und diskutiert. Neben der Präsenzlehre steht insbesondere aber auch die weitere Vertiefung der Inhalte in der Literatur und die inhaltlichen Auseinandersetzung mit den aktuellen Themen der molekularen Medizin im Fokus.

In der Vorlesung und im Seminar werden die theoretische Grundlagen und Konzepte der molekularen Medizin durch Vortrag des Dozierenden vermittelt. Dabei unterstützen Tafelanschriften und PowerPoint-Präsentation die Darstellung von z.B. Wirkung von Therapeutika auf Proteasen, Prozessen der Gentherapie, etc., das Verständnis der Inhalte. Durch den Vortrag des Dozierenden ist ein stufenweiser Aufbau der Modulinhalte (Grundlagen zu weiterführenden Inhalten) möglich. Durch Fragen des Dozierenden an die Zuhörerschaft und Diskussion aktueller Beispiele soll das Wissen im begleitenden Seminar gefestigt werden.

Zusätzlich werden die Studierenden angeregt, eigenständig eine Vertiefung dieser aktuellen Beispiele mittels Recherche der Fachliteratur durchzuführen und durch inhaltliche Auseinandersetzung mit dieser ihr Verständnis der Konzepte der molekularen Medizin zu erweitern.

Media:

Präsentation, Tafelanschrift, Skript, wissenschaftliche Literatur.

Reading List:

Literaturhinweise erfolgen durch den Dozenten.

Responsible for Module:

Groll, Michael; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Molekulare Medizin, Seminar (CH0226b) (Seminar, 1 SWS)

Groll M, Huber E

Molekulare Medizin (CH0226a) (Vorlesung, 2 SWS)

Groll M, Huber E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH3153: Construction Chemistry 1 | Bauchemie 1

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer Klausur (90 Minuten) erbracht. Hierbei sollen die Studierenden zeigen, dass sie in der Lage sind die Vor- und Nachteile sowie die Anwendungseigenschaften typischer bauchemischer Zusatzmittel (wie z.B. Verflüssiger, Fließmittel, Verdickungsmittel und Wasserretentionsmittel) zu benennen und komplexe Fragestellungen hierzu lösen zu können. Darüber hinaus sollen die Studierenden in der Prüfung aufzeigen, dass sie die industrielle Herstellung dieser Zusatzmittel verstehen und schriftlich wiedergeben können. Zudem beschäftigt sich ein Teil der Prüfung mit dem detaillierten Wirkmechanismus dieser Zusatzmittel, den die Studierenden anhand der spezifischen Molekülstruktur herleiten und ausführlich diskutieren sollen. Die Prüfungsfragen umfassen den gesamten Modulstoff. Neben frei formulierten Fragen können auch kurze Rechenaufgaben Teil der Klausur sein. Es sind keine Hilfsmittel erlaubt.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fortgeschrittene Kenntnisse in allgemeiner und anorganischer Chemie, Grundkenntnisse der Polymerchemie.

Content:

Das Modul stellt die Werkstoffkunde der Baumaterialien aus einer chemischen Perspektive dar. Dies umfasst eine kurze Darstellung des mechanischen Verhaltens von festen Körpern, sowie von plastisch verformbaren Werkstoffen, insbesondere Suspensionen. Der erste Teil des Moduls behandelt somit grundlegende Aspekte der Festigkeitslehre, sowie der Rheologie. Im zweiten Teil des Moduls wird auf die Chemie unterschiedlicher Bauwerkstoffe (z.B. Ziegelsteine, Zement, Beton oder Asphalt) eingegangen und deren mechanische und rheologische Eigenschaften werden

auf der Grundlage der atomaren Struktur und der kolloidalen Wechselwirkungen der Materialien dargestellt.

Das Modul behandelt zusammenfassend folgende Fragen:

- Welche Werkstoffklassen sind relevant als Bauwerkstoffe?
- Was sind die grundlegenden (mechanischen) Eigenschaften von Werkstoffen und wie leiten sie sich aus der atomaren Struktur ab?
- Wie werden mechanische Materialeigenschaften gemessen?
- Welche rheologischen Eigenschaften haben Bauwerkstoffe und wie kann man diese messen?
- Was sind die strukturellen Ursachen für die rheologischen Eigenschaften der behandelten Werkstoffe?
- Wie kann die (nanoskopische) Struktur der Werkstoffe beschrieben werden?
- Welche chemische Zusammensetzung haben die behandelten Werkstoffe: Beton, Asphalt, gebrannte Ziegelsteine, Kalksandstein sowie Porenbeton und wie werden diese technisch hergestellt und angewendet?
- Was sind aktuelle technische Herausforderungen und Forschungsfragen im Bereich der großskaligen Strukturmaterialien?

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul kennen die Studierenden die wichtigsten Werkstoffklassen im Bereich der Bauwerkstoffe und sind in der Lage, deren Struktur-Eigenschaftsbeziehung auf der Grundlage der atomaren Struktur zu diskutieren. Die Kenntnisse umfassen dabei sowohl das mechanische Verhalten der Werkstoffe (d.h. Festigkeit, Steifigkeit, etc.) als auch das rheologische Verhalten (d.h. Viskosität, Fließgrenze, etc.). Weiterhin können die Studierenden die chemische Struktur der wichtigsten Bauwerkstoffe (siehe oben) auf unterschiedlichen Größenskalen beschreiben. Insbesondere sind die Studierenden in der Lage, die technischen Eigenschaften der Materialien kritisch zu diskutieren und miteinander zu vergleichen. Abschließend haben die Studierenden ein fundiertes Verständnis auch für die aktuellen technischen Limitierungen der Werkstoffklassen und können daraus Fragestellungen an zukünftige Forschungsprojekte ableiten.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (2 SWS) und einem Kurzpraktikum (1 SWS). Innerhalb der Vorlesung werden z.B. die Inhalte durch Vortrag des Dozierenden thematisiert. Dabei unterstützen Tafelanschriften und Folien-Präsentationen die Darstellung des Lehrstoffs und tragen somit zum Verständnis der Vorlesungsinhalte bei. Durch den Vortrag des Dozierenden ist ein stufenweiser Aufbau der Modulinhalte möglich. Die Vermittlung der Inhalte kann dem Lerntempo der Studierenden angepasst werden. Durch Fragen des Dozierenden an die Zuhörerschaft soll das Wissen gefestigt werden. Das Kurzpraktikum findet im Anschluss an die Vorlesung statt. Im praktischen Teil werden einfache keramische Werkstoffe (z.B. als Mörtel) hergestellt und deren rheologische (am Rotationsrheometer sowie durch Fließmaßbestimmung) und mechanische Eigenschaften (durch zerstörungsfreie Prüfmethoden wie Ultraschall und eine klassische Festigkeitsprüfung) charakterisiert.

Media:

Tafelarbeit, Folien, PowerPoint, Laborarbeit

Reading List:

W. Callister u. a., Materialwissenschaften und Werkstofftechnik: Eine Einführung, VCH, 2012

P. Coussot, Rheophysics - Matter in all its States, Springer, 2014

G. Neroth u.a., Wendehorst Baustoffkunde, Springer, 2011

Responsible for Module:

Gädt, Torben; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Bauchemie 1 (CH3153a) (Vorlesung, 2 SWS)

Gädt T

Bauchemie 1 (CH3153b) (Praktikum, 1 SWS)

Gädt T

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Electrical Engineering and Information Technology (minor) | Technik-Schwerpunkt: Elektro-/Informationstechnik Basismodule (minor)

Elective area 1 | Wahlbereich 1

Module Description

EI10002: Principles of Electrotechnology | Principles of Electrotechnology [PiET]

Version of module description: Gültig ab winterterm 2017/18

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module will be assessed in a written final examination (90 min) after the teaching weeks. In this examination it is to verify that the candidates are able to understand the general principles of electrical engineering and to solve relevant problems in the fields covered in this module in a limited time and without any resources. The examination will cover all parts of the lectures and exercises.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge of electricity and magnetism on high school level.

Basic knowledge of vector analysis.

Content:

Electrostatics:

Electrical charges, Coulomb's law, electrostatic fields, electrostatic potentials and voltages.

Dielectric materials:

Polarisation, dielectric displacement vector, Gauß' law, capacitors and capacitances.

Stationary electrical currents:

Current densities, local and integral Ohm's law, Kirchhoff's laws, resistors and resistivities, electrical networks, voltage and current sources, equivalent circuits, electrical energy and power.

(Electro-)magnetism:

Fundamental terms in magnetism, magnetic dipoles, Dia-, Para-, Ferromagnetism, magnetising field, magnetic induction, Amperé's law, electromagnetic induction, Faraday's law, inductors and inductivities, transformers.

Intended Learning Outcomes:

After participating in the modules lectures and exercises, students are able to understand and apply the basic physical principles of electrical engineering. They have acquired basic knowledge and understanding of some of the underlying problem-solving methods of electrical engineering.

Teaching and Learning Methods:

Teaching methods in lectures and exercises: Lecture-style instructions mainly on the blackboard. In solving relevant exercises a deeper knowledge of the subject-matters presented in the lectures is sought.

Media:

The following media types are used in the lectures and exercises:

- Explanations and exemplifications on the black board, partly supplemented by computer-aided presentations.
- Downloads on the Internet.
- Exercises are provided with the objective that the students first should solve the problems independent by themselves, solution to the problems will be demonstrated in subsequent exercise sessions, and subsequently will be made available also via download on the Internet.

Reading List:

References will be presented in the first lecture hour.

Responsible for Module:

Schrag, Gabriele; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Principles in Electrotechnology (Vorlesung, 3 SWS)

Wittmann F (Essing S)

Principles in Electrotechnology (Übung, 1 SWS)

Wittmann F [L], Essing S (Schrag G)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI1289: Electrical Engineering | Elektrotechnik

Version of module description: Gültig ab summerterm 2019

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer Klausur (90 min) erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit mit Hilfsmittel (2 handgeschriebene A4-Seiten) in den Veranstaltungen des Moduls behandelte Grundaufgaben gelöst werden können. Die Klausur besteht aus Fragen, in dem das Verständnis geprüft wird, und Aufgaben, in den z.B. eine Kurzschlussberechnung eines Transformators berechnet werden müssen. Mit den Prüfungsaufgaben wird das Erreichen der angestrebten Lernergebnisse des Moduls geprüft. Die Prüfungsfragen gehen über den gesamten Vorlesungsstoff.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundkenntnisse der elektrischen Energietechnik;

Content:

Elektrische Größen und Grundgesetze
 Elektromagnetismus
 Analogien des elektrischen und magnetischen Feldes
 Wechselstromkreise
 Drehstromsystem
 Elektrische Maschinen
 Grundlagen Leistungselektronik
 Elektronische Bauelemente
 Steuerungstechnik

Intended Learning Outcomes:

Nach der Teilnahme an der Modulveranstaltung ist der Studierende in der Lage, die Grundzüge der Elektrotechnik zu verstehen. Er kennt die Grundlagen der elektrischen und magnetischen Felder, ist vertraut mit Gleichstrom-, Wechselstrom- und Drehstromsystemen. Die Funktion und Beschreibung von elektrischen Maschinen wird grundsätzlich anhand von Beispielen erklärt. Die Grundlagen der Leistungselektronik sowie die wesentlichen Bauelemente wurden ihm vorgestellt.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (2SWS) und einer Übung (1SWS). In der Vorlesung wird der Lernstoff mittels PowerPoint-Präsentation vermittelt. Details und Beispiele werden an der Tafel präsentiert. In der Übung werden konkrete Aufgabe und Beispiele an der Tafel vorgerechnet. Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch mehrmaliges Aufgabenrechnen in Übungen angestrebt.

Als Lehrmethode wird in der Vorlesungen und Übungen Frontalunterricht gehalten, in den Übungen auch Arbeitsunterricht (Aufgaben rechnen).

Media:

Folgende Medienformen finden Verwendung: Folienvortrag, Skriptum, Übungen, Laborführungen

Reading List:

" Elektrotechnik, Energietechnik
Elpers, Meyer, Skornitzke, Willner
Kieser Verlag, ISBN 3-8242-2022-9
" Taschenbuch der Elektrotechnik
Kories, Schmidt-Walter
Verlag Harry Deutsch, ISBN 3-8171-1563-6
" Fachkunde Elektrotechnik
Verlag Europa-Lehrmittel, ISBN 3-8085-3020-0
" Einführung in die Elektrotechnik
Jötten, Zürneck
Uni-Text, Vieweg Verlag
" Grundlagen der Elektrotechnik
Phillipow,
Hüthig Verlag
" Theoretische Elektrotechnik
Simonyi,
Deutscher Verlag der Wissenschaften

"

Responsible for Module:

Witzmann, Rolf; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Elective area 2 | Wahlbereich 2

Module Description

EI05551: Internet Communication | Internetkommunikation [INT]

Version of module description: Gültig ab summerterm 2017

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a graded written exam (75 min) questions will be asked about basic principles and protocols etc. of Internet communication, which the students have to answer in a closed book fashion either with textual and/or graphical description or via calculations.

The students' acquired capabilities on practical design of communication protocols will be examined and graded via programming exercises. The students work on a concrete problem with respect to a communications application in the Internet in groups and demonstrate and present their results.

The final grade is composed of the following elements:

one exam consisting of two parts

- 60 % graded written final exam
- 40 % graded programming exercises

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic programming experience. In the programming exercises Python will be used.

Content:

Content

- * Basic principles of communication networks
- * Protocol layers and service models
- * Basic methods for network analysis (analytical performance analysis, simulation, prototyping)

- * Application Layer in the Internet (HTTP, FTP, P2P, Socket)
- * Transport Layer (TCP, UDP)
- * Network Layer (Routing, IP)
- * Link Layer and MAC (LAN, WLAN, MAC)
- * QoS mechanisms in the Internet (IntServ, DiffServ)

Intended Learning Outcomes:

After having taken this module successfully, a student is able to understand and apply the principles of the protocol-based communication in the Internet as well as to analyze Internet protocols and mechanisms.

Teaching and Learning Methods:

As learning method, in addition to the students individual methods, knowledge will be deepened through the solving of several exercises as part of the tutorial.

As a teaching method, in the lectures presentations will be given and in the tutorials exercises will be solved.

In addition, students acquire further knowledge based on reading scientific papers to train reading and understanding of scientific literature.

In the programming exercises (class project) students work independently on a solution (concept and programming) for a technical problem. The technical problem will be presented in the lecture/tutorial and varies each semester.

Media:

The following media are used:

- Presentation
- Lecture notes
- Exercises with solutions for download
- selected scientific papers
- programming exercises

Reading List:

The following book is recommended:

- Kurose J. F., Ross W. K.: Computernetzwerke, Pearson Verlag

Responsible for Module:

Kellerer, Wolfgang; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0625: Communication Networks | Kommunikationsnetze

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Im Rahmen einer 90 minütigen schriftlichen Klausur wird überprüft, inwieweit Studierende die Kommunikationsnetze und deren Funktionsblöcke zugrundeliegenden Konzepte wiedergeben können. Dafür müssen Studierende Fragen beantworten und Analysemethoden zur Netzbewertung einsetzen und Optimierungsmöglichkeiten aufzeigen können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

keine Voraussetzungen.

Content:

- * Übertragungsverfahren, Multiplextechniken, Durchschalte- und Paketvermittlung, Signalisierung, Adressierung, Nachrichtenaustausch
- * Leistungsbewertung, Einführung in die Verkehrstheorie (Berechnung von Verlust- und Wartesystemen)
- * Grundlegende Kommunikationsprotokolle (ARQ, Fensterprotokolle)
- * Netzstrukturen, Netzgraphen, Algorithmen, Routing
- * Einführung in die Netzplanung und Optimierung
- * Fehlertoleranz und Verfügbarkeit
- * Mobilitätsmanagement
- * Beispiele heutiger Netze (Internet, Telefonnetz, Mobilfunknetz), Dienste, Anwendungen, Architekturkonzepte

Intended Learning Outcomes:

Nach erfolgreichem Abschluss des Moduls ist die Studierende/der Studierende in der Lage, grundlegende Konzepte von Kommunikationsnetzen und deren Funktionsblöcke zu verstehen,

grundlegende graphen- und verkehrstheoretische Analysemethoden zur Netzbewertung, grundlegende Methoden des Protokollentwurfs, der Netzplanung und Optimierung sowie Routingverfahren anzuwenden.

Teaching and Learning Methods:

Als Lernmethode wird zusätzlich zu den individuellen Methoden der Studierenden/des Studierenden eine vertiefende Wissensbildung durch mehrmaliges Aufgabenrechnen in Übungen angestrebt.

Als Lehrmethode wird in der Vorlesungen Frontalunterricht, in den Übungen Arbeitsunterricht (Aufgaben rechnen) gehalten.

Zusätzlich erarbeiten die Studierenden selbstständig anhand wissenschaftlicher Fachartikel weitere Grundlagen und üben damit das Lesen und Verstehen wissenschaftlicher Literatur.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen
- Skript
- Übungsaufgaben mit Lösungen als Download im Internet
- ausgewählte wissenschaftliche Aufsätze

Reading List:

Folgende Literatur wird empfohlen:

- Tanenbaum A. S.: Computer Netzwerke, Wolframs Verlag
- Killat U.: Entwurf und Analyse von Kommunikationssystemen, Vieweg+Teubner Verlag
- Krüger G., Reschke D.: Telematik, Fachbuchverlag Leipzig

Responsible for Module:

Kellerer, Wolfgang; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Kommunikationsnetze (Vorlesung mit integrierten Übungen, 4 SWS)

Kellerer W, Zerwas J

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI10003: Analog Electronics | Analog Electronics [AE]

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 100	Contact Hours: 50

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module will be assessed in a written final examination (90 min) after the teaching weeks. In this examination it is to verify that the candidates are able to understand the general principles of analog electronic circuits and to solve simple but relevant problems in the fields covered in this module in a limited time and without any resources. The examination will cover all parts of the lectures and exercises of this module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Subject matters as presented in the module "Principle of Electrotechnology"

Calculus; complex numbers and operations for ac signal analysis

Content:

Electronic signals

Circuit analysis (dc, ac)

Electrical characteristics of electronic devices

Electronic filters

Basics of semiconductor's physics

PN Junctions, pn diodes

Transistors

Basic Transistor circuits

Amplifiers

Intended Learning Outcomes:

After participating in the modules lectures and excercises, students are able to

- understand and apply the basic principles of analog electronic cicuits

- have acquired basic knowledge and understanding of some of the basic problem-solving methods of electronic circuits.

Teaching and Learning Methods:

Teaching methods in the lectures and exercises: frontal teaching with presentations and on the blackboard.

In solving relevant exercises a deeper knowledge of the subject matters of the lessons is sought.

Media:

The following media types are used in the lectures and exercises:

- Presentations (also for downloads on the Internet)
- Explanations and exemplifications on the black board
- Exercises are provided with the objective that the students first should solve the problems independent by themselves, the solutions to the problems will be demonstrated in subsequent exercise sessions, and subsequently will be made available also via download on the Internet.

Reading List:

Responsible for Module:

Schrag, Gabriele; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Information Technology and Electronics (major) | Technik-Schwerpunkt: Informationstechnik und Elektronik

Vertiefungsmodule (major)

Module Description

EI0631: Media Technology | Medientechnik

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The type of examination is a written exam with 90 minutes duration. Students solve selected problems based on the introduced concepts and equations. Additionally, they answer questions about the lecture content and explain in their own words selected methods from the lecture. Students are allowed to bring 4 pages of handwritten notes and a non-programmable calculator. Matlab assignments with voluntary participation are offered during the semester and can be used to improve the final grade of the course.

The final grade is composed of the following elements:

- 100% final exam

Successful completion of the Matlab assignments leads to a bonus of 0.3 on the final grade in case the final is passed. The Matlab assignments are successfully completed if at least an average of 65% is obtained when submitting the solutions to the module tutor.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Higher Mathematics, Linear Algebra, Signal Processing

Following modules should have been accomplished before participation:

- Signals
- Introduction to signal processing

- Systems

Content:

image construction camera models and coordinates, mapping from world to pixel coordinates, camera calibration, stereoscopic camera systems, image synthesis, the rasterization of geometric primitives, geometric scene description using polygon meshes and parametric surfaces, illumination of surfaces, shading, texture mapping, rendering pipeline, analog video, color TV systems, digital video, format conversion

Intended Learning Outcomes:

Upon completion of the module, students are able to:

- characterize the fundamental principles of information retrieval using the example of text and image search and to evaluate the performance of different approaches
- develop a simple system for media search and to evaluate its performance
- describe the creation of images and mathematically compute the mapping between world coordinates and pixel coordinates for single and stereo camera systems
- perform external and internal camera calibration and analyze the calibration error
- describe the fundamental principles of image synthesis including the rasterization of geometric primitives, geometric scene description using polygon meshes and parametric surfaces, illumination of surfaces, shading, texture mapping
- describe the basic steps of the rendering pipeline and evaluate it for simple scenes with point light sources
- characterize analog and digital video and to analyze their differences
- compute the influence of phase errors for color TV systems NTSC, SECAM, and PAL.
- perform the conversion between different formats for digital TV signals

Teaching and Learning Methods:

Teaching and learning methods consist of presentations during the lecture and the exercises. Moreover, the students will improve their knowledge by use of scientific literature and implement selected concepts of the lecture using matlab during the voluntary project during the semester.

Media:

Following forms of media are applied:

- presentations
- script
- exercises with solution (downloadable from the internet)

Reading List:

Following literature is recommended:

- R. Steinmetz, Multimedia-Technology Springer-Verlag, 3. überarb. Auflage, 2000.
- Foley et al, Computer Graphics: Principles and Practice, Addison Wesley, zweite Auflage, 1995.
- Manning et al., Introduction to Information Retrieval, Cambridge University Press, 2008.
- U. Schmidt, Professionelle Videotechnik, Springer-Verlag, 2000.

Responsible for Module:

Steinbach, Eckehard; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Medientechnik (Vorlesung mit integrierten Übungen, 4 SWS)

Steinbach E, Xu X

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7331: Design of Integrated Circuits | Entwicklung von Integrierten Schaltungen

Version of module description: Gültig ab summerterm 2014

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 120	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung ist schriftlich (60 min) ohne Unterlagen. Die Teilnehmer beantworten Verständnisfragen zu Methoden und Werkzeugen für die Entwicklung integrierter Schaltungen, einschließlich einem Fragenblock zum Literaturstudium. Als Prüfungsleistung soll ein vertieftes Verständnis für die Leistungsfähigkeit und die Beschränkungen dieser Methoden und Werkzeuge, sowie die Kompetenz zur kritischen Reflektion bezüglich deren Einsatz nachgewiesen werden.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundlagen der integrierten Schaltungstechnik, z.B. aus dem Modul "Digitaltechnik"

Content:

Folgende Themen werden behandelt: Abstraktionsebenen beim Entwurf integrierter Schaltungen, Leistungsfähigkeit und Grenzen der Simulation und der einzelnen Werkzeuge, Leistungsfähigkeit und Grenzen verschiedener Testmethoden, Technisch-organisatorische Aufgaben eines Projektleiters bei der ASIC-Entwicklung, Umsetzen der weltweit wichtigsten Qualitätssicherungs-Vorschriften (ISO 9000) bei der ASIC-Entwicklung.

Intended Learning Outcomes:

Die Teilnehmer sollen nach der Veranstaltung Methoden und Werkzeuge für die Entwicklung Integrierter Schaltungen analysieren und bewerten können. Dies schließt technische, organisatorische und wirtschaftliche Themen ein, mit denen ein zukünftiger VLSI-Entwicklungsingenieur konfrontiert wird.

Teaching and Learning Methods:

Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch anschauliche Fallstudienbetrachtungen angestrebt.

Als Lehrmethode wird in der Vorlesung Frontalunterricht, ergänzt durch Gruppendiskussionen, verwendet.

Eigenstudium des ausgeteilten Materials. In der Vorlesung werden Publikationen zu den prüfungsrelevanten Fallstudien ausgegeben, die von den Studierenden selbstständig analysiert werden.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen mit Laptop und Beamer
- Tafelanschrieb
- Skript, gedruckt von der Fachschaft und online über e-learning verfügbar
- Literatur (wird in der Vorlesung verteilt)

Reading List:

Folgende Literatur wird empfohlen:

- Reifschneider: ""CAE-gestützte IC-Entwurfsmethoden"", Prentice Hall
- Weste, Harris: ""CMOS VLSI Design, A Circuits and Systems Perspective"", Addison Wesley

Responsible for Module:

Stechele, Walter; Apl. Prof. Dr.-Ing. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Power Engineering (major) | Technik-Schwerpunkt: Energietechnik Vertiefungsmodule (major)

Module Description

EI0610: Electrical Drives - Fundamentals and Applications | Elektrische Antriebe - Grundlagen und Anwendungen

Version of module description: Gültig ab winterterm 2016/17

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Abschlussklausur (90 min) ohne Hilfsmittel weisen die Studierenden durch das Beantworten von Wissensfragen und Rechnungen, dass sie die Aufbau und Einbettung von Antrieben in übergeordnete Systeme verstanden haben. Daneben weisen sie die Fähigkeit beispielsweise zur korrekten Berechnung von Parametern wie Auslegung und Dimensionierung nach.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Differentialgleichungen, komplexe Wechselstromrechnung, Maxwell-Gleichungen, Lorentz-Kraft, Regelungstechnik

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:

- Mathematik 1 bis 4
- Elektrizität und Magnetismus
- Systeme

Content:

Geregelte elektrische Antriebe: Grundsätzliche Struktur, Verhalten im anzutreibenden System, Komponenten und deren Eigenschaften (elektrische Maschine, Stromrichter und deren Steuerung bzw. Regelung), Zusammenwirken der Komponenten, Auswirkung von digitalen Reglern, Normen und Richtlinien (CE-Kennzeichnung)

Intended Learning Outcomes:

Nach dem erfolgreichen Abschluss des Moduls kennt der Studierende den grundsätzlichen Aufbau sowie das Verhalten von geregelten Antrieben und ist in der Lage, die Wechselwirkungen zwischen ihren Bestandteilen sowie mit übergeordneten Systemen zu erkennen, einzuschätzen und zu berechnen. Er hat die Fähigkeit, elektrische Antriebe sowie deren Komponenten in realen Anwendungen grob auszulegen. Der Studierende hat vertiefte Kenntnis und Verständnis der elektromagnetischen Drehmomenterzeugung und Spanungsinduktion, und Verständnis der Hintergründe und Ziele der CE-Kennzeichnung sowie deren Konsequenzen für geregelte elektrische Antriebe.

Teaching and Learning Methods:

Aln den Vorlesungen wird Frontalunterricht gehalten. In den Übungen erfolgt die selbstständige Befassung der Studierenden mit den Themen des Moduls zum Kompetenzerwerb (Aufgaben rechnen, vertiefende Herleitungen und Simulationsbeispiele).

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen (Overhead und PowerPoint)
- Skript
- Übungsaufgaben und Lösungsfolien als Download im Internet

Reading List:

Folgende Literatur wird empfohlen:

- Schröder, D. "Elektrische Antriebe-Grundlagen", 3. Auflage 2007, Springer Verlag, Hamburg
- Brosch, F. "Moderne Stromrichterantriebe", 4. Auflage, 2002, Vogel Verlag und Druck
- Mohan, N. Electric Drives: An integrative approach , MNPERE, Minneapolis, USA, 2001
- Groß, H. et al. "Elektrische Vorschubantriebe in der Automatisierungstechnik", 1. Auflage, Publicis Corporate Publishing, 2000

Responsible for Module:

Lobo Heldwein, Marcelo; Prof. Dr.sc. ETH Zürich

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0611: Basics of Electrical Energy Storage | Grundlagen Elektrischer Energiespeicher

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Im Rahmen einer 60 minütigen schriftlichen Klausur wird durch das Beantworten von Fragen und Berechnungen an vorgegebenen Speichersystemen überprüft, ob die Studierenden in der Lage sind Speichertechnologien wiederzugeben und anhand eines universellen Speichermodells zu beschreiben.

Während des Semesters sollen fachliche Vertiefungen durch Lesen von Fachartikeln erfolgen. Diese zu lesenden Artikel werden in der Vorlesung diskutiert und sind auch prüfungsrelevant.

Die Endnote setzt sich aus folgenden Prüfungselementen zusammen:

- 100 % Abschlussklausur

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine speziellen Anforderungen

Content:

Die Vorlesung vermittelt einen Einblick in die Grundlagen und die Funktionsweise von elektrischen Energiespeichern.

- Einführung, Begriffe, Definitionen
- Abstraktes Speichermodell
- Grundlagen kinetische Speicher (Schwungrad)
- Grundlagen weitere mechanische Speicher (Druckluft, Pumpspeichersystem)
- Grundlagen direkte elektrische Speicher
- Grundlagen Batteriespeicher

- Grundlagen Gasspeicher (Elektrolyse, Methanisierung ...)

Intended Learning Outcomes:

Nach erfolgreichem Abschluss des Moduls ist der Hörer in der Lage unterschiedlichen Speichertechnologien und darauf basierende Speichersysteme zu berechnen und zu bewerten, einschließlich eventueller Wandlersysteme, die notwendig sind. Anhand einer abstrakten Betrachtung mit einem universellen Speichermodell vermögen sie eine technologieunabhängige Betrachtung einzusetzen.

Teaching and Learning Methods:

Als Lehrmethode wird in der Vorlesung Frontalunterricht, ergänzt durch Gruppendiskussionen, verwendet. Ferner sollen Exponate zur Veranschaulichung eingesetzt werden und einige Zusammenhänge werden auch mittels Animationen gezeigt.

Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch anschauliche Fallstudienbetrachtungen angestrebt.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen mit Laptop und Beamer
- Tafelanschrieb
- Diskussionen zu Fachaufsätzen und aktuellen Themen, wie Speicher in der Elektromobilität und Speicher für die Energiewende.

Reading List:

Allgemeine Literatur wird in der Vorlesung bekannt gegeben.

Es werden verschiedene Zeitschriftenbeiträge online zur Verfügung gestellt, die dann auch in der Vorlesung diskutiert werden.

Responsible for Module:

Jossen, Andreas; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Grundlagen Elektrischer Energiespeicher (Vorlesung, 3 SWS)

Jossen A, Rehm M

Grundlagen Elektrischer Energiespeicher (Übung, 1 SWS)

Jossen A, Rehm M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0612: Electrical Small Power Machines | Elektrische Kleinmaschinen

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Studierende weisen in einer Abschlussklausur (60 min) durch das Beantworten von Fragen ohne Hilfsmittel nach, dass sie die Besonderheiten elektrischer Maschinen wiedergeben können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundkenntnisse der elektromechanischen Energiewandlung bzw. der elektrischen Maschinen

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:

- Grundlagen elektrischer Maschinen

Es wird empfohlen, ergänzend an folgenden Modulen teilzunehmen:

-

Content:

Permanenterregung in elektrischen Maschinen; PM-Gleichstrommaschine, Universalmotor, einphasig gespeiste Asynchronmaschine (Kondensatormotor, Spaltpolmotor), PM-Synchronmaschine (BLDC, EC-Maschine, PMSM): quasi-stationäres Betriebsverhalten unter Berücksichtigung des Primärwiderstands; Schrittmotoren: konventionelle Stepper, Hybrid-Stepper; Sonderbauformen elektrischer Maschinen: Axial- und Transversalfeldflussmaschine, synchrone und geschaltete Reluktanzmaschine

Intended Learning Outcomes:

Nach erfolgreichem Abschluss des Moduls hat der/die Studierende Kenntnis der Besonderheiten elektrischer Kleinmaschinen und deren Sonderbauformen in Aufbau und Funktionsweise. Er hat

das nötige Wissen erlernt, Permanentmagneten im Maschinenaufbau zu berücksichtigen. Der Studierende hat darüber hinaus Kenntnis über unsymmetrische Speisung.

Teaching and Learning Methods:

Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch mehrmaliges Aufgabenrechnen in Übungsstunden angestrebt.

Als Lehrmethode wird in Vorlesung und Übung Frontalunterricht, in den Übungen teilweise auch Arbeitsunterricht (Aufgaben rechnen) gehalten.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen
- Skript
- Übungsaufgaben mit Lösungen als Download im Internet

Reading List:

Folgende Literatur wird empfohlen:

- Stölting, Kallenbach: Handbuch elektrische Kleinantriebe, Hanser Verlag

Responsible for Module:

Herzog, Hans-Georg; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0620: Fundamentals of Electrical Machines | Grundlagen elektrischer Maschinen

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Anhand von Kurzfragen und Berechnungen bezüglich der Wirkungsweise und des Aufbaus elektrischer Maschinen weisen die Studierenden in einer Abschlussklausur (90 min) ohne Hilfsmittel nach, dass sie die Grundlagen elektrischer Maschinen verstanden haben und die zugehörigen Betriebskennlinien korrekt anwenden können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundkenntnisse über elektromagnetische Felder und elektrische Energietechnik, Maxwell-Gleichungen, komplexe Rechnung.

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:

- Elektromagnetische Feldtheorie
- Elektrische Energietechnik

Content:

Achshöhen und Bauformen elektrischer Maschinen; Grundlagen:

eindimensionale Feldberechnung in elektrischen Maschinen, Kraft- und Drehmomententstehung, thermisches Punktmassenmodell; quasi-stationäres Betriebsverhalten elektrischer Maschinen (jeweils unter Vernachlässigung des Primärwiderstands): elektrisch erregte Gleichstrommaschine, Drehfeld-Asynchronmaschine mit Käfigläufer, elektrisch erregte Drehfeld-Synchronmaschine mit Vollpoläufer; Drehstrom-Transformator; Berücksichtigung von Permanentmagneten: permanenterregte Gleichstrommaschine.

Intended Learning Outcomes:

Nach erfolgreichem Abschluss des Moduls verstehen die Studierenden die physikalische Wirkungsweise sowie die Drehmomententstehung in elektromechanischen Wandlern. Die Studierenden kennen den grundlegenden Aufbau sowie die Funktionsweise elektrischer Maschinen.

Darüber hinaus kennen die Studierenden das quasi-stationäre Betriebsverhalten der Maschinentypen, sie verstehen die zugehörigen Betriebskennlinien und können sie anwenden.

Teaching and Learning Methods:

Als Lernmethode wird zusätzlich zu den individuellen Methoden der Studierenden eine vertiefende Wissensbildung durch mehrmaliges Aufgabenrechnen in Übungen angestrebt.

Als Lehrmethode wird in den Vorlesungen und Übungen Frontalunterricht gehalten, in den Übungen auch Arbeitsunterricht (Aufgaben rechnen).

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen
- Skript
- Übungsaufgaben mit Lösungen als Download im Internet

Reading List:

Folgende Literatur wird empfohlen:

- R. Fischer, Elektrische Maschinen, Hanser-Verlag

Responsible for Module:

Herzog, Hans-Georg; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Grundlagen elektrischer Maschinen (Vorlesung mit integrierten Übungen, 4 SWS)

Filusch D [L], Filusch D, Herzog H

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0628: Power Electronics - Fundamentals and Applications | Leistungselektronik - Grundlagen und Standardanwendungen

Version of module description: Gültig ab winterterm 2015/16

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung erfolgt in Form einer Klausur (90 min). Anhand von vorgegebenen Beispielen und dazugehöriger Fragen weisen Studierende nach, dass sie profunde Kenntnisse in den Eigenschaften und Auslegung von Stromrichterschaltungen erworben haben.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Kirchhoff'sche Prinzipien, Differentialgleichungen, komplexe Wechselstromlehre

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:

- Mathematik 1 und 2
- Physik für Elektroingenieure
- Schaltungstechnik 1 und 2

Content:

Grundsätzliches Verhalten von Stromrichtern sowie deren Anwendungen, Bauelemente der Leistungselektronik, Kühlung von Leistungshalbleitern, Diodengleichrichter, Netzgeführte Stromrichter, DC/DC-Wandler und Netzteile, Spannungszwischenkreisumrichter (VSI), Pulsumrichter

Intended Learning Outcomes:

Nach dem erfolgreichen Abschluss des Moduls ist der Studierende in der Lage:

- Die Verträglichkeit und das Verhalten einer Stromrichterschaltung in der jeweiligen Anwendung zu analysieren und zu bewerten

- Ungesteuerte und gesteuerte Gleichrichterschaltungen (Netzteile) zu berechnen, zu simulieren und auszulegen
- Vor- und Nachteile von Leistungshalbleitern zu kennen
- Spannungszwischenkreisumrichter zu verstehen (Funktionsweise), zu analysieren und auszulegen.

Teaching and Learning Methods:

Präsentanteil (60 Stunden):

Das Modul besteht aus einer Vorlesung (2 SWS), einer begleitenden Übung (1 SWS) und einem Praktikum (1 SWS).

- Die Inhalte der Vorlesung werden hauptsächlich durch Vortrag und Diskussion mit Präsentation(en), Vorführungen und Tafel und/oder Overheadanschrieb vermittelt
- Die Inhalte der Übungen werden interaktiv mit den Studierenden erarbeitet, diskutiert und vorgerechnet
- Die Inhalte im Praktikum werden von den Studierenden in Einzel-, Partner- und Gruppenarbeit selbstständig bei geeigneter Hilfestellung erarbeitet

Eigenstudiumsanteil (90 Stunden):

- Vor- und Nachbereitung des Präsenzteiles
- Lösen von Zusatzaufgaben (Übung, Praktikum etc.)
- Prüfungsvorbereitung

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen
- Skript
- Übungsaufgaben als Download im Internet - multimedial
- gestützte Lehr- und Lernprogramme (Simulationstools)
- Laborübungen

Reading List:

In der FSEI erhältliches Skript

Responsible for Module:

Lobo Heldwein, Marcelo; Prof. Dr.sc. ETH Zürich

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI0709: Fundamentals of Energy Economy | Grundlagen der Energiewirtschaft [GDE]

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In the written examination (90 min) students have to answer questions in order to demonstrate their understanding of fundamentals of energy economy.

Furthermore, students have to solve arithmetical problems in order to demonstrate their understanding of fundamentals of power plant technology and to demonstrate, if they are able to analyse the operating method of power plants based on requirements arising from fulfilments of energy demand in a competitive market and to evaluate the direct results.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

- Fundamental terms and definitions in energy economy,
- Structure and development trends of energy supply and application,
- Fundamentals of energy supply within energy markets,
- Fundamentals of power plant technology (combustion calculation, process cycles and installation technology,
- Methods for modelling and analysis of energy equipment and systems,
- Technical, energetic and economic description and balancing of energy usage ranging from energy services to primary energy,
- Fundamentals, techniques and potentials of renewable energies, especially solar, wind, water, biomass, geothermal. Material, surface and energy consumption, properties and operating behaviour of the power plants.

Intended Learning Outcomes:

At the end of the module, students are able to:

- understand the principles of energy supply and the properties of provision of applied energy carriers,
- provide an overview of the generation of electrical energy and the properties of the applied power plants,
- analyse and assess the operating method of power plants based on requirements arising from fulfilments of energy demand,
- understand basics and technologies for the use of renewable energies..
- design systems and calculate their energy yield.

Teaching and Learning Methods:

Lecture with integrated exercises

The following forms of media are used:

- Presentations
- Script
- Exercises with solutions

Media:

The following Teaching style be used:

- Presentations
- Manuscripts
- Exercises

Reading List:

- Lecture script: Grundlagen der Energiewirtschaft,
- Book: Kaltschmitt Wiese, "Erneuerbare Energien" Springer Verlag,
- Book: Schwab, "Elektroenergiesysteme", Springer Verlag,
- IfE Schriftenreihe Heft 11: Erzeugung elektrischer Energie, Thermische Stromerzeugungsanlagen,
- IfE Schriftenreihe Heft 1: Nutzung regenerativer Energien.

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Vorlesung Grundlagen der Energiewirtschaft (3 SWS)

Übung Grundlagen der Energiewirtschaft (1 SWS)

Ulrich Wagner (uwagner@tum.de)

Peter Tzscheuschler (ptzscheu@tum.de)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI1287: Laboratory Course Power Transmission and High Voltage Technology | Praktikum Energieübertragungs- und Hochspannungstechnik für Lehramt und TUM-BWL

Version of module description: Gültig ab summerterm 2014

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 115	Contact Hours: 35

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in drei verschiedenen Formen erbracht.

Im Eingangstest zu jedem Praktikumsversuch (ohne Hilfsmittel) werden die theoretischen Grundlagen zu den jeweiligen Versuchen aus dem Selbststudium der Skripten/Versuchsunterlagen abgefragt. Die Studierenden zeigen damit, dass sie in der Lage sind, den darauffolgenden Versuch korrekt und eigenständig durchzuführen.

Die benotete Versuchsdurchführung jedes Praktikumsversuches dient dem Nachweis, dass die Studierenden die zuvor erlernten theoretischen Grundlagen praktisch anwenden können.

Insbesondere die Berechnung und Interpretation der jeweiligen Kenngrößen wird geprüft.

Die schriftliche Ausarbeitung eines Praktikumsversuchs dient der Überprüfung, ob das vorher theoretisch erlernte und praktisch angewandte Wissen tiefer verstanden wurde.

Die Abschlussnote ergibt sich aus der gewichteten Bewertung der Eingangstests, der schriftlichen Dokumentation sowie der mündlichen Mitarbeitsnote (Eingangstest 20%, benotete Versuchsdurchführung 40%, schriftliche Ausarbeitung 40%)

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Kenntnis grundlegender Vorgänge in der Energieübertragungstechnik (Verhalten von Betriebsmitteln wie z.B. Transformatoren und Übertragungsleitungen) sowie der Hochspannungstechnik, wie sie in der thematisch abgestimmten Vorlesung Energieübertragungs- und Hochspannungstechnik (EI1291) vermittelt werden. Hinweis: Für ein erfolgreiches Absolvieren des Praktikums wird ein vorheriges Ablegen der zugehörigen Vorlesung dringendst empfohlen.

Content:

Das Praktikum besteht aus 5 Versuchen zu folgenden Themen:

- Messen hoher Spannungen
- Verhalten von Luftfunkenstrecken
- Transformator und Leitung
- Leitungsschutz
- Wanderwellen

Intended Learning Outcomes:

Nach Teilnahme am Praktikum hat der Studierende sein Verständnis für die grundlegenden Mechanismen des elektrischen Durchschlags, die Erzeugung und Messung hoher Spannungen, Vorgänge in Transformatoren und Leitungen, sowie Grundlagen der Netzschutztechnik durch praktische Versuche vertieft.

Teaching and Learning Methods:

Die theoretischen Grundlagen werden in Form von kurzen Skripten oder als Verweis auf die entsprechende Literatur zur Verfügung gestellt. Die Aufgaben- / Hilfestellungen werden in digitaler Form bereitgestellt. Durch das Führen eines Versuchsprotokolls werden die im Praktikum behandelten Themen vertieft. Die Versuchsbetreuung erfolgt durch wissenschaftliche Mitarbeiter

Die praktische Anwendung der theoretischen Grundlagen erfolgt im Rahmen von Experimenten (in Gruppenarbeit).

Media:

- Sicherheitsunterweisung
- Versuchsanleitung (inkl. Theorieteil) zu jedem Versuch
- Versuchsstände im Labor

Reading List:

D. Kind, K. Feser: Hochspannungs-Versuchstechnik

K. Heuck, K.-D. Dettmann, D. Schulz: Elektrische Energieversorgung

D. Oeding, B.R. Oswald: Elektrische Kraftwerke und Netze

A. J. Schwab: Elektro-Energiesysteme

Responsible for Module:

Rolf Witzmann (rolf.witzmann@tum.de)

Courses (Type of course, Weekly hours per semester), Instructor:

Praktikum Energieübertragungs- und Hochspannungstechnik (3 SWS)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI4585: Project: Economic Aspects of Nanotechnology | Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a report (50%) and a presentation (50%).

The report is drawn up in teamwork. The methods discussed in the seminar, such as patent analysis, crowd-funding, market analysis or business plan, are applied and scientifically evaluated, whereby the clear and precise summary of the most important facts and the conclusions drawn from them are in the foreground (15-20-page report).

In the oral presentation followed by discussion, the students show that they understand important applications, perspectives and opportunities of selected technologies in the field of nanotechnology and can evaluate them within the framework of a patent analysis, crowd-funding, market analysis or business plan. The presentation focuses on the visualization of the results and conclusive lines of argumentation. (20 minutes presentation, 20 minutes subsequent discussion).

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic Lectures / Literature

- Introduction to nanoelectronics
- Introduction to nanotechnology

Content:

Fundamentals of nanotechnology. Patent applications, research and development activities in the field of nanotechnology: international comparison. Overview of important fields of application of nanotechnology. Applications of nanotechnology in selected industrial sectors: Automotive industry, aerospace industry, construction industry, textile industry, energy industry, chemistry,

information and communication technology, medicine. Opportunities and risks of nanotechnology. Nanotechnology in Germany.

Intended Learning Outcomes:

Upon successful completion of the course, students will be able to interpret the properties of nanotechnologically relevant structures and elements and understand manufacturing methods for these components. It will also be possible to compare different physical effects of elements of nanotechnology against the background of system applications. After participation, students will be able to understand important applications, perspectives and opportunities of selected technologies in the field of nanotechnology and evaluate them in the context of patent analysis, crowd funding, market analysis or a business plan.

Teaching and Learning Methods:

During the seminar, selected topics will be discussed in a team and technical contexts will be presented and deepened in small lectures. Through independent group work, patent analysis and business plans, for example, are developed and presented in the seminar. The writing of a report and a presentation also takes place in a team.

Media:

Information and teaching material is made available in the form of presentation slides, scientific publications, handouts and topic-specific scripts.

Reading List:

Presentation slides, topic-specific short instructions, technical descriptions and scientific publications will be handed out by the tutor during the course.

The following literature is recommended:

- H. Paschen et al., Nanotechnologie Springer-Verlag, 2004.
- J. Schulte (Hrsg.), Nanotechnologie: Globale Strategien, Branchentrends und Anwendungen, Wiley, 2005.

Responsible for Module:

Weig, Eva; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie (Forschungspraktikum, 4 SWS)
Becherer M [L], Becherer M, Haider M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI70330: Data Networking | Data Networking [DNET]

Data Networking: Methods for the Medium Access and the Resource Management of Wireline and Wireless Packet-based Communication Networks

Version of module description: Gültig ab summerterm 2020

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a written exam (90 min) students proof their understanding of data networking and the related methods by answering questions. With given use cases students proof their ability to apply methods for protocols and mechanisms, e.g. for wireless and wireline data communication networks, by calculations.

During the semester an optional written mid term exam will be offered, which can be used to improve the final grade.

The final grade is composed of the following elements:

- 100% final exam

The mid term exam results can be calculated with a bonus of 0.3 to the result of the final exam, if this leads to an improvement of the overall grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic knowledge of communication networks and their analysis:

- packet based networking
- data communication protocols incl. TCP/IP
- evaluation methods for communication network performance analysis

Content:

Medium Access Control and Resource Management for wireless and wireline networks and their performance analysis:

- Medium Access Control (MAC)
- performance analysis based on queueing theory
- (wireless) contention-based MAC (e.g. in WLAN, Ethernet)
- resource partitioning, polling
- cellular network resource management: OFDMA, scheduling algorithms, cellular principles, protocols (e.g. LTE, 5G)
- packet switching, label switching (MPLS), routing
- Software Defined Networking (SDN)

Intended Learning Outcomes:

After successful completion of the module, students understand the principles of resource management for wireless and wireline packet-based communication networks with a focus on layer 2 protocols (medium access control) and their building blocks, and are able to apply methods for protocol design, resource management, traffic engineering and the analysis and evaluation of network protocols and architectures.

Teaching and Learning Methods:

Learning method:

In addition to the individual methods of the students consolidated knowledge is aspired by repeated lessons in exercises and tutorials.

Teaching method:

During the lectures students are instructed in a teacher-centered style. The exercises are held in a student-centered way where examples of state-of-the-art wireless and wireline communication systems are discussed and calculated.

In addition, students are asked to read 1-4 scientific articles to be discussed during the lecture and tutorial hours to link the methods to current challenges for future communication standards.

Media:

The following kinds of media are used:

- Presentations
- Lecture notes
- Exercises and solutions for download
- Videotutorials
- Online Tools

Reading List:

Lecture notes will be provided. The following books deal with topics covered in DNET:

- Bertsekas, Gallager: Data Networks, Prentice Hall (available online)
- William Stallings: Data and Computer Communications. Pearson Publishers
- Miao, Zander, Sung, Slimane: Fundamentals of Mobile Data Networks. Cambridge University Press
- Kurose, Ross: Computer Networks. Pearson Publishers.

Responsible for Module:

Kellerer, Wolfgang; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Data Networking (Vorlesung mit integrierten Übungen, 4 SWS)

Kellerer W, Aykurt K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI70810: Battery Storage | Batteriespeicher

Version of module description: Gültig ab summerterm 2020

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Anhand einer schriftlichen Prüfung (60 min) ohne Unterlagen ohne Hilfsmittel weisen die Studierenden nach, dass sie elektrochemische Zusammenhänge von Batteriezellen abrufen und erinnern können. Das Beantworten der Fragen erfordert teils eigene Formulierungen und teils kurze Berechnungen.

Während des Semesters sollen fachliche Vertiefungen durch Lesen von Fachartikeln erfolgen. Diese zu lesenden Artikel werden in der Vorlesung diskutiert und sind auch prüfungsrelevant.

Die Endnote setzt sich aus folgenden Prüfungselementen zusammen:

- 100 % Abschlussklausur

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine speziellen Anforderungen

Content:

Die Vorlesung vermittelt einen Einblick in die Grundlagen und die Funktionsweise von Batteriespeichern. Der Schwerpunkt liegt hierbei bei wiederaufladbaren Systemen, wie sie in mobilen Geräten, Elektrofahrzeugen und photovoltaischen Inseln eingesetzt werden.

- Einführung, Begriffe, Definitionen
- Einführung in die Elektrochemie
- Thermodynamische Grundlagen (Gleichgewichtszustand)
- Kinetik und Überspannungen (Spannungszusammensetzung unter Stromfluss)
- Die elektrochemische Doppelschicht
- Diffusionsvorgänge und Vor- nachgelagerte Reaktionen

- Aufbau einer Zelle (unterschiedliche Konstruktionsprinzipien)
- Optimierung von Batterien für unterschiedliche Anforderungen
- Doppelschichtkondensatoren (ideales und reales Verhalten)
- Bleibatterien,
- Alkalische Systeme,
- Li-Ionen Systeme und zukünftige Li-Systeme
- Redox flow und Hochtemperatursysteme

Intended Learning Outcomes:

Die Teilnehmer haben nach dem erfolgreichen Abschluss des Moduls grundlegende Kenntnisse zum elektrochemischen Speicher. Das umfasst die grundlegenden elektrochemischen Zusammenhänge, die Methodik zum Charakterisieren und Auslegen von Speichersystemen. Sie sind in der Lage diese Fragestellungen am Beispiel aktueller Anwendungen, wie der Elektromobilität, diese Aspekte selbständig auch auf andere Anwendungsbereich zu übertragen. Durch das gelegentliche kritische Lesen und Diskutieren von Fachaufsätzen wird an das wissenschaftliche Arbeiten herangeführt.

Teaching and Learning Methods:

Als Lehrmethode wird in der Vorlesung Frontalunterricht, ergänzt durch Gruppendiskussionen, verwendet. Ferner sollen Exponate zur Veranschaulichung eingesetzt werden und einige Zusammenhänge werden auch mittels Animationen gezeigt.

Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch anschauliche Fallstudienbetrachtungen angestrebt.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen mit Laptop und Beamer
- Tafelanschrieb
- Diskussionen zu Fachaufsätzen und aktuellen Themen, wie Speicher in der Elektromobilität und Speicher für die Energiewende.

Reading List:

Allgemeine Literatur wird in der Vorlesung bekannt gegeben.

Es werden verschiedene Zeitschriftenbeiträge online zur Verfügung gestellt, die dann auch in der Vorlesung diskutiert werden.

Responsible for Module:

Jossen, Andreas; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Batteriespeicher (Vorlesung, 3 SWS)

Jossen A, Kücher S

Batteriespeicher (Übung, 1 SWS)

Jossen A, Kücher S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI70870: Modeling of Energy Systems | Modellierung von Energiesystemen

Version of module description: Gültig ab summerterm 2020

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Examination with the following parts: Module examination by written exam (90 min). Theoretical knowledge is tested with short answer questions as well as multiple choice. In order to check the knowledge on algorithms and applications the students have to perform calculations in the exam. Essay-type questions are given to test for methodological knowledge on data quality and model applications, within others. The written exam will be graded.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Bachelor in natural sciences or engineering (fundamentals of higher mathematics and physics)

Content:

Introduction to mathematical modeling and its application to energy systems,
Mathematical optimization as an important tool for energy models,
Basics of economics as well as important concepts of energy economics,
General equilibrium theory and game theory with regard to energy and environmental problems,
System theory at the regional and global level,
Insight into the practice of modeling and the necessary data basis

Intended Learning Outcomes:

Upon successful completion of the course, students will be able to reflect on different approaches to modeling energy systems.

Students will be able to reproduce the necessary methods for optimization, economics modeling, game theory considerations and quantitative system models in an unchanged manner.

They can assess the problems of data collection and classify the quality of data. Based on this, the students can explain and build up optimization problems. They are able to classify and evaluate models used in practice in their function and statement. Likewise, they can assign given problems to a suitable modeling approach.

Teaching and Learning Methods:

Lectures, presentations and blackboard

Written exercise questions are to be solved independently first and then discussed together.

Media:

The following media are used:

- Presentations
- Blackboard
- Exercise questions

Reading List:

Thie 2008, Introduction to Linear Programming and Game Theory, Wiley

Bhattacharyya 2011, Energy Economics, Springer

Erdmann 2010, Energieökonomik, Springer

Mankiw 2011 – Economics, South-Western

Bofinger – Grundzüge der Volkswirtschaftslehre, Pearson

Samuelson, Nordhaus 2005 – Economics, McGraw-Hill

Club of Rome – Die Grenzen des Wachstums, 1972

More literature recommendations can be found in the lecture notes.

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7135: Industrial Energy Economy | Industrielle Energiewirtschaft

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung besteht aus einer Klausur (60 min). Sie soll überprüfen, inwieweit die Teilnehmer in der Lage sind Aufgaben in das Tätigkeitsfeld eines Energieingenieurs einzuordnen und dazu Energiemanagementsysteme einzusetzen. Dafür ist das Beantworten von Fragen und Bearbeiten von Fallbeispielen notwendig.

Repeat Examination:

(Recommended) Prerequisites:

gute Mathematik- und Physik-Kenntnisse

Content:

Betriebliche Analyse von Energieverbrauch und -kosten. Maßnahmen zur rationellen Energienutzung, Auswahlkriterien und Praxisbeispiele, ganzheitliche Bilanzierung des Energiebedarfs. Betriebliches Energiemanagement-System. Aspekte zur zukünftigen Entwicklung von Energieverbrauch und Emissionen in der Industrie.

Intended Learning Outcomes:

Der Studierende ist nach erfolgreichem Abschluss des Moduls in der Lage:
einen Überblick über das Tätigkeitsfeld eines Energie-Ingenieurs zu geben
Energieverbrauch und -kosten von Betrieben zu analysieren
betriebliche Energiemanagementsysteme zu verstehen und anzuwenden.

Teaching and Learning Methods:

Vorträge, Präsentationen und Tafelarbeit
Durchsprache von Praxisbeispielen

Media:

Folgende Medienformen finden Verwendung:

- Rechnergestützte Präsentation für den Vortrag
- Tafelarbeit
- Vorlesungsskript

Reading List:

Folgende Literatur wird empfohlen:

Energieanwendungstechnik; M. Rudolph, U. Wagner

Energieversorgung Grundlagen; U. Wagner

Nutzung regenerativer Energien; U. Wagner

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Industrielle Energiewirtschaft (Vorlesung, 2 SWS)

Gruber A (Winkelmayr M)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7328: Electromagnetic Compatibility in the Field of Power Engineering | Elektromagnetische Verträglichkeit in der Energietechnik

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer Klausur (60 min) ohne Hilfsmittel weisen Studierende durch die Beantwortung von Fragen nach, dass sie die wesentlichen Kenntnisse zur Umsetzung von EMV-gerechten Geräten und Anlagen besitzen und geeignete Maßnahmen zur Blitzschutztechnik für vorgegebene Anwendungsfälle wiedergeben können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine speziellen Voraussetzungen erforderlich.

Content:

Einführung, Grundbegriffe und Definitionen. Beispiele für Störquellen. Koppelmechanismen, passive Schutz- und Entstörungskomponenten (Filter, Ableiter, Schirme). Maßnahmen zur EMV-gerechten Gestaltung von Geräten und Anlagen. Elektromagnetische Beeinflussung durch Blitzentladungen; Blitzschutztechnik. Spezielle EMV-Probleme in der Energie- und Automatisierungstechnik. Wirkung elektromagnetischer Felder auf Bioorganismen.

Intended Learning Outcomes:

Nach der Teilnahme an der Modulveranstaltung ist der Studierende in der Lage, die mögliche Wirkung von Störquellen und die Koppelmechanismen zu verstehen und diese Kenntnisse in geeignete Maßnahmen zur EMV-gerechten Gestaltung von Geräten und Anlagen umzusetzen. Weiter versteht er die Mechanismen, die zur Blitzentladung und infolge zu verschiedenen Schädigungen führen und ist in der Lage, geeignete Maßnahmen zur Blitzschutztechnik umzusetzen.

Teaching and Learning Methods:

Als Lernmethode wird zusätzlich zu den individuellen Methoden des Studierenden eine vertiefende Wissensbildung durch Aufgabenrechnen in Übungen angestrebt.

Als Lehrmethode wird in den Vorlesungen Frontalunterricht, in den Übungen Arbeitsunterricht (Aufgaben rechnen) gehalten. Im Rahmen von Begehungen werden ergänzende Erläuterungen im Hochspannungslabor gegeben.

Media:

Folgende Medienformen finden Verwendung:

- Präsentationen
- Rechnerische und experimentelle Übungen

Reading List:

Folgende Literatur wird empfohlen:

- Schwab, A.J.: Elektromagnetische Verträglichkeit. Springer Verlag, 5. Auflage, 2007
- Heidler, F; Stimper, K.: Blitz und Blitzschutz. VDE-Schriftenreihe - Normen verständlich Band 128. VDE-Verlag Berlin.

Responsible for Module:

Koch, Myriam; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7329: Energy Application Technology | Energieanwendungstechnik

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer benoteten schriftlichen Klausur mit 60 Minuten Dauer erbracht. Zu dieser Klausur sind keine Hilfsmittel zugelassen.

Die Studierenden beantworten Verständnisfragen zu Grundlagen der Energieanwendung und der eingesetzten Technologien.

Anhand von Rechenaufgaben wird überprüft, inwieweit die Studierenden in der Lage sind, Effizienz und Energieeinsatz der vorgestellten Technologien zu analysieren und zu bewerten.

Rechenschritte müssen nachvollziehbar dargestellt sein.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

keine Voraussetzungen

Content:

Grundsätzliche Wege zur rationellen Energieanwendung. Gewinnung und Verarbeitung energetischer Daten. Betriebsverhalten, energetische Bilanzen und Kennzahlen von Anlagen und Maschinen. Grundlagen und Techniken der Anwendung im Bereich von Raumwärme, Klimatisierung, Prozesswärme und -kälte, Kraft, Verkehr, Licht und IKT.

Intended Learning Outcomes:

Der Studierende ist nach erfolgreichem Abschluss des Moduls in der Lage:

- Grundlagen der Energieanwendung zu verstehen und einen Überblick zu geben.
- Die Anwendungsarten in den einzelnen Verbrauchssektoren zu verstehen und zu erläutern.
- Die vorgestellten Anwendungstechnologien hinsichtlich Effizienz, Kummuliertem Energieaufwand und Treibhausgasemissionen zu analysieren und zu bewerten.

Teaching and Learning Methods:

Vorträge, Präsentationen und Tafelarbeit

Diskussion aktueller Literaturquellen

Vorlesung mit begleitenden Übungen, dabei werden Gruppenarbeiten angestrebt, zu vorgegebenen Aufgaben sollen Lösungen erarbeitet werden.

Media:

Folgende Medienformen finden Verwendung:

- Präsentation
- Tafelarbeit
- Übungsaufgaben mit Lösungen

Reading List:

M. Rudolph; U. Wagner: Energieanwendungstechnik. Wege und Techniken zur effizienteren Energienutzung. Springer Verlag

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energieanwendungstechnik (Vorlesung mit integrierten Übungen, 4 SWS)

Goebel C (Zinsmeister D), Tzscheutschler P

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7330: Energy Supply in Liberalised Markets | Energieversorgung im liberalisierten Markt

Energy Supply in Liberalised Markets

Version of module description: Gültig ab summerterm 2016

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Modulprüfung mit folgenden Bestandteilen:

50 % der Prüfungsleistung wird in Form einer Präsentation des Seminarthemas in der Gruppe und anhand einer schriftlichen Dokumentation darüber erbracht. Es wird nachgewiesen, dass die Studierenden in der Lage sind, Fragestellungen der Energieversorgung unter Marktbedingungen zu bearbeiten, im Zusammenhang zu begreifen, zu analysieren und die Ergebnisse zu bewerten.

50 % der Prüfungsleistung wird in Form einer mündlichen Prüfung erbracht. In dieser soll nachgewiesen werden, dass Charakteristika und Zusammenhänge der marktorientierten Energieversorgung verstanden werden. Darüber hinaus sollen die wichtigsten Erkenntnisse aus dem Seminar berichtet und Fragen dazu beantwortet werden können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Energiewirtschaftliche Grundbegriffe, Struktur der Stromversorgung.

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:

- Grundlagen der Energietechnik
- Grundlagen der Energiewirtschaft

Content:

Vorlesung:

- Entwicklung und Wandel der Stromversorgung,
- Rechtliche Grundlagen der Marktöffnung,
- Akteure und ihre Aufgaben,

- Lastprofile und Fahrpläne der Erzeugung,
- Systemdienstleistungen (Regelleistung),
- Integration von Einspeisung aus erneuerbaren Energien,
- Börsenhandel von Energie,
- Parallelen zur Gasversorgung,

Seminar:

Die Studierenden bearbeiten in Kleingruppen ein aktuelles Thema im Bereich der Energieversorgung und präsentieren dies. Zusätzlich wird ein kommentierter Foliensatz erstellt und an die anderen Kursteilnehmer verteilt.

In einer Vorbesprechung werden Fragen zum Inhalt und Umfang der Präsentation geklärt.

Intended Learning Outcomes:

Der Studierende ist nach erfolgreicher Teilnahme am Modul in der Lage:

- den durch die Liberalisierung hervorgerufenen Strukturwandel in der Energieversorgung zu verstehen;
- die Akteure in der Energieversorgung zu benennen und ihre Aufgaben und Pflichten zu erläutern;
- die Abwicklung der Stromversorgung über Bilanzkreise mit Einbindung von Strommärkten, Regelleistung und erneuerbaren Energien über Fahrpläne nachzuvollziehen;
- den Einfluss von Parametervariationen zu analysieren und deren Einfluss auf die Stromversorgung zu bewerten.

Teaching and Learning Methods:

- Vortrag und Diskussion mit Präsentationen und Tafelarbeit
- Planspiel zum Informationsaustausch in der Stromversorgung
- Bearbeitung von ausgewählten Fragestellungen in Kleingruppen,
- Präsentation des Seminarthemas durch Studierenden mit anschließender Diskussion.

Media:

Folgende Medienformen finden Verwendung:

- Rechnergestützte Präsentation für den Vortrag
- Handout mit den Präsentationsfolien und Kurzkomentaren
- Entwicklung von Tafelbildern

Reading List:

Folgende Literatur wird empfohlen:

Informationen im Internet:

- Regelleistung: www.regelleistung.net
- Strombörsen: www.eex.de und www.epexspot.de
- Netzregulierung: www.bundesnetzagentur.de

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energieversorgung im liberalisierten Markt (Vorlesung mit integrierten Übungen, 3 SWS)

Tzscheuschler P (Döpfert M)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7467: Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country | Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country [ProRESDC]

Interdisciplinary Student Project Concept Development of a Renewable Energy System in a Developing Country

Version of module description: Gültig ab winterterm 2016/17

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students' learning success will be determined by the following components of the project:

1. Input throughout the course of the milestone meetings (the supervisor of a team will rate each member of his team individually based on her or his input during the milestone meetings):

- Integration of the extraneous inputs, which his team members from other fields of study give, in order to develop a holistic concept for a renewable energy system in a developing country
- Analyzing the framework conditions, determining obstacles and deriving innovative solutions for renewable energy systems in developing countries before each milestone meeting
- Communication with the team leader and the other team members
- Meeting the timetable

2. Final presentation:

A jury will evaluate, how far the team manages to transfer their developed concept into an understandable context and to convince the audience of their choice of a certain concept. This includes the logic of the presentation, the focus on relevant points and appealing visualizations of their presentation slides.

In addition to this, each team member is individually evaluated for her or his presentation methods and expertise shown during the subsequent questions.

3. Project report (identical evaluation of all team members):

Here is rated how much convincing the decision was explained for the chosen energy concept and against other possible concepts due to the technological, financial and socio-cultural conditions and how comprehensible the implementation of the final concept was described.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Bachelor degree in a technical field of studies or in TUM-BWL
- Participation in "Series of lectures Renewable Energy Systems in Developing Countries"
- Interest in energy systems and their application / realization in developing countries
- Interest in the conversion of knowledge, which may differ from the field of her or his own studies on the one hand , but on the other hand is essential for the holistic understanding of their own study curriculum
- Interest in team-based project work and developing a realizeable concept
- Letter of motivation regarding study program, expertise, motivation and relevant experience (1.000 - 2.000 characters)

Content:

During the study project students develop a concept for the renewable energy system of a given location in a developing country.

During this concept development the variety of possible energy concepts will be reduced by general characteristics of stand-alone systems in the first step, followed by technological criteria in developing countries and socio-cultural impacts. Subsequently, the suitability of the various power production technologies, which are presented in the lectures, will be evaluated for the site in the developing country. Afterwards financing possibilities and framework conditions of regional market will be taken into account for the selection of the energy concept. In the end the final energy concept will be derived out of these sub steps.

Additionally the students derive options based on their developed energy concept, how to empower the population of the region economically by means of renewable energies.

Intended Learning Outcomes:

After participating in the project the students will be able to:

- understand extraneous knowledge concerning renewable energy systems in developing countries by the interdisciplinary collaboration with students from different study fields
- implement this interdisciplinary knowledge about energy systems in developing countries into action competences
- present the progress of a project target-oriented in meetings
- highlight the relevant technological, financial and sociocultural framework conditions of a planned energy system for a certain location in a developing country
- evaluate various options of energy supply concepts with based on their framework conditions
- manage the progress of a concept
- develop a suitable energy concept based on the requirements and possibilities of a defined location

- present convincingly their concept in a final presentation
- describe convincingly in a project report both the choice of their energy concept taking the involvement of all relevant aspects into account and the its realization

Teaching and Learning Methods:

Students are expected to achieve the learning outcomes by means of a project internship. Interdisciplinary teams of students, consisting of students from various faculties, develop a concept for a renewable energy system for a particular location in a developing country in defined milestones. Each team is advised by a scientific assistant, who is their team leader. This advisor is managing the technical expertise of the team members with her or his project experience during the weekly milestone meetings.

Finally, each team presents its energy concept in a final presentation and in a project report. As a closing event there is offered a two-day excursion to an alpine mountain hut in Tyrol. Here both the the pros and cons of the concepts developed by the students are discussed to give the students the opportunity to reflect on their own work and that of their fellow students. Also the island energy system of the alpine hut, consisting of PV, biomass and battery storage, is shown in order to experience a realization of such a low-budget energy system.

Media:

- Practical presentation of components using PowerPoint slides and scripts for the subsequent experiments (practical events)
- PowerPoint slides to define the milestones (milestone meetings)
- Final presentation using PowerPoint
- Project report using Word or Latex

Reading List:

- Engineers without Borders UK in 2014 - Engineering in Development
- Scripts for each practical event
- Other thematic literature on the recommendation of the speakers of the lecture series

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Interdisziplinäres Projektpraktikum Konzeptentwicklung eines Erneuerbaren Energiesystems in einem Entwicklungsland (Forschungspraktikum, 4 SWS)

Hamacher T, Cadavid Isaza A, Elyasi S, Pant P

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI74831: Project Lab Renewable and Sustainable Energy Systems | Project Lab Renewable and Sustainable Energy Systems [PropENS]

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Participants of the Project Lab Renewable and Sustainable Energy Systems should carry out analyses, planning and applications about renewable energy systems and their modelling.

A team of 3-5 students should achieve a goal defined for the group over the duration of the lecture period of the semester within the framework of the project work. The problem definition, role distribution, idea development as well as the choice of suitable instruments, implementation and documentation are to be developed essentially independently by the group. The essential aspects of the work within the framework of the project internship (e.g. essential scientific contents, the treatment of a task as a completed project, division of the task among the group members) should be documented in a written report (volume: 15-20 pages).

In a supplementary presentation, the competence of the students to present their work in a structured way in a small seminar in front of an audience consisting of staff members of the chair and students will be examined. Overall, competencies in project work in the team as well as in documentation and presentation of the work should be demonstrated. The report is included in the grade with 40 %, the presentation and the cooperation in the team with 30%.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic knowledge about:

- Power systems
- Renewable energies (potentials, technologies)
- Matlab / Simulink

Content:

These are research-related and practice-oriented tasks whose topics are in line with the current research areas of the chair, such as:

- Modeling, simulation and / or regulation of energy systems
- Investigation of the potential of renewable energies
- Analysis and generation of data for energy systems
- Evaluation and interpretation of model results
- Planning and installation of plants for the use of renewable energies on the Campus Garching

Intended Learning Outcomes:

After successfully completing the module, the student is - depending on the topic - able to:

- recognize challenges of integrating renewable energies,
- apply and implement appropriate tools and methods to analyze, plan or regulate energy systems,
- interpret and evaluate results from applied models.

Teaching and Learning Methods:

Project tasks are carried out individually or preferably in groups of 2-4 students. In the process, self-dependence respectively teamwork is supported in the processing of a project task.

Depending on the topic, a literature research may be necessary. The main part of the project internship, however, is the computer-aided development of analysis and evaluation tools or the planning and execution of laboratory tests or installations.

The participants will finally have the opportunity to practice preparing and holding presentations.

Media:

- Application of various programs or programming languages (Matlab / Simulink, Python, etc.)
- Test benches (renewable energy conversion plants, real-time simulator, measuring instruments)
- Presentations

Reading List:

Konstantin, Panos: Praxisbuch Energiewirtschaft - Energieumwandlung, -transport und -beschaffung, Übertragungsnetzausbau und Kernenergieausstieg, Springer Vieweg, Springer-Verlag GmbH Deutschland, eBook ISBN 978-3-662-49823-1, DOI 10.1007/978-3-662-49823-1, Hardcover ISBN 978-3-662-49822-4

Wagner, Ulrich; Heilek, Christian (Bearb.): Nutzung regenerativer Energien (Vorlesungsskript), 10., vollständig überarbeitete Auflage, Herrsching, E & M, Energie-&-Management-Verl.-Ges., 2009, ISBN: 978-3-9805179-3-5

The Power of Transformation - Wind, Sun and the Economics of Flexible Power Systems, International Energy Agency, OECD/IEA, 2014, France, ISBN: 978 92 64 20803 2

Hillier, Frederick S., Lieberman, Gerald J.: Introduction to operations research, New York, McGraw-Hill Education, 2015, ISBN: 978-0-07-352345-3, 0-07-352345-3, 978-0-07-126767-0, 978-1-259-25318-8, 1-259-25318-X

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Projektpraktikum Erneuerbare und Nachhaltige Energiesysteme (Forschungspraktikum, 4 SWS)

Hamacher T, Kuhn P, Breuning L, Cadavid Isaza A, de la Rua Lope C, Halilovic S, Kerekes A, Kleeberger H

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7486: Mechanism of Power and Gas Markets in Europe | Energiewirtschaftliche Mechanismen der europäischen Strom- und Gasmärkte

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung besteht aus einer Klausur (60 min), in der die Studierenden die wichtigsten Energiewirtschaftlichen Mechanismen der europäischen Strom- und Gasmärkte ohne Hilfsmittel aufzeigen können. Es wird nachgewiesen, dass die Studierenden geeignete Methoden für gegebene Fragestellungen auswählen können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Energiewirtschaftliche Grundbegriffe

Content:

Teilmärkte und deren Rahmenbedingungen:

Day-Ahead Spotmarkthandel, Intraday Handel, Regelleistungsmärkte, Gasmarkt, Market Coupling, Gemeinsamkeiten und Unterschiede der europäischen Märkte, Netzentwicklungspläne, regulatorischer Rahmen der Märkte

Wirkmechanismen:

Ansätze der Marktmodellierung, Gebotsverhalten, Kapazitätsmärkte, Dispatching, Konzept der Merit Order, Preisbildung, Auktionsformen, Einflussfaktoren auf Nachfrage und Angebot, Angebotserhöhung am Beispiel Fracking, Temperaturabhängigkeit des Gasverbrauchs, Zusammenhang zwischen Energie und Kapazität im Gasmarkt, Lastflexibilisierung - Demand Response, Rückwirkungen von technischen Restriktionen auf das Handelsgeschehen und den Netzbetrieb, Erlöspotenziale für Flexibilitätsoptionen, Potenziale und Rückwirkungen einer verstärkten Elektrifizierung, Szenarien

Intended Learning Outcomes:

Der Studierende ist nach erfolgreicher Teilnahme am Modul in der Lage:

- die Fragestellungen über die Energiewirtschaftlichen Mechanismen der wichtigsten Teilmärkte zu kennen und deren Energiewirtschaftliche Funktionen zu differenzieren,
- die Zusammenhänge zwischen den Energiewirtschaftlichen Einflussfaktoren und deren Wirkmechanismen auf die verschiedenen Märkte zu verstehen,
- Entwicklungen dieser Einflussfaktoren abzuschätzen und beurteilen zu können,
- Historische Preise zu analysieren und zu bewerten sowie auf Basis geeigneter Annahmen eigene Preisprognosen zu erstellen.

Teaching and Learning Methods:

Die Studierenden lernen Energiewirtschaftliche Mechanismen der europäischen Strom- und Gasmärkte anhand aktueller Fragestellungen und Auswertung von Preiszeitreihen kennen. Als Lehrmethoden kommen sowohl Präsentation und Vorführung rechnerischer Umsetzung als auch klassische Herleitung anhand von Tafelarbeit zur Anwendung.

Media:

Folgende Medienformen finden Verwendung:

- Rechnergestützte Präsentation für den Vortrag
- Tafelarbeit
- Vorlesungsskript

Reading List:

Folgende Literatur wird empfohlen:

<http://www.agora-energiewende.de/de/publikationen/>

<https://www.ffe.de/publikationen/veroeffentlichungen>

<https://ffegmbh.de/aktuelles/veroeffentlichungen-und-fachvortraege>

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI74871: Applied Simulation and Optimisation in Energy Economics - Operation Research | Angewandte Simulation und Optimierung in der Energiewirtschaft - Operation Research

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung besteht aus einer Klausur (60 min), in der die Studierenden Teilschritte von Methoden des Operations Research vorführen, geeignete Methoden für gegebene Fragestellungen auswählen und Vor- und Nachteile von Optimierungs- und Simulationmethoden erläutern. Die Klausur wird benotet.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundlagen des Energiesystems
Energiewirtschaftliche Grundlagen

Content:

Aktuelle und zukünftige komplexe Fragestellungen in der Energieversorgung in Europa und deren Modellierung:

- Sicherstellung des Versorgungszuverlässigkeitsniveaus
- Integration der erneuerbaren Energien und Umbau des europäischen Stromversorgungssystems
- Gewinnoptimaler Kraftwerkseinsatz und optimale Pumpspeicherbewirtschaftung
- Emissionsminderung in der nationalen Stromversorgung und im europäischen Stromverbund und Wirkung des Emissionshandelssystems
- Entscheidung unter Unsicherheiten und unvollständigen Marktinformationen im Strom- und CO₂-Handel
- Unterscheidung zwischen einzelwirtschaftlicher und volkswirtschaftlicher Betrachtungsweise

Ausgewählte Simulations- und Optimierungsmethoden für die Anwendung in der Energiewirtschaft:

- Lineare Programmierung, Gemischt-Ganzzahlige Programmierung, Dualitätsprinzip
- Stochastisch-Dynamische Programmierung (Realloptionsansatz)
- Monte Carlo Simulation
- Evolutionäre Algorithmen

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul sind die Studierenden in der Lage:

- zu erkennen, welche Fragestellungen der energiewirtschaftlichen Praxis sich mit Methoden des Operations Research beantworten lassen.
- zu verstehen, wo und weshalb die Grenzen der Aussagekraft unterschiedlicher Methoden erreicht werden.
- eine Auswahl von in der energiewirtschaftlichen Praxis bewährten Methoden des Operations Research anhand konkreter Fragestellungen anzuwenden.
- das Zusammenspiel von Technik, marktwirtschaftlichem Risiko und Regulierung in der Energiewirtschaft mit Hilfe von Modellbildung und Simulation bewerten zu können.

Teaching and Learning Methods:

Die Studierenden lernen den Einsatz quantitativer Modelle und Methoden des Operations Researchs zur Entscheidungsunterstützung in der Energiewirtschaft anhand aktueller Fragestellungen kennen. Hierzu werden die Methoden anhand nachvollziehbarer Beispiele entwickelt und erläutert. Als Lehrmethoden kommen sowohl Präsentationen und Vorführung rechnertechnischer Umsetzung als auch die klassische Herleitung anhand von Tafelarbeit zur Anwendung.

Media:

Folgende Medienformen finden Verwendung:

- Rechnergestützte Präsentation für den Vortrag
- Tafelarbeit
- Vorlesungsskript

Reading List:

Folgende Literatur wird empfohlen:

Hillier F., Lieberman G.: Operations Research – Einführung

Weber, C.: Uncertainty in the electric power industry - Methods and models for decision support

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7513: Ecomanagement and Life Cycle Analysis | Umweltmanagement - Ökoauditierung

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung besteht aus einer Klausur (60 min), die überprüfen soll, inwieweit die Studierenden ein Grundverständnis über Werkzeuge zum Klima- und Umweltschutz ohne Hilfsmittel abrufen können. Dazu werden verschiedene Arten von Fragen (Mehrfachantworten, offene Fragen und Rechenaufgaben) zu den in der Vorlesung behandelten Inhalten gestellt. Die Klausur wird benotet.

Repeat Examination:

(Recommended) Prerequisites:

Folgende Module sollten vor der Teilnahme bereits erfolgreich absolviert sein:
Vorlesung Energiesysteme

Content:

Die Vorlesung bietet eine Einführung in den Werkzeugkasten für eine nachhaltige Entwicklung von Unternehmen sowie übergeordnete Instrumente zum Umwelt- und Klimaschutz.

Es werden die Grundlagen zur Bilanzierung des kumulierten Energieaufwands (KEA) sowie zur Durchführung von Ökobilanzen erarbeitet. Ausgehend von den Ressourcen in der Lagerstätte werden Energieträger, Baustoffe, Metalle, Kunststoffe und andere Produkte auf Halbzeug- und Produktebene bilanziert. Für einzelne Produkte wird der ganze Lebenszyklus von der Herstellung über die Nutzungsphase bis hin zur Entsorgung bewertet. Schwerpunkt wird auf die Ökologie der Stoffströme unter Berücksichtigung von ausgewählten Prozessschritten in der Produktion gelegt. Auf Grundlage der Ökoauditverordnung werden die einzelnen Aufgaben im Umweltmanagementsystem und in der Umweltbetriebsprüfung in Unternehmen erläutert. Basierend darauf werden Kommunikationsformen wie beispielsweise Umweltberichte und Öko-

Labels vorgestellt und die Herausforderungen in Bezug auf die gesellschaftliche Akzeptanz diskutiert.

Abgeschlossen wird die Vorlesung mit einem Überblick über aktuelle klimapolitische Entwicklungen. Hierbei werden das Kyoto-Protokoll und das Übereinkommen von Paris (COP 21) vorgestellt und die Mechanismen des Emissionshandels (EU ETS) erläutert.

Intended Learning Outcomes:

Der Studierende ist nach dem erfolgreichen Abschluss des Moduls zu Folgendem in der Lage:

- zu erkennen wie die Einbettung technischer Systeme in der Gesellschaft funktioniert,
- die Grundlagen des Öko-Audits zu verstehen,
- aktuelle klimapolitische Instrumente anwenden zu können,
- einfach Ökobilanzen zu erstellen und zu analysieren
- und den kumulierten Energieaufwand (KEA) und Ökobilanzen zu interpretieren und zu bewerten.

Teaching and Learning Methods:

- Vortrag und Diskussion mit Präsentationen und Tafelarbeit
- Ergänzung durch Übungsaufgaben. Es werden z.B. Übungen zur Ökobilanzierung aufgestellt, CO₂ Emissionen berechnet, ebenso der kumulierte Energieaufwand verschiedener Produkte ermittelt.
- In einer abschließenden Exkursion wird die Theorie in der Praxis überprüft. Beispiele aus der Vorlesung werden hier aufgezeigt.

Media:

Folgende Medienformen finden Verwendung:

- Rechnergestützte Präsentation für den Vortrag
- Vorlesungsskript
- Tafelarbeit

Reading List:

Folgende Literatur wird empfohlen:

Kumulierter Energieaufwand für Güter und Dienstleistungen - Basis für Ökobilanzen, IfE Schriftenreihe Heft 26

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI7624: Techno-Economic Analysis of Telecommunication Networks | Techno-Economic Analysis of Telecommunication Networks

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The achievement of this course will be evaluated with a project (40%) and a final exam (60%). Both are mandatory.

The project helps students to apply the modeling concepts presented in the course to a self-selected process. The project gives students hands-on on process modeling and the simulation tools learned during the course. The students will select one telecom-related operational process and model it based on BPMN. The model will be presented and discussed in class, before starting with the implementation and evaluation. Tools like arena or TIBCO will be used. The final step is the comparison of a default scenario with two case studies. This comparison will allow the students to understand the value of such techno-economic analysis and to face problems that operators are dealing with. The final analysis will be summarized in a small report (~10 pages) and a presentation in class.

The exam will take place at the end of the semester (90 minutes duration). The exam will include theoretical questions regarding the most important concepts as well as exercises related to the cost modeling, process modeling, cost assessment, etc. The exam evaluates the use of techno-economic evaluation metrics, cost modeling of telecom operators, main cost drivers of networks, etc.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

The knowledge of following modules are recommended:

- Broadband Communication Networks

Content:

Value analysis studies are an integral part of every strategic marketing and business plan related with new products and services in the ICT industry. They are commonly used to compare important parameters such as capital and operational expenditures (CapEx, OpEx), life cycle costs, revenue streams, discounted cash flows, and techno economic evaluation measures such as the net present value (NPV) and the internal rate of return (IRR). Such studies offer a measurable output and can be used to support the decision making process related with the business or the market that a company should be in, the potential of certain technology solutions, or, the future of internal R&D projects, etc. A good modelling of the network operational process is necessary to identify the key cost factors and find ways to reduce cost and increase benefits. Some process modeling exercises will be performed with the students to perform consistent and complete cost assessments.

Intended Learning Outcomes:

After completion of the module, students understand the different processes of telecommunication networks (life cycle) as well as how their economic cost can be evaluated. They are able to apply important economic concepts as well as their application on networks. Students will also have the opportunity to model the process, its implementation, and simulation using a tool such as Arena or TIBCO..

Teaching and Learning Methods:

Learning method: In addition to the individual methods of the students consolidated knowledge is aspired by repeated lessons with exercises and tutorials. The students will apply their knowledge with a process modeling tool (TIBCO or Arena).

Teaching method:

During the lectures students are instructed in a teacher-centered style. The exercises are held in a student-centered way. In the exercise part, the students have access to computer-based tool and will be guided through several problem studies, which they have to model, implement, solve and present independently or in small groups.

Media:

The following kinds of media are used:

- Presentations
- Lecture notes
- Exercises and solutions
- Computer-based tool environment for process modeling

Reading List:

TIBCO/Arena on-line manuals
BPMN tutorials

Responsible for Module:

Kellerer, Wolfgang; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Techno-Economic Analysis of Telecommunication Networks (Vorlesung mit integrierten Übungen, 4 SWS)

Mas Machuca C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI80004: Sustainable Mobility | Sustainable Mobility [SuMo]

Sustainable Mobility: Current and Future Developments

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module exam consists of a 90-minute written exam, in which the students work on short word problems and multiple-choice questions on the different aspects of sustainability - especially with regard to the mobility sector. In addition, simple calculation tasks are used to check the mastery of the acquired procedures based on examples. In addition, students will use a case study to carry out the Life Cycle analysis using basic mathematical calculations. Word problems examine the understanding of the methods and the proper interpretation of results.

The exam is graded and no other documents are allowed.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fundamentals about:

- energy systems
- renewable energies

Content:

The lecture will cover the relevant questions concerning "sustainability" and "mobility" and methods to assess the sustainability of mobility systems.

- term sustainability: definition of sustainability
- tools for sustainability: (i) environmental life cycle analysis, (ii) life cycle cost analysis, (iii) social life cycle analysis and, (iv) socio-economic Input-Output Analysis.
- sustainability deficits of existing mobility: oil based system, geo-politics, CO₂-emissions, particulate emissions, noise, ...
- new mobility concepts beyond technology: car sharing, inter modal transport
- electric vehicles and smart grid: current situation and challenges for sustainability.

- autonomous driving: current situation and challenges for sustainability
- other alternative fuels: current situation and challenges for sustainability

Intended Learning Outcomes:

After completing of the course, the student is able to:

- understand the term of sustainability
- understand the challenge that mobility represents to sustainability
- conduct a Life Cycle Analysis of different mobility options and assess the environmental impact (greenhouse gases, as well as other impacts) associated to different mobility systems from a life cycle approach
- conduct a Life Cycle Cost Analysis of different mobility options
- understand the socio-economic impacts of different systems using the macro-economic Input-Output Analysis.

Teaching and Learning Methods:

Case studies will be provided to the students, who will solve them using the methods learnt during the lectures

The exercises will be solved by the students during the session. The students will be encouraged to participate in the discussions

Language of instruction, English in Winter Semester and German in Summer Semester.

Media:

Lectures, presentations, blackboard and exercises.

Reading List:

Life cycle assessment student handbook

Hrsg./Bearb.: Curran, Mary Ann

Place of Publication, Publisher, Year of Publication: Hoboken, John Wiley & Sons Inc., 2015

Umfangsangabe: XI, 299 Seiten

ISBN: 978-1-119-08354-2

Life Cycle Assessment: Quantitative approaches for decisions that matter. Available at: <http://www.lcatextbook.com/>

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Sustainable Mobility (Übung, 1 SWS)

de la Rua Lope C, Cadavid Isaza A

Sustainable Mobility (Vorlesung, 2 SWS)

Hamacher T, de la Rua Lope C, Cadavid Isaza A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1475: Renewable Energy Technology 1 | Regenerative Energiesysteme 1 [RET I]

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The exam takes 60 minutes and consists of a number of short questions on certain aspects of the topics presented as well as some calculations. Allowed auxiliary are writing and drawing utensils and a non programmable calculator.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic thermodynamics and fluid dynamics

Content:

Content:

This course offers an insight into renewable energy sources, and the existing technologies to use them. It also looks to present the political framework of renewable energy technology, as well as societal and ecological aspects from a global point of view. The course is recommended for students not majoring in the field, who are interested in gaining an overview of renewable energy systems.

The course RENEWABLE ENERGY TECHNOLOGY (taught in English) is split into two modules 3 ECTS each (one per semester), beginning with "RET I" in the Winter Semester. The attached module "RET II" will be offered in the Summer Semester.

The course is supported by various institutions of the TUM: The Institute for Energy Systems, the Institute for Renewable and Sustainable Energies, The Institute for Wind Energy, The chair of Hydraulic and Water Resources Engineering as well as the "Laboratory of Steam Boilers and Thermal Plants" from the National Technical University of Athens.

The module "RET I" covers the following topics:

- Fundamentals
- Energy from Biomass
- Geothermal Energy
- Wind Energy

In the module "RET II" the following topics are covered:

- Hydropower
- Solar Thermal Energy
- Photovoltaics

From the winter semester 2017/2018 onwards
the module "RET I" covers the following topics:

- Fundamentals
- Energy from Biomass
- Geothermal Energy
- Hydropower

whereas the module "RET II " is composed as follows:

- Wind Energy
- Solar Thermal Energy
- Photovoltaics

Intended Learning Outcomes:

After the participation in the module the students are able to understand the basics of the most relevant renewable energy technologies.

The gained knowledge enables the students to describe the fields of application as well as the limits of the presented renewable forms of energy. Moreover, the students are able to explain the elementary aspects of renewable energies from a physical, technical, and economical point of view.

They are familiar with technological solutions of all the presented renewable forms of energy and are able to classify their fields of application.

In addition, the students are able to identify the most suitable technology for a given field of application with particular focus on key physical, technical, and economical issues. In this context, the students are able to list and explain the environmental, economic, and social impacts of the selected technology.

Teaching and Learning Methods:

90 min lecture including discussion on the current topic per week. Students are encouraged to take part in the discussion and to question the arguments given by the lecturer. Autonomous preparing at home is needed to fully understand the learning matter.

Media:

Powerpoint presentations

Reading List:

German Literature:

Kaltschmitt, Martin: Erneuerbare Energien. Springer Verlag, Berlin

Quaschnig, Volker: Regenerative Energiesysteme. Technologie - Berechnung - Simulation. Carl Hanser Verlag, München

Heliß, Michael: Regenerative Energiequellen. Praktikum. Springer Verlag, Berlin

Mohr, Markus: Chancen erneuerbarer Energiequellen. Springer Verlag, Berlin

English Literature:

Spliethoff, Hartmut: Power Generation from Solid Fuels. Springer Verlag, Berlin

Boyle: Renewable Energy. Oxford University Press

Kaltschmitt, Martin: Renewable Energy: Technological Foundations, Economical and Environmental Aspects. Springer Verlag, Berlin

Wengenmayr, Roland: Renewable Energy: Sustainable Energy Concepts for the Future. Wiley-VCH Verlag

International Energy Agency: Energy Technology Perspectives - Scenarios & Strategies to 2050

International Energy Agency: World Energy Outlook

Responsible for Module:

Spliethoff, Hartmut; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Regenerative Energiesysteme I (Vorlesung, 2 SWS)

Roeder G [L], Spliethoff H, Kunze C, Roeder G, Wieland C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1476: Renewable Energy Technology 2 | Regenerative Energiesysteme 2 [RET II]

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The exam takes 60 minutes and consists of a number of short questions on certain aspects of the topics presented as well as some calculations. Allowed auxiliary are writing and drawing utensils and a non programmable calculator.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic thermodynamics and fluid dynamics.

Content:

Content:

This course offers an insight into renewable energy sources, and the existing technologies to use them. It also looks to present the political framework of renewable energy technology, as well as societal and ecological aspects from a global point of view. The course is recommended for students not majoring in the field, who are interested in gaining an overview of renewable energy systems.

The course RENEWABLE ENERGY TECHNOLOGY (taught in English) is split into two modules 3 ECTS each (one per semester), beginning with "RET I" in the Winter Semester. The attached module "RET II" will be offered in the Summer Semester.

The course is supported by various institutions of the TUM: The Institute for Energy Systems, the Institute for Renewable and Sustainable Energies, The Institute for Wind Energy, The chair of Hydraulic and Water Resources Engineering as well as the "Laboratory of Steam Boilers and Thermal Plants" from the National Technical University of Athens.

The module "RET I" covers the following topics:

- Fundamentals
- Energy from Biomass
- Geothermal Energy
- Wind Energy

In the module "RET II" the following topics are covered:

- Hydropower
- Solar Thermal Energy
- Photovoltaics

From the winter semester 2017/2018 onwards
the module "RET I" covers the following topics:

- Fundamentals
- Energy from Biomass
- Geothermal Energy
- Hydropower

whereas the module "RET II " is composed as follows:

- Wind Energy
- Solar Thermal Energy
- Photovoltaics

Intended Learning Outcomes:

After the participation in the module the students are able to understand the basics of the most relevant renewable energy technologies.

The gained knowledge enables the students to describe the fields of application as well as the limits of the presented renewable forms of energy. Moreover, the students are able to explain the elementary aspects of renewable energies from a physical, technical, and economical point of view.

They are familiar with technological solutions of all the presented renewable forms of energy and are able to classify their fields of application.

In addition, the students are able to identify the most suitable technology for a given field of application with particular focus on key physical, technical, and economical issues. In this context, the students are able to list and explain the environmental, economic, and social impacts of the selected technology.

Teaching and Learning Methods:

90 min lecture including discussion on the current topic per week. Students are encouraged to take part in the discussion and to question the arguments given by the lecturer. Autonomous preparing at home is needed to fully understand the learning matter.

Media:

Powerpoint presentations

Reading List:

German Literature:

Kaltschmitt, Martin: Erneuerbare Energien. Springer Verlag, Berlin

Quaschnig, Volker: Regenerative Energiesysteme. Technologie - Berechnung - Simulation. Carl Hanser Verlag, München

Heliß, Michael: Regenerative Energiequellen. Praktikum. Springer Verlag, Berlin

Mohr, Markus: Chancen erneuerbarer Energiequellen. Springer Verlag, Berlin

English Literature:

Spliethoff, Hartmut: Power Generation from Solid Fuels. Springer Verlag, Berlin

Boyle: Renewable Energy. Oxford University Press

Kaltschmitt, Martin: Renewable Energy: Technological Foundations, Economical and Environmental Aspects. Springer Verlag, Berlin

Wengenmayr, Roland: Renewable Energy: Sustainable Energy Concepts for the Future. Wiley-VCH Verlag

International Energy Agency: Energy Technology Perspectives - Scenarios & Strategies to 2050

International Energy Agency: World Energy Outlook

Responsible for Module:

Spliethoff, Hartmut; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW2076: Design of Electric Vehicles | Auslegung von Elektrofahrzeugen

Version of module description: Gültig ab summerterm 2013

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Prüfung (90 min) sind die vermittelten Inhalte auf verschiedene Problemstellungen anzuwenden und auf weiterführende Aufgabenstellungen zu übertragen. Zugelassene Hilfsmittel: keine bis einen nicht-programmierbaren Taschenrechner, nichtelektronisches Wörterbuch.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

In der Vorlesung werden alle relevanten Aspekte der Elektromobilität sowie Konzepte, Komponenten und Fragestellungen zur Entwicklung von Elektro- und Hybridfahrzeugen behandelt:

- *Einführung: Rolle von E-Mobilität in der Gesamtmobilität
- *Feldversuche/ Felddaten: Flottenversuche, Erfassung und Aufbereitung von Mobilitäts-Daten
- *Fahrzeugkonzepte: Ableitung von Fahrzeugkonzepten
- *Antriebskonzepte: Antriebskomponenten, elektrischer Antriebskonzepte, Hybridfahrzeugkonzepte
- *Rekuperation
- *Einflüsse der Elektromobilität auf Fahrzeugkomponenten
- *RE-Konzepte: verschiedener RE-Konzepte, Einsatzarten
- *Antriebsmotoren:Wirkprinzip, Bauformen, Modellierung
- *Leistungselektronik
- *Batterien: Überblick, Auslegung

- *Batteriemanagementsystem
- *Batterien: Modellbildung
- *Fahrzeugintegration von Batteriesystemen
- *Fahrzeugtopologien für E-Fahrzeuge/ Hybrid: Package
- *HV-Sicherheit: HV-Komponenten, Normen, Aufbau HV-Netz, EMV
- *Gewichtsmanagement in E-Fahrzeugen: Konzeptbezogene Optimierung, Einfluss Werkstoffe
- *Auswirkungen Netz, Ladetechnologie: Lademöglichkeiten, AC-DC-Ladung, Batteriewechselkonzepte, Ladedauer/Wirkungsgrade, Funktionssicherheit, Auswirkungen auf das E-Netz, Well to Wheel, Vehicle to grid, Vehicle to building)
- *Betriebsstrategien: unterschiedliche Hybridstrategien
- *Wärmemanagement

Intended Learning Outcomes:

Nach Besuch der Modulveranstaltungen haben die Studenten einen umfassenden Überblick über die Rahmenbedingungen und Unterschiede der Elektromobilität gegenüber konventionellen Mobilitätslösungen, sowie über alle relevanten Bauteile von Elektrofahrzeugen, die in konventionell betriebenen Fahrzeugen nicht verbaut sind. Des weiteren besitzen die Studenten einen Überblick über den Aufbau, Packaging und Topologieaspekte von Elektrofahrzeugen.

Die Studenten sind in der Lage einzelne Komponenten, wie den elektrifizierten Antriebstrang oder den Energiespeicher, zu charakterisieren und dessen Funktionsweise darzustellen. Darüber hinaus sind die Studenten in der Lage grundsätzliche Abschätzungen über die Auslegung von Elektrofahrzeugen z.B. Antrieb und Batteriesystem zu unternehmen.

Teaching and Learning Methods:

In der Vorlesung werden die Lehrinhalte mittels Vortrag und Präsentation vermittelt. Dabei werden mittels Tablet-PC komplexere Sachverhalte hergeleitet und illustriert. Während der Vorlesung werden explizit Vorlesungsfragen gestellt, die eine Transferleistung von den Studenten erwarten und bei denen die Studenten die Möglichkeit bekommen sich zu Wort zu melden und eine etwaige Lösung zu diskutieren.

Nach jeder Vorlesungseinheit werden entsprechende Lernfragen den Studenten übergeben, die die Thematik der Lerneinheit behandeln und als Vorbereitung für die Prüfung dienen.

Media:

Vortrag, Präsentationen, Tablet-PC und Beamer

Reading List:

Responsible for Module:

Lienkamp, Markus; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Auslegung von Elektrofahrzeugen (Modul MW2076, Online & virtuelle Sprechstunde) (Vorlesung, 3 SWS)

Diermeyer F [L], Lienkamp M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001255: Lecture Series Renewable Energy Systems in the Global South | Ringvorlesung Erneuerbare Energiesysteme im Globalen Süden

Version of module description: Gültig ab summerterm 2020

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam of 60 minutes:

- In multiple-choice questions and short questions, it is examined if the students are able to name and explain facts regarding renewable energy technologies, decentralized energy systems and their utilization and operation in the Global South correctly.
- In computational tasks, it is examined if the students are able to classify relevant location parameters correctly and perform calculations on renewable energy technologies correctly in order to design decentralized energy systems in the Global South according to the framework conditions of a certain location.
- In text tasks, it is examined if the students are able to classify and evaluate technological, economic and social factors influencing renewable energy technologies, decentralized energy systems and their utilization and operation in the Global South correctly.
- The exam is graded.
- Up to 20% of the exam can be multiple-choice questions.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Bachelor degree in an engineering study program or a study program, which included technological/engineering aspects (such as B.Sc. Management & Technology)
- Interest in various renewable energy technologies, decentralized energy systems and their utilization and operation in the Global South
- Interest in the socio-economic factors influencing the utilization of renewable energies in the Global South

Content:

Overview of renewable energy technologies including their functionality, their technological and economical assessment, their integration in decentralized energy systems as well as business concepts for their utilization in the Global South:

- Renewable energy systems in the Global South - Why and how?
- Small-scale solar thermals and photovoltaics
- Small-scale hydro-power
- Small-scale wind-power
- Small-scale biogas systems
- Battery storages
- Electrical components of mini-grids
- Rural electrification planning through Geo Information Systems
- System sizing through least-cost modelling
- Sustainable energies and entrepreneurship in the Global South
- Sustainable enterprises for Renewable Energies in the Global South
- Rural electrification projects in the Global South

Intended Learning Outcomes:

After successfully completing the module, students are able to

- Name and explain facts regarding renewable energy technologies, decentralized energy systems and their utilization and operation in the Global South.
- Perform calculations regarding renewable energy technologies in order to be able to design decentralized energy systems in the Global South.
- Classify and evaluate technological, economic and social factors influencing renewable energy technologies, decentralized energy systems and their utilization and operation in the Global South.
- Develop concepts for decentralized energy systems in the Global South based on the technological, economic and social framework conditions of a certain location.

Teaching and Learning Methods:

Lectures and presentations by various researchers from TUM as well as entrepreneurs and other experts from the field of Renewable Energies in the Global South.

In exercise lessons, the taught knowledge of the lectures are applied to exemplary topics. After each lecture, the students conduct these exercises in homework and afterwards, these are discussed during the upcoming exercise lesson. Most of these exercises are calculating tasks about the technical components, but there are also some exercises regarding the financial assessment of renewable energy technologies. The exercises are not graded.

Media:

The following media types are used:

- Computer-aided presentations for the lectures
- Exercises
- Discussion of provided literature

Reading List:

- Presentation slides of the speakers
- Solutions of exercise lessons
- Other literature recommended by the speakers

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Computer Engineering (minor) | Technik-Schwerpunkt: Computer Engineering Basismodule (minor)

Module Description

CIT3230000: Advanced Concepts of Programming Languages | Advanced Concepts of Programming Languages

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments assess in how far students are able to reproduce the complex semantical behaviors of small example programs. Their knowledge and practical skills concerning programming constructs is further assessed by assignments, which ask to simulate programming language constructs of one kind by programming language constructs of another kind.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics,
IN0002 Fundamentals of Programming (Exercises & Laboratory),
IN0003 Functional Programming and Verification,
at least one programming language

Content:

This is not a beginners programming course – Instead, this lecture focusses on the semantics of various programming language concepts, and their implementation from the point of view of a compiler engineer. Topics may include, among others:

- Relaxed Memory Models
- Wait-/Lock-free Programming
- Locks, Monitors & Condition Variables
- Transactional Memory

- Gotos, Co-Routines and Continuations
- Single/Multi-Dispatching
- (Multiple-) Inheritance
- Delegation and Prototype Based Programming
- Aspect Oriented Programming
- Meta programming

Intended Learning Outcomes:

After successful completion of this module, students are familiar with an assortment of programming language constructs from popular programming languages. They understand the semantics of these constructs as well as the implementation consequences, that they inflict on the implementation as well as the runtime behavior of compiler and runtime system. They are able to analyze and compare different language based approaches, to discuss their relative merits and potential workarounds in case certain language features are missing. By means of this knowledge, they are able to extend existing compilers to handle the aforementioned constructs as well as able to re-encode concepts from one language by means of another language.

Teaching and Learning Methods:

By means of pre-recorded lesson videos of around 15 minutes each, students can prepare the lecture content at their own pace. In the classroom, students can open discussion on unclear parts of the lesson videos. Additionally, illustrating examples and live programming enhance and deepen the student's insights into the topics. Selected problems that are then solved by the joined effort of the audience and the lecturer further illustrate the lessons with hands-on experiences.

In the additionally offered exercise course (2h), accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, train students to apply the learnt concepts in implementations and develop the skill to simulate the effect of missing language features by others.

Media:

Pre-recorded lesson videos, in-class programming experiments, quizzes, collaborative shared whiteboard, programming assignments

Reading List:

Selected literature of the area and appropriate conference or journal papers

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Concepts of Programming Languages (CIT3230000) (Vorlesung, 3 SWS)

Seidl H [L], Petter M

Exercise - Advanced Concepts of Programming Languages (CIT3230000) (Übung, 2 SWS)

Tilscher S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CIT5230000: Introduction to Programming | Introduction to Programming

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 12	Total Hours: 360	Self-study Hours: 240	Contact Hours: 120

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

2-4 weekly programming tasks will be posed as homework and graded. Participants must solve and hand in these in electronic form. This ensures, that participants can program in the small by means of an object-oriented programming language such as Java, that they have understood fundamental concepts of programming, and are able to apply these to provide original solutions or programs. To identify the individual contributions of the participants, they must be able to defend their solutions interactively.

The test takes the form of 120 minutes computer-based test. Questions allow to assess acquaintance with concepts of programming, small programming tasks assess the ability to conceive appropriate algorithmic solutions and realize applications.

Homework and test are both equally weighed 50%.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

- Introduction
- Basic notions: Problem – algorithm – program
- Imperative programming constructs
- Object-oriented programming
- Objects, classes, methods
- Inheritance, abstract classes, and interfaces

- Polymorphism
- Generics
- Functional programming
- Iterators and collections
- Lambda expressions and streams
- Data structures
- Numbers, strings, arrays
- Lists, stacks, queues, trees
- Recursion
- Binary search
- Patterns of recursion
- Syntax and semantics
- Syntax of programming languages: regular expressions and context-free grammars
- Semantics of programs: control-flow graphs
- Programming in the large (perspectives)
- Graphical user interfaces
- Concurrency and Threads

Intended Learning Outcomes:

Upon successful completion of the module, participants understand the essential concepts of computer science on a basic, practical, but scientific level. Participants can solve manageable algorithmic problems and implement basic applications in Java or a similar object-oriented language on their own. They understand the underlying concepts and models and are therefore able to acquire skills in other object-oriented programming languages on their own.

Teaching and Learning Methods:

By means of a slide presentation with animations, the interactive lecture introduces the basic concepts and methods of programming and explains them using examples. Small exercises, e.g., quizzes and programming tasks, with individual feedback help students to identify whether they have understood the basic concepts and methods.

Accompanying tutor groups deepen the understanding of fundamental concepts explained in the lecture by means of suitable group exercises: participants develop small sample applications under guidance to develop their programming skills in an object-oriented programming language.

Homework exercises assess whether the students understand the learned concepts. The presentation of the own solution in the accompanying tutor group improves communication skills, which are essential in computer science. Individual feedback on homework allows students to measure learning progress and improve their skills.

Media:

Lecture with digital slides, livestream, online exercises (programming, quiz) with individual feedback, communication platform for the exchange between instructors, tutors, and students

Reading List:

Deitel, Harvey / Deitel, Paul: Java How to Program, Early Objects, Pearson, 11th edition, 2017

Evans, Ben / Flanagan, David: Java in a Nutshell O'Reilly, 7th edition, 2018

Sedgewick, Robert / Wayne, Kevin: Computer science: An interdisciplinary approach, Addison-Wesley, 2016

Sedgewick, Robert / Wayne, Kevin: Introduction to programming in Java: an interdisciplinary approach, Addison-Wesley, 2017

Responsible for Module:

Krusche, Stephan; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Introduction to Programming (CIT5230000) (Vorlesung mit integrierten Übungen, 8 SWS)

Krusche S [L], Krusche S, Milusheva S, Paulsen M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI10002: Principles of Electrotechnology | Principles of Electrotechnology [PiET]

Version of module description: Gültig ab winterterm 2017/18

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module will be assessed in a written final examination (90 min) after the teaching weeks. In this examination it is to verify that the candidates are able to understand the general principles of electrical engineering and to solve relevant problems in the fields covered in this module in a limited time and without any resources. The examination will cover all parts of the lectures and exercises.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge of electricity and magnetism on high school level.

Basic knowledge of vector analysis.

Content:

Electrostatics:

Electrical charges, Coulomb's law, electrostatic fields, electrostatic potentials and voltages.

Dielectric materials:

Polarisation, dielectric displacement vector, Gauß' law, capacitors and capacitances.

Stationary electrical currents:

Current densities, local and integral Ohm's law, Kirchhoff's laws, resistors and resistivities, electrical networks, voltage and current sources, equivalent circuits, electrical energy and power.

(Electro-)magnetism:

Fundamental terms in magnetism, magnetic dipoles, Dia-, Para-, Ferromagnetism, magnetising field, magnetic induction, Amperé's law, electromagnetic induction, Faraday's law, inductors and inductivities, transformers.

Intended Learning Outcomes:

After participating in the modules lectures and exercises, students are able to understand and apply the basic physical principles of electrical engineering. They have acquired basic knowledge and understanding of some of the underlying problem-solving methods of electrical engineering.

Teaching and Learning Methods:

Teaching methods in lectures and exercises: Lecture-style instructions mainly on the blackboard. In solving relevant exercises a deeper knowledge of the subject-matters presented in the lectures is sought.

Media:

The following media types are used in the lectures and exercises:

- Explanations and exemplifications on the black board, partly supplemented by computer-aided presentations.
- Downloads on the Internet.
- Exercises are provided with the objective that the students first should solve the problems independent by themselves, solution to the problems will be demonstrated in subsequent exercise sessions, and subsequently will be made available also via download on the Internet.

Reading List:

References will be presented in the first lecture hour.

Responsible for Module:

Schrag, Gabriele; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Principles in Electrotechnology (Vorlesung, 3 SWS)

Wittmann F (Essing S)

Principles in Electrotechnology (Übung, 1 SWS)

Wittmann F [L], Essing S (Schrag G)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN8029: Informatics Bachelor Practical Courses for Management | Informatik Bachelor-Praktika für Management

Version of module description: Gültig ab winterterm 2019/20

Module Level: Bachelor	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 10	Total Hours: 300	Self-study Hours: 210	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type of assessment: project work

The participants in teams will handle different phases of a software project. Individual teams may deal with only one or more selected phases of the project. By their work, the participants demonstrate that they can deal with a given project contract or subcontract within a given time and using appropriate tools in teams. During design and implementation, they demonstrate that they are able to apply methods and models of engineering. They can assess the risks and problems in the various phases of a software project and are able to deal with these difficulties. A written report is prepared and possibly presented orally in order to evaluate the communicative competence in documentation and presentation of results.

Oral presentations last from 10 to 20 minutes.

Written elaborations may vary in size, but should not exceed 10 pages.

The evaluation of the artefacts created, the evaluation of the cooperation in the teams as well as the written or oral presentations of the results flow into the grading.

This practical course is offered by several lecturers with different didactic concepts.

Before the start of the practical course the respective lecturer will announced which components are to be developed and how the individual components are weighted in the calculation of the module grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0006 Introduction to Software Engineering, IN0008 Fundamentals of Databases, IN0009 Basic Principles: Operating Systems and System Software, IN0010 Introduction to computer networking and distributed systems, basic programming skills

Content:

- Implementation of a software project or subproject in teams
- Methods and models of engineering for software development in various areas of informatics
- Techniques for documentation and presentation of results or intermediate results in software development

This module is offered by different chairs. The chairs select the topic for the projects based on their research and education preferences (e.g., databases, information systems, networks, groupware, graphics, robotics, image recognition).

Intended Learning Outcomes:

Participants are able to design and implement small software systems in a team. They know how to apply engineering methods and models from different areas of informatics in order to realize the various phases of the project. They can judge the risks and typical problems encountered in software projects and know methods to cope with these. They are able to report about their project work in written as well as oral form.

Teaching and Learning Methods:

Participants exercise systematic software engineering for a small system in small teams with a precise task description with tight time constraints (design, implementation, test). Intermediate results of the team work have to be presented. Design, project plans and implementation have to be documented.

Media:

Beamer, slides, whiteboard, platform for collaborative work, software development environment

Reading List:

Dedicated literature according to the topic

Responsible for Module:

Neumann, Thomas; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Praktikum - iPraktikum, iOS Praktikum (IN0012, IN2106, IN2175, IN2128, IN4049) (Praktikum, 6 SWS)

Krusche S [L], Krusche S, Linhuber M

Praktikum - Internet-Praktikum - iLabX (IN0012, IN2106, IN4240) (Praktikum, 6 SWS)

Pahl M [L], Carle G, Holzinger K, Stubbe H, Wüstrich L, Kirdan E, Gallenmüller S, Lübken C, Schwarzenberg C, Simon M

Bachelor-Praktikum - IT-basiertes Lernen gestalten (IN0012, IN4138) (Praktikum, 6 SWS)

Wittges H [L], Utesch M, Faizan N, Wittges H

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Computer Engineering (major) | Technik-Schwerpunkt: Computer Engineering Vertiefungsmodule (major)

Module Description

EI0697: Mobile Communications | Mobile Communications

Version of module description: Gültig ab summerterm 2015

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

For successful participation in the lecture, the student has to pass a written exam (90 min). The overall grade will be solely based on the student's result in the written exam. Students will demonstrate that they have gained both fundamental and deeper understanding in various aspects of mobile communications. They have to answer the questions with self-formulated responses and do quantitative calculations. The allowed support material is constraint to a non-programmable calculator.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Signal description in time and frequency, System theory, Basic knowledge in theory of probability, Basic knowledge in digital communications engineering

The following modules should be passed before the participation:

- Höhere Mathematik 1-3
- Signale
- Nachrichtentechnik 1 (Part of Systeme)
- Nachrichtentechnik 2

Content:

Introduction to mobile communication systems; models for mobile radio channels: path loss models, slow fading (shadowing), fast fading channel, frequency and time selective channels, delay and Doppler spread, multipath propagation. Derivation of error probabilities due to fading and

noise, equalization for mobile communication systems: maximum ratio combining, zero-forcing, MMSE equalizer, Viterbi algorithm; channel and noise estimation. The physical layer of the existing UMTS and its successor LTE, associated with an introduction of CDM(A), OFDM(A), MIMO and scheduling techniques.

The modul is offered only in English.

Intended Learning Outcomes:

After successful completion of the module the student knows about wave propagation in mobile communications and resultant effects. He further knows how to adapt transmitter and receiver to combat these effects. He finally gets an insight into the physical layer of the three mobile communications standards used in Europe: GSM, UMTS, and its successor LTE.

Teaching and Learning Methods:

Lerning method:

In addition to the students' personal study, additional knowledge is acquired by lab exercises which are supported by tutor hours.

Teaching method:

During the lectures students are instructed in a teacher-centered style with demonstrations at the PC. The lecture is supported by lab exercises to gain hands-on experience with selected problems.

Media:

The following media will be used:

- Presentations
- Demonstrations at the PC
- Script
- Downloadable exercises with solutions
- Matlab-programs to illustrate the content

Reading List:

The following literature is recommended:

- Molisch, A. F.: Wireless Communications. Wileys, 2005
- Sklar, B.: Digital Communications. Prentice Hall, 2nd edition, 2001
- Tse, D.; Viswanath, P.: Fundamentals of Wireless Communications. Cambridge 2006

Responsible for Module:

Kramer, Gerhard

Courses (Type of course, Weekly hours per semester), Instructor:

VU Mobile Communications 4SWS

Gerhard Kramer

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2040: Virtual Machines | Virtuelle Maschinen

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments ask to apply the learnt translation schemes to small example programs. By that, the exam assesses how well the student is acquainted with various programming constructs and whether she or he is able to translate these into machine code. Further assignments reflect on the concept of virtual machines itself by proposing extra language concepts for which translation schemes should be provided. The successful completion of homework assignments may contribute to the grade as a bonus. The exact details for this are announced timely at the begin of the lecture.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

At least rudimentary knowledge of different programming languages.

Content:

While trying to produce code for a programming language like Prolog, one quickly realizes that one would like to use certain instructions during the translation which are not already available on concrete machines. On the other hand, instruction sets of modern computers are changing so quickly that it doesn't seem useful for the compiler to depend on some arbitrarily chosen instructions. Such a dependance would mean that in a few years one would feel obliged to rewrite the compiler anew.

With the implementation of the first Pascal compilers, one already arrived at the idea of first generating code for a slightly idealized machine, each of whose instructions then only need to be implemented on different target machines. Translation of modern programming languages like Prolog, Haskell or Java are also based on this principle. On one hand this facilitates portability of the compiler. On the other hand this also simplifies the translation itself since one can choose a

suitable instruction set according to the programming language to be translated. In particular, we consider:

- the translation of C;
- the translation of a functional language;
- the translation of Prolog;
- the translation of a concurrent dialect of C.

Intended Learning Outcomes:

Participants are acquainted with virtual machines for imperative, functional, logical and object-oriented programming languages. They know the principles by which various programming language concepts are translated into sequences of machine code. For sections of programs, they are able to generate code of some virtual machine, and they are able to apply the learnt principles to provide new translation schemes for given language constructs on their own.

Teaching and Learning Methods:

By means of a presentation, either by slides or whiteboard, the lecture presents schemata for the translation of various language constructs and illustrates these by means of small examples. Accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, and train students to apply the learnt schemata for the translation and to develop new schemata for selected language constructs.

Media:

Slide show, blackboard, possibly online programming and/or animations

Reading List:

Seidl, wilhelm: Compiler Design. Virtual Machines. Springer, 2010

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2067: Robotics | Robotik

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a 90-minute written exam, participants must create a mathematical model of a kinematic chain of a given manipulator, determine the relationship between the required forces and torques in the actuator and the dynamic state of the robot, and design a stable PID controller for an exemplary task design that is described in the problem.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

- Vector algebra
- Differential calculus
- Basic knowledge of physics (Newton's Law, etc.)

Content:

On the one hand, this module presents a method how a mechanical system can be converted into a mathematical system of equations for analysis of motion. In a second step, the parameterization of the control of a manipulator is derived from the mathematical analysis of the above equation in order to compensate for any errors and deviations along a given trajectory.

The following topics are defined in the lecture and discussed using practical examples:

- Coordinate systems (Denavit-Hartenberg convention)
- Forward kinematics (relationship: joint rotation to manipulator motion)
- Inverse kinematics (relationship: manipulator motion to joint rotations)
- Newton-Euler/Lagrange analysis of the dynamic state in the joints
- Dynamic modeling of the manipulator (mathematical model (MVG) for motion analysis)
- PID control of position and force

Intended Learning Outcomes:

The participants should be able to create a mathematical model of a mechanical system using force/torque analysis (Newton-Euler approach) or by energy analysis (Lagrange method), which relates the drive torques in the joints to motion parameters of the manipulator.

They should also be able to explain the meaning and mathematical relationship to the above model for the control parameters of a PID controller for a robotic system and determine their optimal values for a position and force controller.

Teaching and Learning Methods:

The course content is presented to the students in a lecture and deepened in an interactive discussion. There are also recorded lectures from previous years that can be used for self-study. The individual learning is supported by tutorials, which are to be solved independently by the students and then their solutions are presented in a 2-hour exercise.

Practical examples from the industry on the presented topics will also be shown and guest lectures from the industry will be organised.

Media:

Blackboard, slides, videos and online examples

Reading List:

Introduction to Robotics Mechanics and Control John J, Craig, Prentice Hall. ISBN 0-13-123629-6

Responsible for Module:

Burschka, Darius; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Robotik (IN2067) (Vorlesung mit integrierten Übungen, 5 SWS)

Burschka D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2101: Network Security | Netzsicherheit

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination will take the form of a 75-minute examination.

Questions of comprehension and arithmetic tasks check the familiarity with the technologies and methods of cryptographic procedures and protocols and mechanisms for network security covered in the module.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0009 Basic Principles: Operating Systems and System Software, IN0010 Introduction to computer networking and distributed systems

Content:

The course provides an introduction to the field of network security. Starting with possible threats and attack scenarios, requirements for providing specific security services are derived. After introducing the basic concepts of security mechanisms, the integration of security mechanisms into network architectures and network protocols are discussed. Security vulnerabilities of existing network architectures are also discussed.

As a basis for the realization of security mechanisms, cryptographic algorithms (in particular symmetric cryptography, public key cryptography and cryptographic hash functions) are presented. Afterwards, the basics and methods for security protocols for authentication, authorization, access control, message integrity, confidentiality and non-repudiation are discussed. Subsequent sections present specific security mechanisms, in particular of the TCP/IP protocol family. The standard examples include PKI, Kerberos, IPSec, and TLS, Firewall-architectures and Intrusion Detection Systems.

Intended Learning Outcomes:

Participants understand security goals for the Internet and the components in which communication protocols are implemented. They understand the possibilities available to attackers in the network. They understand the protection offered by cryptographic and network security mechanisms, and have the knowledge to apply network security protocols and implement architectures that can achieve specific security goals.

Teaching and Learning Methods:

Lecture for content transfer, as well as tasks for self-study in order to deepen the subject, as well as programming challenges to test and apply the learned knowledge.

Media:

Lecture slides, whiteboard, exercise sheets, demos

Reading List:

- R. Bless, S. Mink, E.-O. Blaß, M. Conrad, H.-J. Hof, K. Kutzner, M. Schöller: "Sichere Netzerkcommunication", Springer, 2005, ISBN: 3-540-21845-9
- Niels Ferguson, B. Schneier: "Practical Cryptography", Wiley, 1st edition, March 2003.
- G. Schäfer. Netzsicherheit ? Algorithmische Grundlagen und Protokolle. Soft cover, 422 pages, dpunkt.verlag, 2003.

Additional references to articles and other resources are given in the slides.

Responsible for Module:

Carle, Georg; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Netzsicherheit (IN2101) (Vorlesung mit integrierten Übungen, 4 SWS)

Carle G [L], Carle G, Kinkelin H, von Seck R, Rezabek F, Aulbach J, Sattler P, Steger L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2105: Business Process Technologies and Management | Geschäftsprozesstechnologien und -management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written 90 minutes exam. The exam shall ensure that students understand and can apply terminology, challenges, and concepts of business process technologies. To reflect the understanding as well as the practical application, the examination comprises a question-oriented and an application-oriented part. The latter is based on the topics addressed by the exercises such as process mining algorithms and modeling of process choreographies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Bachelor

IN0021 Introduction to Information Systems

Content:

The course focuses on advanced aspects of business process management and business process technologies. Starting from the process-oriented development of applications the following topics are discussed:

- Management of resources and work lists
- Logging and monitoring of business process instances
- Introduction to process mining
- Business process compliance
- Runtime adaptations of business process instances and business process evolution
- Modeling and correctness aspects of process choreographies

Intended Learning Outcomes:

After successful completion of the module students are familiar with the different perspectives of business processes, i.e., control flow, data flow, and resources. Students can model these perspectives and implement them within a process-oriented application. The students understand how business process are monitored during runtime and how execution data (i.e., event-based data) is logged during process execution. Based on the logged process data, the students can apply basic process mining algorithms and interpret the results. Moreover, students are familiar with correctness and compliance notions for business processes. The students understand which and how side effects of changes and adaptations of running business process instances arise and can be controlled. Finally, students are able to model partner-spanning processes (so called process choreographies).

Teaching and Learning Methods:

The teaching format features a lecture and a content-aligned tutorial. The lecturer present the content of the lecture. In addition, videos of the lecture content are provided on the website of the lecture. The videos serve as means to repeat and deepen the presented contents. Moreover, the videos can be used for in a „flipped-classroom“ mode. The lecture content consists of the theoretical background of process-oriented technologies and business process management as well as their illustration based on practical examples from real-world applications and projects. The intention is to enable students to understand and assess process-oriented problems in a conceptual way as well as in an application context. The tutorial consists of deepening exercises on the theoretical parts of the lecture and of implementation exercises. The exercises are worked on in single person. The tutorial aims at enabling students in understanding and applying the concepts. Moreover, an overview on existing tools should be provided to students. Through the implementation exercises the students understand the paradigm of process-oriented application development and its application in practice.

Media:

Slides, videos, exercises, discussion

Reading List:

- M. Weske: Business Process Management - Concepts, Languages, Architectures, Third Edition. Springer 2019, ISBN 978-3-662-59431-5
- W. Grossmann, S. Rinderle-Ma: Fundamentals of Business Intelligence. Data-Centric Systems and Applications, Springer 2015, ISBN 978-3-662-46530-1
- M. Reichert, B. Weber: Enabling Flexibility in Process-Aware Information Systems - Challenges, Methods, Technologies. Springer 2012, ISBN 978-3-642-30408-8
- Wil M. P. van der Aalst: Process Mining - Data Science in Action, Second Edition. Springer 2016, ISBN 978-3-662-49850-7
- Zusätzlich wird am Ende jeder Vorlesung relevante Literatur zur Verfügung gestellt.

Responsible for Module:

Rinderle-Ma, Stefanie; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2359: Blockchain-based Systems Engineering | Blockchain-based Systems Engineering

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type: Written exam

The assessment is by means of a written exam of 90 minutes. Students are required to be able to answer questions regarding the contents of the lecture without further aids. Answering the questions requires partly own formulations, partly own calculations.

Amount of Work:

Comprehensive knowledge about the contents of the lecture and the exercises has to be gained. The completion of voluntary homework assignments is recommended for the successful passing.

Repeat Examination:

(Recommended) Prerequisites:

- IN0002: Fundamentals of Programming
- IN0006: Introduction to Software Engineering
- IN0009: Basic Principles: Operating Systems and System Software

Content:

Blockchain technology and, in general, distributed ledger technology (DLT) provide the technical foundation for the development and usage of innovative, decentralized distributed systems. In this lecture, we analyze the characteristics of these technologies. Additionally, students should be empowered to analyze and develop Blockchain-based solutions. Following contents are going to be covered:

- Cryptographic basics
- Peer to peer-networks
- Data structure and setup of Blockchain
- Consensus mechanisms

- Smart contracts & smart contract Engineering
- Use cases of digital ledger technologies
- Alternative DLT approaches
- Risks, challenges, and limitations of the technology
- Trends and developments in Blockchain

Intended Learning Outcomes:

After the successful participation in this module, the students are able to analyze Blockchain-based application systems. Further, they are able to create these systems for given use cases and to select appropriate technology. They understand the technological foundations such that they are enabled to comprehend and assess alternative distributed ledger technologies.

Teaching and Learning Methods:

Lecture, central exercise

Media:

Presentation with digital slides

Reading List:

Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press

Responsible for Module:

Matthes, Florian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2406: Fundamentals of Artificial Intelligence | Fundamentals of Artificial Intelligence

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam at the end of the semester lasting 90min. The questions will cover most of the learned material and are typically shorter than the problems solved in the exercise, but similar in difficulty.

As an incentive to create artificial intelligence oneself, we provide programming challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Previous attendance of

- IN0007 Fundamentals of Algorithms and Data Structures
- IN0015 Discrete Structures
- IN0018 Discrete Probability Theory

is beneficial. However, all content is taught from ground up and the listed lectures are not essential. Students who have not attended these lectures will have to invest additional time.

Content:

- Task environments and the structure of intelligent agents.
- Solving problems by searching: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening search, greedy best-first search, A* search.
- Constraint satisfaction problems: defining constraint satisfaction problems, backtracking search for constraint satisfaction problems, heuristics for backtracking search, interleaving search and inference, the structure of constraint satisfaction problems.

- Logical agents: propositional logic, propositional theorem proving, syntax and semantics of first-order logic, using first-order logic, knowledge engineering in first-order logic, reducing first-order inference to propositional inference, unification and lifting, forward chaining, backward chaining, resolution.
- Bayesian networks: acting under uncertainty, basics of probability theory, Bayesian networks, inference in Bayesian networks, approximate inference in Bayesian networks.
- Hidden Markov models: time and uncertainty, inference in hidden Markov models (filtering, prediction, smoothing, most likely explanation), approximate inference in hidden Markov models.
- Rational decisions: introduction to utility theory, utility functions, decision networks, the value of information, Markov decision processes, value iteration, policy iteration, partially observable Markov decision processes.
- Learning: types of learning, supervised learning, learning decision trees, reinforcement learning.
- Introduction to robotics: robot hardware, robotic perception, path planning, planning uncertain movements, control of movements, application domains.

Intended Learning Outcomes:

After attending the module, you are able to create artificial intelligence on a basic level using search techniques, logics, probability theory and decision theory. Your learned abilities will be the foundation for more advanced topics in artificial intelligence. In particular, you will acquire the following skills:

- You can analyze problems of artificial intelligence and judge how difficult it is to solve them.
- You can recall the basic concepts of intelligent agents and know possible task environments.
- You can formalize, apply, and understand search problems.
- You understand the difference between constraint satisfaction and classical search problems as well as apply and evaluate various constraint satisfaction approaches.
- You can critically assess the advantages and disadvantages of logics in artificial intelligence.
- You can formalize problems using propositional and first-order logic.
- You can apply automatic reasoning techniques in propositional and first-order logic.
- You understand the advantages and disadvantages of probabilistic and logic-based reasoning.
- You can apply and critically assess methods for probabilistic reasoning with Bayesian networks and Hidden Markov Models.
- You understand and know how to compute rational decisions.
- You have a basic understanding on how a machine learns.
- You know the basic areas and concepts in robotics.

Teaching and Learning Methods:

The module consists of a lecture and exercise classes. The content of the lecture is presented via slides, which are completed during the lecture using the blackboard and/or an electronic writing pad. Students are encouraged to additionally study the relevant literature. In the exercise classes, the learned content is applied to practical examples to consolidate the content of the lecture. Students should ideally have tried to solve the problems before they attend the exercise. To encourage more participation, students are regularly asked questions or encouraged to participate in online polls. As an incentive to create artificial intelligence oneself, we provide programming

challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Media:

Slides, blackboard, electronic writing pad, exercise sheets;

Reading List:

- P. Norvig and S. Russell: Artificial Intelligence: A Modern Approach, Prentice Hall, 4th edition. (English version)
- P. Norvig and S. Russell: Künstliche Intelligenz: Ein moderner Ansatz, Pearson Studium, 4. Auflage. (German version)
- W. Ertel: Grundkurs Künstliche Intelligenz: Eine praxisorientierte Einführung, Springer, 4. Auflage.
- P. Zöller-Greer: Künstliche Intelligenz: Grundlagen und Anwendungen, composia, 2. Auflage.
- D. L. Poole and A. K. Mackworth: Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.
- P. C. Jackson Jr: Introduction to Artificial Intelligence, Dover Publications.

Responsible for Module:

Althoff, Matthias; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Fundamentals of Artificial Intelligence (IN2406) (Vorlesung mit integrierten Übungen, 5 SWS)

Althoff M [L], Althoff M, Gaßner J, Kulmburg A, Meyer E, Würsching G

For further information in this module, please click campus.tum.de or [here](#).

Specialization in Technology: Industrial Engineering (minor) | Technik-Schwerpunkt: Industrial Engineering Basissmodule (minor)

Module Description

BGU56058: Travel Behavior and Environmental Impacts | Verkehrsverhalten und Umweltauswirkungen [TBEI]

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination is a written, closed book test with the duration of 120 minutes. In the exam, the students demonstrate - without aids and under time constraints that they know the most important environmental effects of transportation, can classify emissions in a transportation context, understand their production mechanisms, their local and global impact and know standards for their measurement and limitation. They also demonstrate that they understand the contribution of transportation in global challenges, such as climate change and the exploitation of resources and can critically analyse different transportation solutions that aim into tackling those problems. Furthermore, they demonstrate that they understand the foundations of descriptions of transportation data. Based on practical tasks, they demonstrate that they understand fundamental travel behavior theories and are able to apply them to transport problems. Finally, students show that they know how to apply basic rules of multiple regression analyses and logit model estimation.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic competences in transportation planning, e.g. BV000029 "Traffic Engineering and Transport Planning Basic Module" or comparable bachelor level modules

Content:

The module covers the following topics:

-- Transport and Air Pollution

- Vehicle Emissions Standards
- Noise
- Consumption of energy
- Climate change
- Sustainable transport
- Travel behavior theory
- Transportation data description
- Statistical learning to describe transportation data
- Linear regression to explain travel behavior
- Logit models to explain travel behavior
- Land use/transport interactions

Intended Learning Outcomes:

After the completion of the module, students are able to:

- know the main environmental effects of traffic
- know the main traffic related emissions, their sources and their health impacts
- understand the common emission standards for vehicles and their measurement
- understand the relation of sound and noise as well as the health impact of noise
- understand the cause and impact of global climate change
- know definitions and measures for a sustainable transport system
- know and describe fundamental theories of travel behaviour
- describe the interactions of land use and transport systems
- know the guidelines for estimation of regression and logit models
- apply independently regression and logit models to explain travel behavior.

Teaching and Learning Methods:

The module consists of lectures and discussions. During the lectures, the theoretical background is presented through presentations and PowerPoint slides. Current debates and developments are topics for interactive discussions. For special topics, there will be also used group games and interactions. Furthermore, exercise in R will be handed out to statistically explore travel behavior in household travel surveys.

Media:

PowerPoint presentation, open discussions, small group assignments, exercises in R

Reading List:

Edwards-Jones, G.; Davies, B.; Hussain, S. [2000]: Ecological Economics - An Introduction. Blackwell Science, Oxford.

Hensher, D.; Rose J. M. and W. H. Green [2015]: Applied Choice Analysis. University Press, Cambridge.

Schönfelder, S.; Axhausen, K.W. [2010]: Urban Rhythms and Travel Behaviour: Spatial and Temporal Phenomena of Daily Travel. Ashgate, Farnham.

Responsible for Module:

Dr.-Ing. Antonios Tsakarestos

Courses (Type of course, Weekly hours per semester), Instructor:

Verkehr und Umwelt (Vorlesung, 2 SWS)

Bogenberger K [L], Tsakarestos A (Bachmann F, Dandl F, Dumler K, Ilic M)

Verkehrsverhalten (Vorlesung, 3 SWS)

Moeckel R [L], Moeckel R

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU68007: Applied Transport Modeling | Angewandte Verkehrsmodellierung [Applied transport modeling]

Version of module description: Gültig ab summerterm 2017

Module Level:	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for the module is in the form of a take-home assignment.

The aim of the exam is to demonstrate that the students understood modeling concepts and methods, and that they can develop a travel demand model, use models to assess the impacts of proposed developments, and describe modeling procedures and results in a documentation. The nature of the exam ensures that students are able to independently use the VISUM software in applying the four-step modeling techniques.

Each student submits an Excel file showing the calculations done on the input data, a Visum version file showing the model output, and a written report detailing the modeling procedures and results.

Repeat Examination:

(Recommended) Prerequisites:

Transport Planning Models (240744419) by Gebhard Wulfhorst and Chenyi Ji

Content:

This module introduces students to the practical application of transport modeling concepts using the VISUM transport modeling software. Topics covered include:

- Conduct of household travel survey and data processing
- Processing of transport network data
- Trip generation modeling

- Trip distribution modeling
- Mode choice modeling
- Traffic assignment modeling
- Scenario management
- Extension of modeling software capabilities with scripts

Intended Learning Outcomes:

Upon completion of the course, students are able to use the VISUM software to model travel demand in order to reconstruct existing traffic conditions in an area and assess the effects of future developments and planned traffic measures. Specifically, they are able to...

- understand modeling concepts and methods
- develop a travel demand model
- use models to assess the impacts of proposed developments
- describe modeling procedures and results in a documentation

Teaching and Learning Methods:

A hands-on computer training approach where students complete real-world tasks with the support of the tutor(s). The tasks mimic the modeling process and subsequent tasks build upon previous tasks such that by the end of the final task, each student would have developed a complete travel demand model from scratch using the VISUM software.

For each task, an introduction is given in the form of a short lecture to help students understand the modeling concepts and methods. After the introductory lecture, students use the VISUM Software and put the theory into practice in order to deepen the knowledge that has been learned during the lectures. Here, the capabilities of the VISUM software for each modeling task are learned.

Media:

- PowerPoint Presentations
- PTV VISUM Transport modeling software
- Microsoft Excel and Access

Reading List:

- Ortúzar, J. de D., and Willumsen, L. G. (2011). Modelling Transport (4th ed.). Chichester: John Wiley & Sons.
- Cambridge Sytematics Inc. (2010). Travel Model Validation and Reasonableness Checking Manual Second Edition.
- PTV AG (2016). PTV VISUM 16 Manual.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Applied Transport Modeling with VISUM

Matthew Okrah

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU68011: Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments | Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]

Version of module description: Gültig ab winterterm 2019/20

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 45	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

One report must be submitted at the end of the semester (80%). Students need to show that they understood the range of mobility concepts that could be implemented at a mixed-use residential development and develop one from the perspective of one stakeholder (real estate developer, mobility service provider, resident, etc.). Special focus will be given to shared mobility services as a complement of public transport and non-motorized modes. Students must demonstrate that they are able to discuss different case-based perspectives on integrated mobility planning and mixed-use residential development and apply them to actual new real estate development projects. The written report will be complemented by a short 10-minute presentation (20%), through which the student will demonstrate their ability to present their main findings and communicate to an audience in the form of a mock client pitch.

The final grade is composed of the grade of the report (80%) and the presentation (20%).

Repeat Examination:

(Recommended) Prerequisites:

Transport Sociology and Psychology (Course number 240834759)

Content:

The aim of this course is to introduce students to mobility concepts that could be required in mixed-use residential developments.

The first half of this course aims to provide students with an overview and critical discussion of current and future urban and district planning best practice and the relevance of transport and mobility planning for district developments and building structures. The initial sessions will

introduce the students to how to quantify and qualify user types and user demands through urban and socio/cultural-demographic analysis as well as trip assessments. Basic principles of user centered design, user mapping, formal and informal mobility mapping will be presented. The module offers the theoretical basis and tools for the development and realization of new approaches and methods towards integrated urban planning. Real case studies will be presented and discussed. The case studies will be selected from international research literature. The discussion will cover the perspectives of different stakeholders (real-estate developer, mobility service provider, resident, city urban planners, etc.).

In the second half of the course, the focus turns on the students, who will apply the gained knowledge to design integrated mobility service solutions. Through cost estimates, analysis of the specific regulatory and stakeholder framework and basic business modeling, the students learn how to conceptualize operative models and specify integrated service packages that add value to the end user and also the real estate developer. This is usually achieved through space gains (less parking) and financial gains (less car dependency).

Intended Learning Outcomes:

After completion of the course, the students understand the methodological basis for the development of mobility concepts for mixed-use residential developments. The students will apply familiar and new interdisciplinary assessment tools and methods from transport planning to problem solving and business modelling in urban planning.

The aim of this course enable the students to design with the principals of transport planning and create integrated, user centered mobility solutions. Students will learn the skill sets necessary to consult potential clients on the benefits of shared mobility solutions, economic implications and operative risks.

Teaching and Learning Methods:

The course is based around weekly interactive seminars. The course will apply different teaching methods from traditional lectures to discussions, group work, desktop research, in-class exercises, and presentation skill training. Students are expected to come prepared and engage actively throughout the semester.

In the first half, the lecturer will present the students literature and case studies, followed by discussion between students. Discussions will be facilitated by short PowerPoint presentations with key aspects, structured questionnaires and group work on some examples.

In the second half, the students will perform group work in teams to develop a mobility concept for a real-life large scale mixed use development. The project – in its early planning stage – is set in an urban/ peripheral location with substantial mobility and transportation demands. Each team will assume the perspective of a different stakeholder, and therefore a unique focus area (i.e. business plan, spatial planning, user segmentation etc.). The lecturer will supervise the students and discuss their intermediate results in the weekly interactive seminars. The outcome of the exercise is the development of different mobility concepts with different focus areas. At the end of the course, students will present their concepts in form of a mock client pitch.

Media:

Various reading materials and handouts, scientific articles, planning documents and websites.
PowerPoint presentations, whiteboard and exercise sheets may be used in sessions.

Reading List:

Federal Ministry for Economic Cooperation and Development. (2016). Urban Mobility. Strategies for Liveable Cities.

Bormann, R., Gross, M., Holzapfel, H., Luehmann, K., Schwedes, O. (2017). Shaping urban change and promoting sustainable mobility. Friedrich-Ebert-Stiftung ISBN 978-3-95861-952-4.

Eleftheriou, V., Knieling, J. (2017). The urban project HafenCity. Today's Urban and Traffic profile of the area. Executive summary of methodology and traffic research conducted in the region. Transportation Research Procedia 24, 73-80.

Meurs, H.J., van Wee G.P. (2003). Land Use and Mobility: a Synthesis of Findings and Policy Implications. European Journal of Transport and Infrastructure Research 3(2), 219-233.

Banister, D. (2008). The sustainable mobility paradigm. Transport Policy 15(2), 73-80.

Bridge, G., Butler, T., Less, L. (2012). Mixed Communities: Gentrification by Stealth? Policy Press, 372 pp.

Jarass, J., Heinrichs, D. (2014). New Urban Living and Mobility. Transportation Research Procedia 1(1), 142-153.

Cirianni, F.M.M., Leonardi, G. (2006). Analysis of transport modes in the urban environment: an application for a sustainable mobility system. WIT Transactions on Ecology and the Environment 93, 637-645.

Circella, G., F. Alemi, K. Tiedeman, S. Handy and P. Mokhtarian (2018). The Adoption of Shared Mobility in California and Its Relationship with Other Components of Travel Behavior Report, National Center for Sustainable Transportation, United States
<http://www.urban-transport-roadmaps.eu/>

Responsible for Module:

Moeckel, Rolf; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70004: Discrete Choice Methods for Transportation Systems Analysis | Diskrete Wahlmethoden für Verkehrssystemanalyse

Discrete Choice Methods for Transportation Systems Analysis

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The learning outcomes be examined by excercises (Übungsleistungen).

The coursework and examination requirements will will be based on 3 individual homeworks that will aim at demonstrating that the students have understood the concepts presented in the lectures and are able to specify and evaluate discrete choice models using freely available software (such as pythonbiogeme and R). Each exercise will be conceptually stand-alone, i.e. will include one or more related questions/problems, aiming at demonstrating that the participants have grasped the material. Each homework will be graded individually and the final grade will be obtained as the weighted average of the individual grades. The weight of each homework will be indicated on the assignment.

This module is also available to the participants of the TUM Skills Excellence Program. For the participants of this programme there are 20 places available.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

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Content:

The module provides the participants with an overview of the tools and methods that are available to specify and estimate discrete choice models for transportation systems analysis. The following key areas will be covered:

- Mathematical Modeling of Behavior

- Logit and probit models
- Model estimation and specification tests
- Model specification
- Experimental design and data collection
- Mixtures/simulation based estimation
- Latent class and hybrid models
- Panel data and models
- Forecasting and aggregation
- Bayesian procedures

Intended Learning Outcomes:

After the completion of the module, the participants will have established a solid knowledge of the theoretical foundations of choice modelling, and they will be able to specify, estimate and interpret a wide range of discrete choice models, such as logit, probit, nested logit, mixed logit, latent class models. They will be able to obtain revealed-preference and stated-preference data as well as create a suitable experimental design, including the questionnaire. The participants will also be able to use available software tools, such as pythonbiogeme and R to evaluate these models.

Teaching and Learning Methods:

Format: Lecture with integrated practical exercises.

Lectures provide the students with the theoretical basics of Discrete Choice Methods, e.g. the various building parts of the models, related experimental designs and the survey data, as a Powerpoint presentation, supported by pictures, possibly films and discussions. Practical calculation tasks from realistic studies and models provide the quantitative methods for the data analysis and modelling of different Discrete Choice Methods and the calculation and interpretation of the model results.

Media:

Presentation slides, whiteboard, readings

Reading List:

Train, Kenneth E. Discrete choice methods with simulation. Cambridge University Press, 2009.

Ben-Akiva, Moshe E., and Steven R. Lerman. Discrete choice analysis: theory and application to travel demand. Vol. 9. MIT Press, 1985.

Louviere, Jordan J., David A. Hensher, and Joffre D. Swait. Stated choice methods: analysis and applications. Cambridge University Press, 2000.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Discrete Choice Methods for Transportation Systems Analysis (Vorlesung mit integrierten Übungen, 4 SWS)

Antoniou C [L], Abouelela M, Antoniou C, Lu Q, Moghavem Ghaffari S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70006: Statistical Learning and Data Analytics for Transportation Systems | Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]

Version of module description: Gültig ab summerterm 2018

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework is evaluated based on 4 problem sets (Übungsleistung), aimed at assessing the students' achievement of the learning outcomes. This method of evaluation has been chosen based on the nature of the module (working with real data, and exploring the applicability of alternative analysis methods).

Each individual problem set/homework assignment will aim at demonstrating that the students have understood the concepts presented in a specific topical set of lectures. The students will use synthetic and real data to demonstrate that they have learned the presented material. The module uses the freely available R software, but the students will be allowed to complete the problem sets in other environments (e.g. matlab, python), if they prefer that. Each problem set will be graded individually and the final grade will be obtained as the weighted average of the individual grades (the weights will be determined based on the work-load associated with each problem set).

This module is also available to the participants of the TUM Skills Excellence Program. For the participants of this programme there are 20 places available.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

linear algebra, applied statistics

Content:

The module provides the participants with an overview of the advanced methods that are available to perform statistical learning and big data analytics for transportation systems analysis. The following key areas will be covered:

- Visualization of high dimensional data
- Dimensionality reduction and data mining techniques
- Clustering and classification for high dimensional data
- Statistical Learning
- Going beyond (linear) regression
- The EM Algorithm
- Time series modeling and forecasting
- State space model and solution approaches, e.g. Kalman Filters

Intended Learning Outcomes:

After the completion of the module, the students will have established a solid theoretical foundation and knowledge base for statistical learning and data analytics. The aims of this module enable the students to:

- identify appropriate statistical learning and data analytics methods for a given transportation systems data set and research question;
- understand the ideas behind the methods, their purposes, their assumptions and their limitations;
- apply statistical learning and data analytics techniques using R (or another suitable software tool, e.g. matlab or python, if they so choose), and interpret the results;
- critically evaluate statistical learning and data analytics results from the literature.

Teaching and Learning Methods:

Format: Lecture with integrated practical exercises;

Lectures introduce the students to the concepts of statistical learning and data analytics using slide presentations, supported by whiteboard writing and discussions, and provide an overview of the available quantitative methods for statistical learning, big data analytics, and interpretation of the results. All methods and the calculation will be illustrated with real data sets, using open source statistical software. The given problems sets will be completed individually by each participant.

Media:

Presentation slides, whiteboard, readings

Reading List:

- Wolfgang Karl Härdle (2011) Applied Multivariate Statistical Analysis 3rd Ed.
- Brian Everitt, and Torsten Hothorn, (2011) An Introduction to Applied Multivariate Analysis with R. Springer
- Robert H. Shumway, David S. Stoffer, (2017) Time Series Analysis and Its Applications, 4th Ed. Springer

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70008: Urban Transportation Systems: Operations Research and Emerging Mobility Technologies | Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination of the module consists of 2-3 problem sets on operations research and one take-home essay to be written for emerging mobility technologies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Applied probability and statistics (e.g. BGU70009)

Content:

The module provides students with an overview of the advanced mathematical analytics for modeling operations of urban transportation systems. The module covers the following components:

- Probabilistic modeling (Poisson Processes, Geometric Probability, Perturbation, Crofton's Method)
- Queueing Theory and Its Applications (Birth-and-Death Process)
- Network Optimization Models (Shortest-Path, Maximum Flow, Minimum Cost, Facility Location)
- Linear Programming (Network Simplex Method)

Besides, this module provides its students with an overview of the effects of emerging forms of transportation, such as ride-hailing and Mobility-as-a-Service (MaaS). The literature on behaviour effects and traffic externalities is analysed in detail, and then the elements for the regulation of these technologies are discussed. The following key areas will be covered:

- The concept of sharing economy
- Ride-hailing: effects on travel behaviour and traffic externalities
- Ride-hailing and substitute modes: competition and increased efficiency
- Regulation of ride-hailing: pricing and optimal fleet size.
- Shared fleet optimal deployment and optimal routing.
- Mobility-as-a-service: bundling future transportation modes.
- Shared mobility and vehicle ownership: future scenarios and the role of the regulator.

Intended Learning Outcomes:

After completion of the module, the students will understand the methodological and empirical basis for the analysis of emerging transportation technologies such that ride-hailing, shared ride-hailing and mobility as a service. The students will have established a solid theoretical foundation and knowledge base for modeling of urban transportation and service systems. Therefore, the students are able to:

- understand the mathematics behind urban operation research methods, their assumptions and limitations;
- apply modern techniques to formulate a mathematical operations research model and interpret the results;
- identify the main analytical models (e.g., optimization models) and econometric tools for the analysis of behaviour and traffic effects of such technologies.
- design an economic model for the regulation of ride-hailing and to solve it.
- discuss the latest research on merging transportation modes and identify the main elements that a regulation should have.

Teaching and Learning Methods:

The module consists of lectures with integrated exercises.

Lectures introduce the students to the concepts of probabilistic analysis and modeling, queueing models, graph theory, and linear programming methods for modeling urban transport systems or network-wide optimization.

Besides, integrated practical exercises provide the students with the theoretical basics of the assessment of emerging modes, e.g. the various parts of appropriate optimization and econometric models presented in the literature. A social welfare maximization model for the regulation of ride-hailing will be solved in the lectures by the students with support from the lecturer, and applied to realistic scenarios using empirical values for input variables and attributes. State-of-the-art papers will be presented and discussed.

Along the course, lectures will use slide presentations, supported by whiteboard writing. Student discussion and active participation will be encouraged throughout the lectures. All methods and calculations will be illustrated with practical examples. Exercises will be given to students following each major topic, and the solutions will be presented and explained in the lectures.

The module will be shifted to the winter term, starting with winter semester 2022/23.

Media:

The contents are provided with presentation slides, whiteboard, exercises, readings.

Reading List:

- Circella, G., F. Alemi, K. Tiedeman, S. Handy and P. Mokhtarian (2018). The Adoption of Shared Mobility in California and Its Relationship with Other Components of Travel Behavior Report, National Center for Sustainable Transportation, United States.
- Docherty, I., G. Marsden and J. Anable (2018). The governance of smart mobility. Transportation Research Part A: Policy and Practice 115: 114-125.
- Hall, J. D., C. Palsson and J. Price (2018). Is Uber a substitute or complement for public transit? Journal of Urban Economics 108: 36-50.
- Henao, A. and W. E. Marshall (2018). The impact of ride-hailing on vehicle miles traveled. Transportation <https://doi.org/10.1007/s11116-018-9923-2>.
- Hillier, S. F., Lieberman, J. G. (2001) Introduction to operations research, 7th ed., McGraw-Hill
- Kamargianni, M. and M. Matyas (2017). The Business Ecosystem of Mobility-as-a-Service. 96th Transportation Research Board (TRB) Annual Meeting, 8-12 January 2017, Washington DC.
- Larson, R. and Odoni, A. (1981) Urban Operations Research, Prentice Hall, (available at: http://web.mit.edu/urban_or_book/www/book/)
- Matyas, M. and M. Kamargianni (2018). The potential of mobility as a service bundles as a mobility management tool. Transportation.
- Rader, J. D. (2010) Deterministic Operations Research: Models and Methods in Linear Optimization. John Wiley and Sons
- Shaheen, S. (2018). Shared Mobility: The Potential of Ridehailing and Pooling. Three Revolutions. Island Press, Washington, DC: 55-76.
- Tirachini, A. and A. Gómez-Lobo (2018). Does ride-hailing increase or decrease vehicle kilometers traveled (VKT)? A simulation approach for Santiago de Chile. International Journal of Sustainable Transportation. Forthcoming.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2211: Auction Theory and Market Design | Auktionstheorie und Marktdesign

Version of module description: Gültig ab winterterm 2015/16

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination takes the form of a written 90 minutes test, in which students solve problems to prove they are able to use, analyze and assess the game theoretical models of auctions. The additional answering of theory questions ensures participants understand the fundamental challenges of combinatorial auctions. Moreover, the correct responses require independent defense of the choice of auction format based on desired properties of the market allocation such as efficiency or revenue maximization for example. All problems and questions demand the students to phrase their individual responses.

Repeat Examination:

(Recommended) Prerequisites:

IN0022 Informations Systems II or IN0024 Operations Research, linear programming

Content:

Basic game theoretical concepts (dominant strategies, Nash equilibrium under complete and incomplete information), Mechanism Design Theory, basics of auction theory (sealed bid and open auction formats, Revenue Equivalence, Optimal Auctions), Combinatorial Auctions, Assignment Markets, challenges of combinatorial auction design (iterative combinatorial auctions and combinatorial clock auctions), applications of combinatorial auctions (spectrum and procurement auctions), approximation mechanisms, Matching Markets

Intended Learning Outcomes:

After successful completion of the module students understand the economic properties of various auction formats. They know different game theoretical approaches to model the strategic interactions between the auctioneer and bidders. Furthermore, they understand the fundamental

strategical challenges of various auction mechanisms and computational questions related to the determination of allocations and payments. Moreover, they can independently defend the choice of auction format based on desired properties of the market allocation such as efficiency or revenue maximization for example.

Teaching and Learning Methods:

The module consists of a lecture and a content-aligned tutorial. The lecturer presents the content of the module, parts of the corresponding literature and application examples for various auctions interactively. Students are accustomed with different auction formats and their modeling, and learn to differentiate their applications. In the tutorial participants solve exercises in single person and team work, and evaluate the respective game- and auction theoretical models. Thus, students learn particularly to assess the basic challenges of combinatorial auction design and to constructively criticize their own work.

Media:

Script, exercise sheets, PowerPoint, PC and E-Learning platform

Reading List:

Y. Shoham and K. Leyton-Brown: Multiagent Systems: Algorithmic, Game-Theoretic, and Logical Foundations. Chapters 3, 5, 6, 10, 11, 12. For class 2 and 3.: N. Nisan, T. Roughgarden, E. Tardos and V. Vazirani (editors): Algorithmic Game Theory. Chapters 9 and 11 by Nisan. For class 2, 4 and 6: V. Krishna: Auction Theory. Chapters 16 and 17 on multi-object auctions.

Responsible for Module:

Bichler, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Auktionstheorie und Marktdesign (IN2211) (Vorlesung, 2 SWS)

Bichler M [L], Ahunbay M

Übung zu Auktionstheorie und Marktdesign (IN2211) (Übung, 2 SWS)

Bichler M [L], Ahunbay M, Batziou E, Oberlechner M, Pieroth F

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN8005: Introduction into Computer Science (for non informatics studies) | Einführung in die Informatik für andere Fachrichtungen

Version of module description: Gültig ab summerterm 2015

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type of Assessment: written exam (90 minutes)

The exam takes the form of written test. Knowledge questions allow to assess acquaintance with and understanding of the basic concepts of Computer Science. Small programming and modelling problems allow to assess the ability to practically apply the learned programming- and query-languages and modelling-techniques for the solution of small problems.

Homework will be scored and upon achieving a minimum required number of points, a 0,3 bonus for the final grade is granted.

In case of epidemiologic emergencies, the exam may be substituted by a graded electronic exercise or a proctored exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Recommended requirements are Mathematics modules of the first year of the TUM-BWL bachelor's program as well as the module WI000275 'Management Science'.

Content:

The module IN8005 is concerned with topics such as:

- Database Management Systems, ER models, Relational Algebra, SQL
- Java as a programming language:
 - ++ basic constructs of imperative programming (if, while, for, arrays etc.)
 - ++ object-oriented programming (inheritance, interfaces, polymorphism etc.)
 - ++ basics of Exception Handling and Generics
 - ++ code conventions

- ++ Java class library
- Basic algorithms and data structures:
 - ++ algorithm concept, complexity
 - ++ data structures for sequences (arrays, doubly linked lists, stacks & queues)
 - ++ recursion
 - ++ hashing (chaining, probing)
 - ++ searching (binary search, balanced search trees)
 - ++ sorting (Insertion-Sort, Selection-Sort, Merge-Sort)

Intended Learning Outcomes:

Upon successful completion of the module, participants understand important foundations, concepts and ways of thinking of Computer Science, in particular object-oriented programming, databases and SQL, and basic algorithms and data structures, have an overview over these topics and be able use them for the development of own programs with a link to a database in a basic way.

Teaching and Learning Methods:

Lecture and practical tutorial assignments. A central tutorial deepens the understanding of the concepts introduced in the lecture using example assignments in regard to being able to solve given problems. In the tutorials, the students solve basic assignments under intensive supervision, which contributes to providing them with the basic skills in programming, in order to be able to apply the knowledge acquired by self-study of the accompanying materials of lecture and central tutorial for autonomously solving the programming assignments of the homework. During the second half of the semester, the students work on a small practical project, which aims at deepening the connected understanding of the desired learning outcomes. Programming aspects of this project are distributed over tutorial and homework assignments and are aligned with the topics of the respective week.

Media:

Slides, blackboard, lecture- and central tutorial recording, discussion boards in suitable e-learning platforms

Reading List:

Chapters from textbooks, which are closely associated with the module content and are provided to the students online.

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Einführung in die Informatik für andere Fachrichtungen (TUM BWL) (IN8005) (Vorlesung, 2 SWS)
Groh G

Übung zur Einführung in die Informatik für andere Fachrichtungen (TUM BWL) (IN8005) (Übung, 2 SWS)

Groh G [L], Dall'Olio G, Groh G, Steinberger C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MA4800: Foundations of Data Analysis | Foundations of Data Analysis

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 8	Total Hours: 240	Self-study Hours: 150	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The exam will be in written form (90 minutes). Students demonstrate that they have gained deeper knowledge of definitions and main mathematical tools and results in linear algebra, convex optimization, differential geometry presented in the course and their applicability in data analysis. The students are expected to be able to derive the methods, to explain their properties, and to apply them to specific examples.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

MA1001 Analysis 1, MA1002 Analysis 2, MA1101 Linear Algebra and Discrete Structures 1, MA1102 Linear Algebra and Discrete Structures 2, MA0901 Lineare Algebra for Informatics, MA0902 Analysis for Informatics, IN0018 Discrete Probability Theory, MA1401 Introduction to Probability Theory. Vorteilhaft: MA2501 Algorithmic Discrete Mathematics, MA2503 Introduction to Nonlinear Optimization

Content:

- I) Representations of data as matrices
 - a. Many data vectors form a matrix
 - b. Review of basic linear algebra
 - c. Linear dependence and concept of rank
 - d. Approximate linear dependence with varying degree of approximation: Singular value decomposition /Principal Component Analysis
 - e. Redundancy of data representations -> orthonormal bases, frames and dictionaries
 - f. Fourier basis as singular vectors of spatial shift
 - g. Fast Fourier Transform
- II) Linear dimension reduction

- a. Johnson-Lindenstrauss (JL) Lemma
 - b. Review of basic probability, random matrices
 - c. Random Matrices satisfying JL with high probability
 - d. Fast JL embeddings
 - e. Sparsity, low rank as structured signal models
 - f. Compressed sensing
 - g. Matrix completion and low rank matrix recovery
 - h. Optimization review
 - j. Dictionary Learning
- III) Non-linear dimension reduction
- a. Manifolds as data models
 - b. Review of differential geometry
 - c. ISOMAP
 - d. Diffusion maps
 - e. Importance of Nearest neighbor search, use of JL
- IV) Outlook: Data Analysis and Machine Learning

Intended Learning Outcomes:

After successful completion of the module students are able to understand and apply the basic notions, concepts, and methods of computational linear algebra, convex optimization, differential geometry for data analysis. They master in particular the use of the singular value decomposition and random matrices for low dimensional data representations. They know fundamentals of sparse recovery problems, including compressed sensing, low rank matrix recovery, and dictionary learning algorithms. They understand the representation of data as clusters around manifolds in high dimension and they know how to use methods for constructing local charts for the data.

Teaching and Learning Methods:

The module is offered as lectures with accompanying practice sessions. In the lectures, the contents will be presented in a talk with demonstrative examples, as well as through discussion with the students. The lectures should animate the students to carry out their own analysis of the themes presented and to independently study the relevant literature. Corresponding to each lecture, practice sessions will be offered, in which exercise sheets and solutions will be available. In this way, students can deepen their understanding of the methods and concepts taught in the lectures and independently check their progress. At the beginning of the module, the practice sessions will be offered under guidance, but during the term the sessions will become more independent, and intensify learning individually as well as in small groups.

Media:

The following media are used

- Blackboard
- Slides

Reading List:

Golub, Gene H.; Van Loan, Charles F. Matrix computations. Fourth edition. Johns Hopkins Studies in the Mathematical Sciences. Johns Hopkins University Press, Baltimore, MD, 2013

Foucart, Simon; Rauhut, Holger A mathematical introduction to compressive sensing. Applied and Numerical Harmonic Analysis. Birkhäuser/Springer, New York, 2013

P. Gritzmann. Grundlagen der mathematischen Optimierung, Springer, 2013.

D. P. Bertsekas, A. Nedic, A. E. Ozdaglar. Convex Analysis and Optimization, Athena Scientific, 2003.

J.-B. Hiriart-Urruty, C. Lemarechal. Fundamentals of Convex Analysis, Springer, 2001.

Dasgupta, Sanjoy; Gupta, Anupam, "An elementary proof of a theorem of Johnson and Lindenstrauss" (PDF), Random Structures & Algorithms 22 (1): 60–65, 2003

Krahmer, Felix; Ward, Rachel New and improved Johnson-Lindenstrauss embeddings via the restricted isometry property. SIAM J. Math. Anal. 43 (2011), no. 3, 1269–1281.

J. B. Tenenbaum, V. de Silva, J. C. Langford, A Global Geometric Framework for Nonlinear Dimensionality Reduction, Science 290, (2000), 2319–2323.

Saxena, A. Gupta and A. Mukerjee. Non-linear dimensionality reduction by locally linear Isomaps, . Lecture Notes in Computer Science, 3316:1038–1043, 2004.

Chen, Guangliang; Little, Anna V.; Maggioni, Mauro Multi-resolution geometric analysis for data in high dimensions. Excursions in harmonic analysis. Volume 1, 259–285, Appl. Numer. Harmon. Anal., Birkhäuser/Springer, New York, 2013.

Responsible for Module:

Fornasier, Massimo; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Electives in Management and/or Technology | Wirtschaftswissenschaftlich-technische Wahlmodule

Within the framework of the economic-technical elective modules, students complete examinations in the area of economics or technology totalling 30 credits. in the field of economics or technology to the extent of 30 credits. Of these, 12 credits can be earned as part of project studies according to § 37 a. In the elective modules in economics and technology, students have access to all courses of the all courses of the specialisation areas in economics at Master's level as well as all technical elective modules of the Master's programme Master's program in Management & Technology. Instead of taking examinations at the TUM, students can take subject-related examinations at a foreign university within the framework of a stay abroad. in the amount of 30 credits at a foreign university. For this purpose, the students make arrangements with a mentor appointed by the TUM School of Management to draw up an individual semester study plan. together. The corresponding courses are to be selected from the courses offered by the foreign university. 30 The elective module catalogue will be announced by the TUM School of Management in a suitable manner in good time before the start of lectures. announced in an appropriate manner. Students who have already successfully completed basic modules of an engineering/scientific specialisation in the Bachelor's degree program cannot take them again in the Master's program Management & Technology.

Catalogue of Elective Modules: Mechanical Engineering | Wahlkatalog: Maschinenwesen

Module Description

ED150010: Sustainable Mobile Drivetrains | Nachhaltige Mobile Antriebssysteme

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung erfolgt in Form einer schriftlichen Klausur (Prüfungsdauer: 90 min). Die Studierenden sollen in begrenzter Zeit die Konzepte nachhaltiger mobiler Antriebssysteme auf verschiedene Frage- und Problemstellungen anwenden. Damit soll z. B. überprüft werden, ob die Studierenden bewerten können, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann oder ob die Studierenden die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren, elektrischen Antriebssträngen und von Antriebssträngen mit Brennstoffzelle verstehen. Als Hilfsmittel zugelassen sind: Schreibutensilien, Lineal und ein nicht programmierbarer Taschenrechner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

Themenschwerpunkte:

- * Nachhaltigkeit und Klimaschutz
- * Gestaltung nachhaltiger Mobilität
- * Grundlagen der Fahrzeugtechnik
- * Grundlagen der Fahrzeugantriebe
- * Verbrennungsmotoren mit nachhaltigen Kraftstoffen

- * Elektrische Antriebssysteme (Batterie, Inverter, e-Motor)
- * Antriebssysteme mit Brennstoffzellen
- * Energie und Mobilität

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul "Nachhaltige Mobile Antriebssysteme" sind die Studierenden in der Lage...

- ... zu verstehen, wie und warum der Klimawandel eine Transformation hin zu nachhaltiger Mobilität erfordert
- ... einzuordnen, wie sich diese Transformation auf die traditionellen Verkehrsmittel und ihre Antriebe auswirken wird
- ... zu bewerten, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann
- ... die wichtigsten mobilen Antriebssysteme nach ihren jeweiligen Vorteilen, Nachteilen und Einsatzgebieten zu beurteilen
- ... die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren zu verstehen
- ... die Grundlagen der Funktionsweise und des Aufbaus elektrischer Antriebsstränge zu verstehen
- ... die Grundlagen der Funktionsweise und des Aufbaus von Antriebssträngen mit Brennstoffzelle zu verstehen
- ... einzuordnen, welches Antriebssystem für eine gegebene Anwendung am besten geeignet ist
- ... zu bewerten, welchen Einfluss die Rolle des Energieträgers auf die Nachhaltigkeit des gesamten Antriebssystems ausübt
- ... grundlegende Zusammenhänge zwischen Energie, Mobilität und Antriebssystem kritisch zu hinterfragen
- ... einfache aber wirkungsvolle Grobabschätzungen der wichtigsten Eigenschaften moderner Antriebssysteme vorzunehmen

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen nachhaltiger mobiler Antriebssysteme anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von einfachen Rechenbeispielen gefestigt. Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet.

Damit sollen die Studierenden beispielsweise lernen, zu bewerten, wie eine konkrete Ausgestaltung eines Antriebssystems in verschiedensten Fortbewegungsmitteln ausgeführt werden kann sowie die Grundlagen der Funktionsweise und des Aufbaus von Kolbenmotoren, elektrischer Antriebsstränge und von Antriebssträngen mit Brennstoffzelle zu verstehen.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. Sprechstunden werden flexibel angeboten.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer
- * Online-Lehrmaterialien

Reading List:

Zapf, Martin: Kosteneffiziente und nachhaltige Automobile. 2. Auflage. Wiesbaden: Springer Vieweg, 2021.

Doppelbauer, Martin: Grundlagen der Elektromobilität. Wiesbaden: Springer Vieweg, 2020.

Schreiner, Klaus: Verbrennungsmotor - kurz und bündig. Wiesbaden: Springer Vieweg, 2017.

Klell, Manfred: Wasserstoff in der Fahrzeugtechnik. 4. Auflage. Wiesbaden: Springer Vieweg, 2018.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Nachhaltige Mobile Antriebssysteme (Vorlesung, 3 SWS)

Jaensch M [L], Jaensch M, Sonntag C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED160007: Lithium-Ion Battery Production | Lithium-Ionen-Batterieproduktion [VLBP]

Lithium-ion battery production

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination takes place in the form of a written exam (examination duration 90 minutes). By means of comprehension questions, calculation tasks and transfer tasks, the students should prove that they have an understanding of the basic processes of lithium-ion battery production and that they can apply this understanding. The content of the exam consists of comprehension questions from the lecture as well as various tasks, some of which are more advanced, based on the content of the exercises accompanying the lecture. Only a non-programmable calculator is allowed as an aid.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Prior experience in electrical energy storage and production engineering is recommended. Prior knowledge in chemistry and process engineering is not required but helpful.

Content:

The lecture provides an insight into all process steps in the production of lithium-ion batteries. The focus is on the holistic view of the process chain, including important process parameters and influencing factors.

Detailed content:

- Structure of the lithium-ion cell, electrochemical and electro-technical fundamentals, energy storage methods
- Material and cell systems on component level, process chains of battery production, safety aspects, production environment
- Mixing processes for anodes and cathodes (stirring, mixing)

- Coating processes for anodes and cathodes (slot die, doctor blade, cascade die) and process variants
- Calendering processes (porosity analysis, defect patterns)
- Packaging and assembling (cell formats, application areas)
- Packaging and contacting (ultrasonic welding, friction stir welding, laser welding)
- Filling and wetting (electrolyte properties, electrochemical impedance spectroscopy)
- Formation and aging (passivation layer, charge/discharge rate and lifetime test)
- Electrochemical characterization, cost models, quality criteria
- Recycling (material recycling, second life of the battery cell)
- Innovative process steps (laser patterning, mechanical prelithiation) and alternative lithium-ion battery technologies (solid-state batteries, sodium-ion battery)

Intended Learning Outcomes:

After participating in the module, students will be able to understand basic interrelationships of lithium-ion battery production and to evaluate them.

After successful participation in the module, students will be able to:

- Demonstrate a basic understanding of the material systems processed
- Evaluate the mode of operation of a lithium-ion battery on the basis of measurement characteristics
- Know, analyze and classify all process steps in lithium-ion battery production and their variants
- Understand basic interrelationships in lithium-ion battery production
- To develop requirements for the respective processes and suitable plant technology
- Evaluate typical fault patterns and assess their possible causes and consequences for the product
- Characterize the properties of a battery cell using cell tests and correlate them with the manufacturing processes
- Know, understand and apply important methods of quality assurance
- Understand future technologies and their special features with regard to the product and be able to recognize and classify trends

Teaching and Learning Methods:

In the lecture, the theoretical basics of lithium-ion battery production are taught by means of lecture and presentation. With the explanations from the lecture and corresponding self-study, the students learn to understand, evaluate and develop all process steps of lithium-ion battery production. Students supplement the course material by studying the recommended literature on battery production and related areas.

Students independently solve questions and tasks related to the content of the course using practical examples. In the exercise, sample tasks are calculated, discussed and debated together with the students. This is intended to ensure that the students can independently acquire the learning outcomes and transfer performance.

Media:

Presentations, videos and other illustrative material are used for visualization. Via the eLearning portal, the participants receive all exercise documents for preparation, which are then discussed

in the exercises. Furthermore, the lecture materials from the lecture are made available to the participants.

Reading List:

Recommended basic literature:

Korthauer, Reiner (Hrsg.): Handbuch Lithium-Ionen-Batterien. Springer-Verlag Berlin Heidelberg 2013. ISBN: 978-3-642-30653-2

Gulbinska, Malgorzata K. (Hrsg.): Lithium-ion Battery Materials and Engineering. Springer-Verlag 2014. ISBN: 1447165470

Julien, Christian (Hrsg.): Lithium Batteries, Science and Technology. Springer International Publishing 2015. ISBN: 9783319191089

In addition, further literature references are recommended in the individual lectures for in-depth study.

Responsible for Module:

Daub, Rüdiger; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Lithium-Ionen-Batterieproduktion (Übung, 1 SWS)

Daub R [L], Daub R, Keilhofer J

Lithium-Ionen-Batterieproduktion (Vorlesung, 2 SWS)

Daub R [L], Daub R, Stock S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED160017: Sustainable Manufacturing | Nachhaltige Produktion [SuM]

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination is held as a written exam (90 min) in order to be able to check the learning outcomes achieved by means of short and comprehension questions as well as complex application examples and calculation tasks. A non-programmable calculator can be used as an aid. The students calculate, among other things, various technically and economically relevant sustainability variables and parameters on the basis of given practical examples.

Thus the learning outcomes examined include basic aspects on awareness of the need for sustainable production, sustainability in the context of production, the holistic view of sustainability, manufacturing engineering measures, as well as assessment and measurement and standardisation of sustainability in production. In addition, the topics of sustainable design and use of products, energy and resource efficiency in production, social sustainability in production, data-based sustainability assessment in production and industrial circular economy are examined.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge of the basics of production and related areas (logistics, product development, etc.) is recommended but not mandatory.

Content:

The module covers all relevant aspects regarding the topic “sustainable manufacturing” including a general overview, ways of assessing sustainability and methods to improve sustainability in an industrial context.

Lecture units:

- Sense of urgency: Why do we need to act now?
- Sustainability in the context of manufacturing
- Thinking sustainability holistically

- Manufacturing technology measures
- Evaluate, measure and standardize sustainability in manufacturing
- Sustainable design and use of products
- Energy and resource efficiency in production
- Social sustainability in production
- Data-based sustainability assessment for manufacturing
- Industrial circular economy

The module also includes exercise units, e.g. how to conduct an LCA, how to follow ISO 14001 for sustainability assessments, practical exercise on system thinking, group activity (develop suggestions for improvement of sustainability for an exemplary company).

Intended Learning Outcomes:

After attending the module, students can understand the importance of addressing the topic of sustainability, understand the fundamentals of sustainable manufacturing, evaluate the possible technical lever in a production that can be addressed to increase sustainability, analyze products regarding the potentials for being produced more sustainably, apply the concept of system thinking on sustainable manufacturing, and apply methods to measure sustainability.

Teaching and Learning Methods:

The module takes place in the form of a lecture and an exercise. In the lecture, the basics of sustainable production are explained using PowerPoint presentations. The basics of sustainable production are deepened by means of use cases, expert presentations and practical application examples. In this way, participants learn, for example, how to carry out a life cycle assessment, how to follow the standards of ISO 14001 for sustainability assessments, or how to use systems thinking to find solutions. The lecture is rounded off by guest lectures from industry in order to give students an insight into current industrial issues relating to sustainability in production.

In the exercise, the methods and concepts learned in the lecture are applied to concrete examples. The participants can create solution concepts directly with the exercise instructor and thus apply what they have learned directly to industrial or academic practical examples. They thus learn, for example, how energy and resource efficiency in production can be increased, how social sustainability in production can be integrated into production management, or which measures need to be taken for data-based sustainability assessment in production.

Media:

Presentations, Videos, Additional Literature

Reading List:

- Neugebauer (2014): Handbuch Ressourcenorientierte Produktion. Hanser. ISBN: 978-3-446-43008-2
- Garbie (2016): Sustainability in Manufacturing Enterprises. Springer. ISBN: 978-3-319-29304-2
- Stark et al. (2017): Sustainable Manufacturing. Challenges, Solutions and Implementation Perspectives. Springer. ISBN: 978-3-319-48513-3
- Meadows (2008): Thinking in Systems. Chelsea Green. ISBN: 978-1603580557

- DIN EN ISO 14040: Umweltmanagement – Ökobilanz – Grundsätze und Rahmenbedingungen
- DIN EN ISO 14001: Umweltmanagementsysteme – Anforderungen mit Anleitung zur Anwendung

Responsible for Module:

Zäh, Michael; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Sustainable Manufacturing - Exercise (Übung, 1 SWS)

Zäh M, Paul M, Schneider D

Sustainable Manufacturing (Vorlesung, 2 SWS)

Zäh M, Paul M, Schneider D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW0066: Piston Engines 1 | Kolbenmotoren 1 [Piston Engines I]

Piston Engine Fundamentals and Mechanics

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Prüfung (90 min) sind die Kenntnisse der Grundlagen und Mechanik von Kolbenmotoren auf verschiedene Frage- und Problemstellungen anzuwenden.

So soll überprüft werden, ob die Studierenden in der Lage sind, die grundlegende Funktion und die möglichen Bauformen von Kolbenmotoren zu verstehen und deren Entwicklungsmöglichkeiten und Anwendungen zu bewerten.

Als Hilfsmittel zugelassen sind Geodreieck, Lineal und Zirkel.

(Stifte dokumentenecht, Bleistifte oder Stifte in roter oder grüner Farbe sind nicht erlaubt). Nicht zugelassen sind Formelsammlungen, Taschenrechner und weitere schriftliche oder elektronische Unterlagen.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Keine.

Content:

- * Aktuelle und zukünftige Bedeutung des Kolbenmotors
- * Anwendungsnahe Kenngrößen
- * Grundsätzliche thermodynamische Überlegungen und Kreisprozesse
- * Mechanischer Aufbau von Kolbenmotoren: Kurbeltrieb, Ventiltrieb, Nebenaggregate
- * Schwingungen aus Massenkräften und pulsierender Leistungsabgabe: Ursachen und Vermeidung
- * Konventionelle und nachhaltige Kraftstoffe
- * Entflammung und Verbrennung: vorgemischte und nicht-vorgemischte Verfahren
- * Ladungswechsel und Steuerorgane

- * Otto- und Dieserverfahren: Vor- und Nachteile, Unterschiede und Gemeinsamkeiten
- * Abgasemissionen: Anforderungen des Umweltschutzes und Vermeidungsstrategien

Intended Learning Outcomes:

Nach der erfolgreichen Teilnahme am Modul Kolbenmotoren I sind die Studierenden in der Lage...

- ... Verbrennungsmotoren durch Anwenden der wichtigsten Kenngrößen zu bewerten.
- ... sich an die wichtigsten Bauteile des Verbrennungsmotors zu erinnern und die wichtigsten Anforderungen, die an Verbrennungsmotoren gestellt werden, zu verstehen.
- ... verschiedene Kraftstoffe, die im Verbrennungsmotor eingesetzt werden, aufzulisten und diese nach ihren Vor- und Nachteilen zu analysieren. Weiterhin verstehen die Studenten die Entflammung von Kohlenwasserstoffen und den Unterschied zwischen vorgemischten und nicht-vorgemischten Flammen.
- ... die thermodynamischen Zusammenhänge von Verbrennungsmotoren durch Vergleichsprozesse zu analysieren und den Verbrennungsmotor hinsichtlich des Wirkungsgrades zu bewerten.
- ... die wichtigsten Merkmale der konventionellen Brennverfahren des Otto- und des Dieselprozesses zu verstehen.
- ... die Schadstoffentstehung bei Verbrennungsmotoren zu verstehen und die entsprechenden Abgasnachbehandlungssysteme zu bewerten.
- ... die Kräfte und Momente sowie die resultierenden Bewegungen und Schwingungen der Bauteile in Triebwerk und Steuertrieb eines Verbrennungsmotors einzuschätzen und ihren Einfluss auf Betriebssicherheit und Wirtschaftlichkeit des Gesamtsystems zu bewerten.
- ... das Vorgehen bei der Auslegung und Berechnung von Motorkomponenten wie Kolbenringen, Nocken, Ventilen und Ventilsfedern nachzuvollziehen und kritische Beanspruchungssituationen zu erkennen.
- ... die Einflussgrößen auf die motorischen Reibungsverluste zu verstehen und dadurch Ansatzpunkte für die Senkung des spezifischen Kraftstoffverbrauchs herzuleiten.
- ... praxisnahe Methoden zur Ermittlung der im Kolbenmotor wirkenden Massenkräfte zu verstehen und bei der Auslegung von Bauteilen zu berücksichtigen.

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen und Mechanik von Kolbenmotoren anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von Rechenbeispielen gefestigt, Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet.

So sollen die Studierenden beispielsweise lernen, die grundlegende Funktion und die möglichen Bauformen von Kolbenmotoren zu verstehen und deren Entwicklungsmöglichkeiten und Anwendungen zu bewerten.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. Sprechstunden werden flexibel angeboten.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer

- * Online-Lehrmaterialien
- * Skripten

Reading List:

Köhler, Flierl: Verbrennungsmotoren. Vieweg ATZ/ MTZ-Fachbuch, 2006.

van Basshuysen: Handbuch Verbrennungsmotor - Grundlagen, Komponenten, Systeme, Perspektiven. 4. Auflage. Wiesbaden: Vieweg, 2007.

Merker, Günter: Verbrennungsmotoren - Simulation der Verbrennung und Schadstoffbildung. 3. Auflage. Wiesbaden: Teubner, 2006.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Kolbenmotoren I (Vorlesung, 3 SWS)

Härtl M [L], Dürrholder W, Härtl M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1903: Bioprocess Engineering | Bioverfahrenstechnik

Version of module description: Gültig ab summerterm 2013

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Klausur (Bearbeitungsdauer 90 min, zugelassenes Hilfsmittel: Taschenrechner) sind die vermittelten Inhalte zu den Grundlagen der Bioverfahrenstechnik auf entsprechende Problemstellungen anzuwenden und auf weiterführende Aufgabenstellungen zu übertragen. Dadurch weisen die Studierenden nach, dass sie die Eigenschaften biotechnischer Verfahren verstehen und bewerten können wie beispielsweise die zu Grunde liegende Formalkinetik oder die Aufteilung biotechnologischer Prozesse in verschiedene Schritte.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Empfohlene Kenntnisse sind Grundlagen der Mathematik, Chemie und Biologie, wie sie in Bachelorstudiengängen an deutschen Hochschulen vermittelt werden.

Content:

In diesem Modul werden die physikalischen, chemischen, biochemischen, biologischen und thermodynamischen Grundlagen biologischer Stoffumwandlungen für Ingenieure vermittelt.

1. Einführung und Grundlegendes über die Bioverfahrenstechnik, 2. physikochemische Eigenschaften des Wassers, 3. Biophysikalische Eigenschaften von Zellen, 4: Biochemische Reaktionssysteme, 5. Bioreaktionstechnik I – Enzymkinetik, 6. Bioreaktionstechnik II – Metabolische Modelle, 7. Bioreaktionstechnik III – Wachstumskinetik, 8. Steril-Verfahrenstechnik, 9. Aufarbeitung von Bioprodukten, 10. Bioprozessanalytik, 11. Industrielle Biotechnologie

Intended Learning Outcomes:

Nach der Teilnahme an dieser Modulveranstaltung haben die Studierenden grundlegende Kenntnisse der Bioverfahrenstechnik erworben und sind in der Lage, die wesentlichen Eigenschaften biotechnologischer Verfahren zu verstehen und zu bewerten. Die Studierenden sind

in der Lage die der Bioreaktionstechnik zu Grunde liegende Formalkinetik zu erkennen und diese auf exemplarische Problemstellung anzuwenden. Ebenfalls sind die Studierenden in der Lage, zu erkennen, dass ein biotechnologischer Prozess mit Enzymen und Zellen aus einer Vielzahl verschiedener Schritte (Stoffumwandlung, Aufarbeitung, Steriltechnik, Analytik) besteht.

Teaching and Learning Methods:

In der Vorlesung werden mittels PowerPoint Folien die theoretischen Grundlagen der Bioverfahrenstechnik vermittelt. Wichtige Inhalte werden wiederholt aufgegriffen, um das Verständnis und die Bewertung der Eigenschaften biotechnologischer Verfahren zu stärken. Die Vorlesungsunterlagen werden den Studierenden auf geeignete Weise zur Verfügung gestellt. In der (zeitlich daran anschließenden) Übung werden Übungsaufgaben vorgerechnet und die Musterlösungen den Studierenden ebenfalls zur Verfügung gestellt. Damit und durch gezielte Fragen an den Übungsleiter haben die Studierenden die Möglichkeit ihr Verständnis zu vertiefen, um beispielsweise die der Bioreaktionstechnik zu Grunde liegende Formalkinetik sowie die Aufteilung biotechnologischer Prozesse in verschiedene Schritte zu erkennen.

Zur Verfügung gestellt werden Powerpoint-Folien (via Beamer) als Vorlesungs- und Übungsunterlagen und Musterlösungen zu den Übungsaufgaben.

Media:

Die in der Vorlesung verwendeten Folien werden den Studierenden in geeigneter Form rechtzeitig zugänglich gemacht. Übungsaufgaben werden regelmäßig verteilt und in der Regel werden die Musterlösungen eine Woche später ausgegeben und mit den Studierenden diskutiert.

Reading List:

Es ist kein Lehrbuch zu allen Inhalten dieses Moduls verfügbar. Als Einführung empfiehlt sich: Horst Chmiele: Bioprozesstechnik. Elsevier GmbH, München.

Responsible for Module:

Weuster-Botz, Dirk; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Bioverfahrenstechnik (MW1903) (Vorlesung, 3 SWS)

Weuster-Botz D [L], Weuster-Botz D, Benner P, Caballero Cerbon D, Heins A, Oppelt A, Sampaio de Oliveira L, Thurn A

For further information in this module, please click campus.tum.de or [here](#).

Catalogue of Elective Modules: Mechanical Engineering (advanced) | Wahlkatalog: Maschinenwesen (advanced)

Module Description

ED150011: Hydrogen Mobility | Wasserstoffmobilität [H2Mobil]

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung erfolgt in Form einer schriftlichen Klausur (Prüfungsdauer: 90 min). Die Studierenden sollen in begrenzter Zeit die Konzepte der Wasserstoffmobilität auf verschiedene Frage- und Problemstellungen anwenden. So soll überprüft werden, ob sie beispielsweise bewerten können, welche Energiewandler mit Wasserstoff in der Antriebstechnik sinnvoll eingesetzt werden können und ob sie verstehen wie verschiedene Brennstoffzellen und Verbrennungsmotoren mit Wasserstoff betrieben werden können.

Als Hilfsmittel zugelassen sind: Schreibutensilien, Lineal und ein nicht programmierbarer Taschenrechner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Nachhaltige Mobile Antriebssysteme [ED150010]

Content:

Themenschwerpunkte:

- * Energie und Mobilität auf Basis von Wasserstoff und Wasserstoffträgern
- * Erzeugung von Wasserstoff
- * Speicherung und Transport von Wasserstoff
- * Grundlagen der Fahrzeugantriebe
- * Wasserstoff-Verbrennungsmotoren
- * Antriebssysteme mit Brennstoffzellen und E-Antrieb
- * Energie und Mobilität auf Basis von Wasserstoff und Wasserstoffträgern

Intended Learning Outcomes:

Nach erfolgreicher Teilnahme am Modul "Wasserstoffmobilität" sind die Studierenden in der Lage...
... zu verstehen, wie und warum Wasserstoff für eine Transformation hin zu nachhaltiger Mobilität sinnvoll ist.

... die wichtigsten Erzeugungsmethoden von Wasserstoff nach ihren jeweiligen Vorteilen zu beurteilen

... die Grundlagen der Funktionsweise einer Wasserstoffversorgungsinfrastruktur zu verstehen

... zu bewerten, welche Energiewandler Wasserstoff in die Antriebstechnik sinnvoll einsetzen können

... zu verstehen wie verschiedene Brennstoffzellen mit Wasserstoff betrieben werden können

... zu verstehen wie Verbrennungsmotoren mit Wasserstoff betrieben werden können

... einzuordnen, welche Herausforderungen bei der Energiewandlung von Wasserstoff auftreten können

Teaching and Learning Methods:

In der Vorlesung werden die Grundlagen und Konzepte der Wasserstoffmobilität anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von einfachen Rechenbeispielen gefestigt. Erfahrungen und Probleme aus der Praxis werden vorgestellt, diskutiert und gerechnet. So sollen die Studierenden beispielsweise lernen, zu bewerten, welche Energiewandler mit Wasserstoff in der Antriebstechnik sinnvoll eingesetzt werden können und lernen zu verstehen wie verschiedene Brennstoffzellen und Verbrennungsmotoren mit Wasserstoff betrieben werden können.

Media:

- * Vortrag
- * Präsentation
- * Tablet-PC mit Beamer
- * Online-Lehrmaterialien

Reading List:

Zapf, Martin: Kosteneffiziente und nachhaltige Automobile. 2. Auflage. Wiesbaden: Springer Vieweg, 2021.

Kurzweil, Peter: Brennstoffzellentechnik. 3. Auflage, Wiesbaden, Springer Vieweg, 2016

Schreiner, Klaus: Verbrennungsmotor - kurz und bündig. Wiesbaden: Springer Vieweg, 2017.

Klell, Manfred: Wasserstoff in der Fahrzeugtechnik. 4. Auflage. Wiesbaden: Springer Vieweg, 2018.

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Wasserstoffmobilität (Vorlesung, 3 SWS)

Prager M [L], Armbruster F, Prager M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW0628: Energy and Economy | Energie und Wirtschaft

Version of module description: Gültig ab winterterm 2020/21

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a written exam (process time 60 min), it will be examined whether the students have understood the content conveyed regarding energy economy and can apply it to simple problems of the energy economy as well as energy conversion and transport.

No tools are allowed in the test. Task types are knowledge and understanding questions e.g. on basics of global trading with primary energy sources as well as their conversion to other energy forms (heat, power...) and the transport of the energy sources, short calculations e.g. on profitability calculation and drawing diagrams on energy policy but also on technological topics. The exam will be in German, English answers are possible after consulting the lecturer.

The final score consists of the following elements:

- 100% final examination

Repeat Examination:

Next semester

(Recommended) Prerequisites:

As the energy production technology itself is less treated, it is advisable to attend basic lectures such as energy systems 1 and sustainable energy systems in advance.

Content:

The lecture "Energy and Economics" deals with current issues of energy supply, economics and social impacts. Since the fundamental energy generation technologies are not in the main focus, it is recommended to attend lectures like "Energy Systems" in advance. The lecture and the exam is held in German language. Involving external experts from industry the following topics are presented and discussed:

- Fundamentals of energy supply
- Commodity markets and world trade in primary energy

- Power trading
- Energy conversion concepts
- Methods of economic calculation
- Efficiency factors of power plants
- Governmental intervention in the market and liberalization
- Importance of energy-intensive companies to the economy
- Heat generation and supply
- Emissions and related costs
- Requirements for future energy systems

Intended Learning Outcomes:

After successful participation in the lecture, students are able to understand the essential functioning and correlations of the energy markets. They can apply the methods of cost-effectiveness calculation to energy-related questions. The functioning of the electricity market is understood and can be reproduced. The basic principles of global trade in primary energy carriers as well as their transformation into other energy forms (heat, electricity ...) and the transport of energy carriers can be discussed and analyzed.

Teaching and Learning Methods:

Frontal teaching, with media support by a PowerPoint presentation to disseminate knowledge with the aim of reproducing and discussing essential functions and relationships of the energy markets. Interactive exercises to deepen what has been learned, for example on the calculation of profitability. Interactive quiz to ensure the level of knowledge (At the beginning of each lecture the contents of the previous lecture are repeated).

During the semester, professional deliberations should be carried out by reading and editing book sections and / or paper articles as well as calculating simple exercises. The articles and tasks to be read are discussed / presented in the lecture and are also part of the exam.

Media:

Lecture, presentation (script), panel presentation, exercises

Reading List:

General literature will be announced in the lecture.

Responsible for Module:

Spliethoff, Hartmut; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Energie und Wirtschaft (Vorlesung, 2 SWS)

Wieland C [L], Mörtchenkötter H, Wieland C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW1909: Sustainable Energy Systems | Nachhaltige Energiesysteme

Version of module description: Gültig ab summerterm 2020

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination takes place in the form of a written exam (processing time 90 min, permitted aid is a pocket calculator). The examination is divided into a short question section (comprehension questions, no aids allowed) and a calculation section. The students should demonstrate that they can technically evaluate, for example, the regenerative, fossil and nuclear options for energy conversion, calculate the process steps in energy conversion and place them within an economic and socio-economic framework.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basics in Thermodynamics, Heat and Mass Transfer

Content:

Introduction to energy technology and its challenges (climate change, energy consumption and reserves, future studies, merit order), thermal energy conversion, energy sources (fossil and regenerative), renewable (non-thermal) energy conversion, heat supply, energy storage, economic viability

Intended Learning Outcomes:

After participation in the module, the students will be able to evaluate different energy conversion methods (thermal and alternative) with regard to their properties, as well as to classify the most common fossil, nuclear and regenerative energy sources with regard to economics, environmental and social sustainability. Furthermore, students will be able to calculate the process and conversion steps in thermal and alternative energy conversion.

Teaching and Learning Methods:

The module is divided into a lecture and an exercise. The lecture is held in the classical lecture style using PowerPoint slides and, if necessary, a supplementary blackboard to explain the theoretical principles of sustainable energy systems. The students are provided with an accompanying script that they can supplement with their own notes. The exercise is carried out interactively with the students as a combination of independent work on the exercises provided and finding a solution together with the trainer. In this way the students should learn to technically evaluate the regenerative, fossil and also nuclear options of energy conversion, to calculate the process steps in energy conversion and to place them within an economic and socio-economic framework.

Media:

Lecture, presentation (script), blackboard, exercises

Reading List:

Baehr, H. D.: Thermodynamik - Grundlagen und technische Anwendungen. Springer-Verlag, Berlin, Heidelberg, New York, 2004

Thomas, H.-J.: Thermische Kraftanlagen - Grundlagen, Technik, Probleme. Springer-Verlag, Berlin, Heidelberg, New York, Tokyo, 1985

Responsible for Module:

Spliethoff, Hartmut; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MW2277: Energy Carriers for mobile Applications | Energieträger für mobile Anwendungen

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor/Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In einer schriftlichen Klausur (60 min) sind die vermittelten Kompetenzen auf verschiedene Frage- und Problemstellungen anzuwenden.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Verbrennungsmotoren (MW0137)

Content:

- Kraftstoffe als Energiespeicher
- Mobile Nutzung elektrischer Energie: E-Fuels vs. Batteriespeicher
- Klimaschutz durch Biokraftstoffe und synthetische Kraftstoffe
- Sub-Zero-Emissionen mit alternativen Kraftstoffen
- Kraftstoffkennzahlen und ihre Anwendung für Ingenieure
- Rechtliche Aspekte: Klimaziele und ihre Umsetzung im EU-Rahmen
- Chemische Grundlagen
- Zukünftige Herstellung konventioneller und synthetischer Kraftstoffe
- Aktuelle Forschungsansätze im Kraftstoffbereich
- Energiewende: Dekarbonisierung vs. Defossilisierung?

Intended Learning Outcomes:

Nach der Teilnahme an der Modulveranstaltung Energieträger für mobile Anwendungen sind die Studierenden in der Lage...

... die technischen Optionen zur Speicherung von Energie hinsichtlich ihrer Leistungsfähigkeit, ihrer Energiedichte und ihres technologischen Reifegrads einzuschätzen.

... aktuelle Entwicklungen im Bereich der Kraftstoffe hinsichtlich ihrer Wechselwirkungen mit Umwelt und gesetzlichen Vorgaben zu beurteilen.

... die Relevanz üblicher Bewertungskriterien für die Eigenschaften von Kraftstoffen kompetent einzuschätzen und diese anzuwenden.

... chemisches Grundwissen auf Kraftstoffe anzuwenden und diese dadurch hinsichtlich ihrer technologischen Einsatzmöglichkeiten zu bewerten.

... die Zusammenhänge zwischen motorischen Brennverfahren und den Eigenschaften dafür geeigneter Kraftstoffe herzustellen.

Teaching and Learning Methods:

In der Vorlesung werden die Lehrinhalte anhand von Vortrag, Präsentation und Tablet-PC vermittelt. Die Theorie wird durch Anwendungsfälle erläutert und mit Hilfe von Praxisbeispielen gefestigt, Erfahrungen und Probleme aus der Praxis werden vorgestellt und diskutiert.

Alle Lehrmaterialien sowie weiterführende Informationen werden kostenfrei in der Vorlesung verteilt oder werden online zur Verfügung gestellt. In den Assistentensprechstunden kann individuelle Hilfe gegeben werden.

Media:

- Vortrag
- Präsentation
- Tablet-PC mit Beamer
- Online-Lehrmaterialien

Reading List:

Responsible for Module:

Jaensch, Malte; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Catalogue of Elective Modules: Informatics | Wahlkatalog: Informatik

Module Description

CIT3230000: Advanced Concepts of Programming Languages | Advanced Concepts of Programming Languages

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments assess in how far students are able to reproduce the complex semantical behaviors of small example programs. Their knowledge and practical skills concerning programming constructs is further assessed by assignments, which ask to simulate programming language constructs of one kind by programming language constructs of another kind.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics,
IN0002 Fundamentals of Programming (Exercises & Laboratory),
IN0003 Functional Programming and Verification,
at least one programming language

Content:

This is not a beginners programming course – Instead, this lecture focusses on the semantics of various programming language concepts, and their implementation from the point of view of a compiler engineer. Topics may include, among others:

- Relaxed Memory Models
- Wait-/Lock-free Programming
- Locks, Monitors & Condition Variables
- Transactional Memory
- Gotos, Co-Routines and Continuations

- Single/Multi-Dispatching
- (Multiple-) Inheritance
- Delegation and Prototype Based Programming
- Aspect Oriented Programming
- Meta programming

Intended Learning Outcomes:

After successful completion of this module, students are familiar with an assortment of programming language constructs from popular programming languages. They understand the semantics of these constructs as well as the implementation consequences, that they inflict on the implementation as well as the runtime behavior of compiler and runtime system. They are able to analyze and compare different language based approaches, to discuss their relative merits and potential workarounds in case certain language features are missing. By means of this knowledge, they are able to extend existing compilers to handle the aforementioned constructs as well as able to re-encode concepts from one language by means of another language.

Teaching and Learning Methods:

By means of pre-recorded lesson videos of around 15 minutes each, students can prepare the lecture content at their own pace. In the classroom, students can open discussion on unclear parts of the lesson videos. Additionally, illustrating examples and live programming enhance and deepen the student's insights into the topics. Selected problems that are then solved by the joined effort of the audience and the lecturer further illustrate the lessons with hands-on experiences. In the additionally offered exercise course (2h), accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, train students to apply the learnt concepts in implementations and develop the skill to to simulate the effect of missing language features by others.

Media:

Pre-recorded lesson videos, in-class programming experiments, quizzes, collaborative shared whiteboard, programming assignments

Reading List:

Selected literature of the area and appropriate conference or journal papers

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Concepts of Programming Languages (CIT3230000) (Vorlesung, 3 SWS)
Seidl H [L], Petter M

Exercise - Advanced Concepts of Programming Languages (CIT3230000) (Übung, 2 SWS)
Tilscher S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN0042: IT Security | IT-Sicherheit

Version of module description: Gültig ab winterterm 2021/22

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 60	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination performance is provided in the form of a 90-minute written exam. Knowledge questions test familiarity with basic concepts and methodical procedures for securing components and systems as well as familiarity with basic protocols. Smaller tasks test the ability to apply security concepts in a targeted and correct manner, or to recognize security efficiencies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics and IN004 Introduction to Computer Organization and Technology - Computer Architecture

Content:

- Basic concepts of IT security,
- Selected security problems of today's systems and selected attacks,
- Basics and practical methods of applied cryptography
- Basic concepts and protocols for identification/authentication, access control and system security
- Fundamentals of network security: firewall concepts and practice-relevant protocols for network security
- Methods of operational IT risk and security management (ISM)

Intended Learning Outcomes:

After successful participation in this module, participants understand the basic concepts, methods and protocols for protecting data and systems from manipulation and misuse at a fundamental, practice-oriented, scientific level. They understand the causes of security problems in today's systems, can reproduce the relationships between protection mechanisms and the problems they

address and apply them to case studies. They also master basic methods of operational IT security management.

Teaching and Learning Methods:

Lecture supplemented by exercise with practical parts to gain a detailed understanding of conceptual and technical issues by means of concrete tasks, including simple practical programming tasks.

Media:

Lecture slides

Reading List:

- IT-Sicherheit: Konzepte, Verfahren, Protokolle, Claudia Eckert, 10. Auflage, De Gruyter, 2018.
- Understanding Cryptography, C. Paar und J. Pelzl, 2. Auflage Springer, 2010.

Responsible for Module:

Eckert, Claudia; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

IT Sicherheit (IN0042) (Vorlesung, 2 SWS)

Eckert C [L], Eckert C, Franzen F

Übung zu IT Sicherheit - Gruppen Mi, Do, Fr (IN0042) (Übung, 2 SWS)

Eckert C [L], Franzen F

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2339: Data Analysis and Visualization in R | Data Analysis and Visualization in R

Version of module description: Gültig ab winterterm 2016/17

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 90	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam and project work:

The listed achievements, see Intended Learning Outcomes, are evaluated by one written exam of 90 min. There will be moreover two case studies, where the students must provide the source code that generates the report of an analysis of a given dataset. The analysis of this data covers all topics stated under Intended Learning Outcomes. The first case study covers topics 1-7. The second covers the topics 8-16. The final mark is the exam mark with bonus points for the two case studies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

R programming basics 1
 R programming basics 2 (including report generation with R markdown)
 Data importing
 Cleaning and organizing data: Tidy data 1
 Cleaning and organizing data: Tidy data 2
 Base plot
 Grammar of graphics 1
 Grammar of graphics 2
 Unsupervised learning (hierarchical clustering, k-means, PCA)
 Case study I
 Drawing robust interpretations 1: empirical testing by sampling

Drawing robust interpretations 2: classical statistical tests

Supervised learning 1: regression, cross-validation

Supervised learning 2: classification, ROC curve, precision, recall

Case study II

Intended Learning Outcomes:

At the end of the module students are able to:

- 1. produce scripts that automatically generate data analysis report
- 2. import data from various sources into R
- 3. apply the concepts of tidy data to clean and organize a dataset
- 4. decide which plot is appropriate for a given question about the data
- 5. generate such plots
- 6. know the methods of hierarchical clustering, k-means, PCA
- 7. apply the above methods and interpret their outcome on real-life datasets
- 8. know the concept of statistical testing
- 9. devise and implement resampling procedures to assess statistical significance
- 10. know the conditions of applications and how to perform in R the following statistical tests:
Fisher test, Wilcoxon test, T-test.
- 11. know the concept of regression and classification
- 12. apply regression and classification algorithms in R
- 13. know the concept of error in generalization, cross-validation
- 14. implement in R a cross-validation scheme.
- 15. know the concepts of sensitivity, specificity, ROC curves
- 16. assess the latter in R

Teaching and Learning Methods:

Lecture provides the concept + programming exercises where these concepts are applied on data.
The goal of each exercise is the generation of report documents.

Media:

Weekly posted exercises online, slides, live demo

Reading List:

An Introduction to Statistical Learning
with Applications in R <http://www-bcf.usc.edu/~gareth/ISL/>
R for Data Science, by Garrett Golemund and Hadley Wickham

Responsible for Module:

Gagneur, Julien; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Data Analysis and Visualization in R (IN2339) (Vorlesung, 2 SWS)
Gagneur J [L], Gagneur J

Exercise Data Analysis and Visualization in R (IN2339) (Übung, 4 SWS)

Gagneur J [L], Gagneur J

For further information in this module, please click campus.tum.de or [here](#).

Catalogue of Elective Modules: Informatics (advanced) | Wahlkatalog: Informatik (advanced)

Module Description

CIT4230000: Strategic IT Management | Strategic IT Management

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 4	Total Hours: 120	Self-study Hours: 75	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination will be in the form of a written exam (90 minutes) in which the students' ability to describe, evaluate and apply models, methods, key figures, visualizations and tools of strategic IT management to given problems in a context-dependent manner will be tested. Successful participation in a voluntary case study or a workshop throughout the exercise can be included as a bonus in the assessment of the exam. The exact regulations for this will be announced in time at the beginning of the module.

Repeat Examination:

(Recommended) Prerequisites:

Bachelor in Informatics or Information Systems, specifically:

- Fundamentals of Business Information Systems
- Databases
- Software Engineering
- Business Process Management

Content:

1. IT Strategy and IT Management Frameworks
2. IT Governance and IT Organisation
3. Enterprise Architecture Management
 - 3.1 Schools of EAM
 - 3.2 Foundations of EAM
 - 3.3 Capability Based Planning

3.4 Agile EAM and EAM Patterns

4. Large-scale Agile Software Development

4.1 Foundations and Frameworks of LSAD

4.2 Selected Topics of LSAD

5. Case Studies

Intended Learning Outcomes:

After participating in the module, students will be able to understand the key challenges, concepts, methods and decision areas of strategic IT management and their interactions. Furthermore, students will understand the relationship between strategic IT management, enterprise architecture management, scaled agile software development and IT governance. Moreover, after participating in the module, students have in-depth knowledge of patterns and frameworks of enterprise architecture management and scaled agile software development in the areas of models, methods, metrics and visualizations, among others.

Teaching and Learning Methods:

With the help of a slide presentation, the lecture introduces the fundamental concepts of strategic IT management. Furthermore, the understanding of the basic concepts of strategic IT management is deepened in the lectures with the help of appropriate tasks and examples. Through exercises during the lecture and the work on a separate case study, special modeling techniques from enterprise architecture management and from scaled agile software development are explained and practiced. In addition, self-study assignments are provided.

Media:

Slide presentation, teamwork

Reading List:

Hanschke, I. (2013). Strategisches Management der IT-Landschaft: Ein praktischer Leitfaden für das Enterprise Architecture Management. Carl Hanser Verlag GmbH Co KG.

Kaplan, J. D. (2005). Strategic IT portfolio management: governing enterprise transformation. PRTM.

Buckl, S., Ernst, A. M., Matthes, F., Ramacher, R., & Schweda, C. M. (2009, September). Using enterprise architecture management patterns to complement TOGAF. In 2009 IEEE International Enterprise Distributed Object Computing Conference (pp. 34-41). IEEE.

Buckl, S., Ernst, J., Lankes, A. M., Matthes (2008).

Enterprise architecture management pattern catalog (version 1.0, february 2008)

Sandkuhl, K., Fill, H. G., Hoppenbrouwers, S., Krogstie, J., Matthes, F., Opdahl, A., ... & Winter, R. (2018). From expert discipline to common practice: a vision and research agenda for extending the reach of enterprise modeling. Business & Information Systems Engineering, 60(1), 69-80. Chicago

Uludag, O#, Kleehaus, M., Caprano, C., & Matthes, F. (2018, October). Identifying and structuring challenges in large-scale agile development based on a structured literature review. In 2018 IEEE 22nd International Enterprise Distributed Object Computing Conference (EDOC) (pp. 191-197). IEEE.

Dikert, K., Paasivaara, M., & Lassenius, C. (2016). Challenges and success factors for large-scale agile transformations: A systematic literature review. *Journal of Systems and Software*, 119, 87-108.

Paasivaara, M., Behm, B., Lassenius, C., & Hallikainen, M. (2018). Large-scale agile transformation at Ericsson: a case study. *Empirical Software Engineering*, 23(5), 2550-2596. Chicago

Responsible for Module:

Matthes, Florian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Strategisches IT-Management (CIT4230000) (Vorlesung, 3 SWS)

Matthes F [L], Matthes F, Tobisch F, Philipp P, Schneider P

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2073: Cloud Computing | Cloud Computing

Version of module description: Gültig ab summerterm 2022

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 4	Total Hours: 120	Self-study Hours: 75	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The exam takes the form of an written 60 minutes test. Questions allow to asses acquaintance with the concepts of Cloud and Grid Computing. Questions describing usage scenarios and asking for the evaluation of the learned techniques in these scenarios are used to assess the ability to apply the learned techniques. In a discussion, their ability to solve research question is assessed.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in computer architectures and distributed systems would be helpful.

Content:

The lecture starts with an introduction and a presentation of the base technologies for Cloud and Grid computing. The layered architecture of Grids and the base services are presented. Cloud Computing is then introduced and the different models SaaS, PaaS, IaaS. The list of base services is extended for Cloud Computing. The lecture also covers a discussion of legal issues.

Intended Learning Outcomes:

The students know the goals of Cloud and Grid computing. They can present application scenarios in different domains. They are familiar with the fundamental techniques in the areas security, application development and resource management. They can identify the differences and similarities between Cloud and Grid computing and distributed systems. They are able to participate in Cloud and Grid-related research projects.

Teaching and Learning Methods:

The concepts of Grid and Cloud Computing are introduced in the lecture. In the exercises, the student work on assignments that allow them to train the development of Cloud applications. References to current literature allow the students to deepen their understanding of the concepts.

Media:

Slides, Script, Exercise Sheets, Prepared Code Snippets.

Reading List:

- Berman, F., Fox, G., Hey, A. (ed.): Grid Computing-Making the Global Infrastructure a Reality, Wiley, Chichester 2003 (collection of 43 contributions, Grids and applications)
- Di Martino et.al. Engineering the Grid, American Scientific Publishers, 2004, (collection of 34 contributions to application and technology of grids)
- Furht, B., Escalante, A.: Handbook of Cloud Computing, Springer 2010
- Chorafas, D.: Cloud Computing Strategies, CRC Press 2011

Responsible for Module:

Gerndt, Hans Michael; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2406: Fundamentals of Artificial Intelligence | Fundamentals of Artificial Intelligence

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam at the end of the semester lasting 90min. The questions will cover most of the learned material and are typically shorter than the problems solved in the exercise, but similar in difficulty.

As an incentive to create artificial intelligence oneself, we provide programming challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Previous attendance of

- IN0007 Fundamentals of Algorithms and Data Structures
- IN0015 Discrete Structures
- IN0018 Discrete Probability Theory

is beneficial. However, all content is taught from ground up and the listed lectures are not essential. Students who have not attended these lectures will have to invest additional time.

Content:

- Task environments and the structure of intelligent agents.
- Solving problems by searching: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening search, greedy best-first search, A* search.
- Constraint satisfaction problems: defining constraint satisfaction problems, backtracking search for constraint satisfaction problems, heuristics for backtracking search, interleaving search and inference, the structure of constraint satisfaction problems.

- Logical agents: propositional logic, propositional theorem proving, syntax and semantics of first-order logic, using first-order logic, knowledge engineering in first-order logic, reducing first-order inference to propositional inference, unification and lifting, forward chaining, backward chaining, resolution.
- Bayesian networks: acting under uncertainty, basics of probability theory, Bayesian networks, inference in Bayesian networks, approximate inference in Bayesian networks.
- Hidden Markov models: time and uncertainty, inference in hidden Markov models (filtering, prediction, smoothing, most likely explanation), approximate inference in hidden Markov models.
- Rational decisions: introduction to utility theory, utility functions, decision networks, the value of information, Markov decision processes, value iteration, policy iteration, partially observable Markov decision processes.
- Learning: types of learning, supervised learning, learning decision trees, reinforcement learning.
- Introduction to robotics: robot hardware, robotic perception, path planning, planning uncertain movements, control of movements, application domains.

Intended Learning Outcomes:

After attending the module, you are able to create artificial intelligence on a basic level using search techniques, logics, probability theory and decision theory. Your learned abilities will be the foundation for more advanced topics in artificial intelligence. In particular, you will acquire the following skills:

- You can analyze problems of artificial intelligence and judge how difficult it is to solve them.
- You can recall the basic concepts of intelligent agents and know possible task environments.
- You can formalize, apply, and understand search problems.
- You understand the difference between constraint satisfaction and classical search problems as well as apply and evaluate various constraint satisfaction approaches.
- You can critically assess the advantages and disadvantages of logics in artificial intelligence.
- You can formalize problems using propositional and first-order logic.
- You can apply automatic reasoning techniques in propositional and first-order logic.
- You understand the advantages and disadvantages of probabilistic and logic-based reasoning.
- You can apply and critically assess methods for probabilistic reasoning with Bayesian networks and Hidden Markov Models.
- You understand and know how to compute rational decisions.
- You have a basic understanding on how a machine learns.
- You know the basic areas and concepts in robotics.

Teaching and Learning Methods:

The module consists of a lecture and exercise classes. The content of the lecture is presented via slides, which are completed during the lecture using the blackboard and/or an electronic writing pad. Students are encouraged to additionally study the relevant literature. In the exercise classes, the learned content is applied to practical examples to consolidate the content of the lecture. Students should ideally have tried to solve the problems before they attend the exercise. To encourage more participation, students are regularly asked questions or encouraged to participate in online polls. As an incentive to create artificial intelligence oneself, we provide programming

challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Media:

Slides, blackboard, electronic writing pad, exercise sheets;

Reading List:

- P. Norvig and S. Russell: Artificial Intelligence: A Modern Approach, Prentice Hall, 4th edition. (English version)
- P. Norvig and S. Russell: Künstliche Intelligenz: Ein moderner Ansatz, Pearson Studium, 4. Auflage. (German version)
- W. Ertel: Grundkurs Künstliche Intelligenz: Eine praxisorientierte Einführung, Springer, 4. Auflage.
- P. Zöller-Greer: Künstliche Intelligenz: Grundlagen und Anwendungen, composia, 2. Auflage.
- D. L. Poole and A. K. Mackworth: Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.
- P. C. Jackson Jr: Introduction to Artificial Intelligence, Dover Publications.

Responsible for Module:

Althoff, Matthias; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Fundamentals of Artificial Intelligence (IN2406) (Vorlesung mit integrierten Übungen, 5 SWS)

Althoff M [L], Althoff M, Gaßner J, Kulmburg A, Meyer E, Würsching G

For further information in this module, please click campus.tum.de or [here](#).

Catalogue of Elective Modules: Chemistry | Wahlkatalog: Chemie

Module Description

CH0107: Analytical Chemistry | Analytische Chemie

Version of module description: Gültig ab winterterm 2021/22

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer Klausur (60 Minuten) erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit und ohne Hilfsmittel die verschiedenen Schritte moderner Analytik von der Probenahme bis zur Auswertung erkannt und gängige instrumentelle Analyseverfahren erinnert werden können. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Grundwissen in Chemie und Physik.

Content:

Der Analytische Prozess: Probennahme, Probenvorbereitung, Detektions- und Bestimmungsverfahren, Validierung der Ergebnisse, Qualitätssicherung. Instrumentelle Analytik, u.a. AAS, OES, RFA, MS, Kopplungstechniken. Illustrative Beispiele moderner Elementanalytik.

Intended Learning Outcomes:

Nach der Teilnahme am Modul sind die Studierenden in der Lage, die einzelnen Schritte einer chemischen Analyse von Probenahme, Probenaufbereitung, Messung, Auswertung und Validierung zu erinnern und deren Eigenheiten und Wichtigkeit zu verstehen und anzuwenden. Sie können verschiedene moderne Analyseverfahren wie AAS, OES, RFA, MS und Kopplungsverfahren benennen und erklären.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung deren Inhalt im Vortrag und durch Präsentationen vermittelt wird. Studierende werden zur inhaltlichen Auseinandersetzung mit der Thematik und zum Studium der Literatur angeregt.

Media:

Bücher, Online-Skript

Reading List:

Skoog, Douglas A., Holler, F. James, Crouch, Stanley R. Niessner, R. (Hrsg.), Instrumentelle Analytik Grundlagen - Geräte Anwendungen. Springer 2013, 6. Auflage.

Harris, Daniel C., Werner, Gerhard, Werner, Tobias (Hrsg.), Lehrbuch der Quantitativen Analyse. Springer 2014, 8. Auflage.

Responsible for Module:

Strittmatter, Nicole; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Analytische Chemie (CH0107) (Vorlesung, 2 SWS)

Strittmatter N (Ivleva N)

For further information in this module, please click campus.tum.de or [here](#).

Electives from Chemistry (advanced) | Wahlfächer aus Chemie (advanced)

Module Description

CH0226: Molecular Medicine | Molekulare Medizin

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer 90-minütigen Klausur erbracht. Zum Nachweis der erworbenen Lernergebnisse beantworten die Studierenden auf Basis ihrer erworbenen Fachkompetenzen komplexe Problemstellungen aus dem Bereich der molekularen Medizin (z.B. molekulare Prozesse bei der Entstehung von Krankheiten und deren Therapieansätzen). Dabei wird das Verständnis der Vorgänge in Zellen auf molekularer Ebene (z.B. chemische Reaktionen ausgelöst durch Therapeutika oder Fehlreaktionen von Enzymen nach Mutation) überprüft. Hierbei zeigen die Studierenden, dass sie die theoretischen molekularen Grundlagen, die enzymatischen und chemischen Reaktionsmechanismen, sowie deren Modulation durch Therapeutika wiedergeben, erklären und bewerten können.

Die Aufgabenstellungen der Klausur beinhalten beispielsweise das Aufzeichnen chemischer Strukturformeln, die Darstellung chemischer und enzymatischer Reaktionen, das Erklären von Anwendungsbeispielen für die spezifischen Therapeutika zum Angriff von Biomolekülen oder auch das Erkennen möglicher, abgeleiteter wissenschaftlicher Anwendungen.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Grundkenntnisse auf Bachelor-Niveau in Biochemie.

Content:

Vermittlung von fortgeschrittenen Kenntnissen über molekulare Entstehungs- und Funktionsprozessen von Krankheiten. Inhalte sind u.a.:

- Überblick über Krankheitsbilder und deren auslösende, molekularen Mechanismen;

- Entstehung von Krankheitserregern, Strategien zur Medikamentenentwicklung;
- Proteasen als Zielmoleküle zur Entwicklung von Medikamenten;
- Wirkstoffdesign;
- Identifizierung von molekularen Zielmolekülen;
- Feinregulation der Immunantwort;
- Epigenetik;
- Molekulare Onkologie;
- Gentherapie.

Der Fokus liegt in allen Themenbereichen auf dem detaillierten Verständnis des molekularen, mechanistischen Zusammenspiels und der Interaktion und Dynamik von Wirkstoff und Zielmolekül.

Intended Learning Outcomes:

Nach der Teilnahme am Modul sind die Studierenden in der Lage, detailliert die molekularen Prozesse in der Entstehung und Therapie von ausgewählten Krankheitsbildern zu verstehen. Darüber hinaus sind sie in der Lage, aktuelle Forschungsergebnisse im Bereich der molekularen Medizin (z.B. Wirkstoffdesign gegen Proteasen, molekulare Prozesse von Gentherapeutischen Ansätzen oder epigenetische Veränderungen) zu verstehen, wiederzugeben und detailliert zu erklären. Die Studierenden können auch ihr erlerntes theoretische Verständnis und Fachwissen auf aktuelle Problemstellungen aus dem Bereich der molekularen Medizin übertragen und Forschungsergebnisse qualitativ interpretieren und bewerten.

Teaching and Learning Methods:

Das Modul wird als Vorlesung (2 SWS) mit begleitendem Seminar (1 SWS) abgehalten. Im Seminar werden Teile der angesprochenen Thematiken an konkreten Beispielen vertieft und diskutiert. Neben der Präsenzlehre steht insbesondere aber auch die weitere Vertiefung der Inhalte in der Literatur und die inhaltlichen Auseinandersetzung mit den aktuellen Themen der molekularen Medizin im Fokus.

In der Vorlesung und im Seminar werden die theoretische Grundlagen und Konzepte der molekularen Medizin durch Vortrag des Dozierenden vermittelt. Dabei unterstützen Tafelanschriften und PowerPoint-Präsentation die Darstellung von z.B. Wirkung von Therapeutika auf Proteasen, Prozessen der Gentherapie, etc., das Verständnis der Inhalte. Durch den Vortrag des Dozierenden ist ein stufenweiser Aufbau der Modulinhalt (Grundlagen zu weiterführenden Inhalten) möglich. Durch Fragen des Dozierenden an die Zuhörerschaft und Diskussion aktueller Beispiele soll das Wissen im begleitenden Seminar gefestigt werden.

Zusätzlich werden die Studierenden angeregt, eigenständig eine Vertiefung dieser aktuellen Beispiele mittels Recherche der Fachliteratur durchzuführen und durch inhaltliche Auseinandersetzung mit dieser ihr Verständnis der Konzepte der molekularen Medizin zu erweitern.

Media:

Präsentation, Tafelanschrift, Skript, wissenschaftliche Literatur.

Reading List:

Literaturhinweise erfolgen durch den Dozenten.

Responsible for Module:

Groll, Michael; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Molekulare Medizin, Seminar (CH0226b) (Seminar, 1 SWS)

Groll M, Huber E

Molekulare Medizin (CH0226a) (Vorlesung, 2 SWS)

Groll M, Huber E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CH4107: Inorganic Solid State and Organometallic Chemistry | Anorganische Festkörperchemie und Organometallchemie

Version of module description: Gültig ab winterterm 2017/18

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird schriftlich in Form einer 90 minütigen Klausur erbracht. Geprüft werden das Erkennen und Beschreiben typischer anorganischer Festkörperstrukturen, Festkörpersynthesen, Phasendiagramme und die Kenntnisse über Materialklassen sowie Synthesen, Strukturen und Reaktivitäten metallorganischer Stoffklassen. Die Antworten erfordern teils eigene Berechnungen und Formulierungen teils Ankreuzen von vorgegebenen Mehrfachantworten.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Inhalte der Vorlesungen: "Allgemeine und Anorganische Chemie", "Anorganische Molekülchemie"

Content:

Teil I: Einführung in die Anorganische Festkörper-Chemie: Basis-Strukturtypen und Beschreibungsprinzipien (Lückenfüllung, Polyederverknüpfung, Netzwerktopologie), Strukturen und Eigenschaften der metallischen Elemente, Verbindungsklassen und Strukturfamilien, Übergang ionisch-kovalent, Synthesemethoden und Reaktivität, Phasendiagramme, Grundlagen der Beugungsmethoden zur Strukturaufklärung.

Teil II: Einführung in die Metallorganische Molekülchemie: Donor/Akzeptor-Modell der Ligandeigenschaften und qualitative MO-theoretische Beschreibung der Bindungsverhältnisse, Isolobal-Prinzip; Systematik metallorganischer Stoffklassen nach Ligandtypen, Bindungs- und Koordinationsformen, beispielhafte Synthesen und Struktur/Bindungs-Reaktivitätsbeziehungen von Molekülen bzw. Komplexen mit M-H und M-C Bindungen unterschiedlicher Typen.

Intended Learning Outcomes:

Nach der Teilnahme am Modul verfügen die Studierenden über Grundlagenkenntnisse zur Anorganischen Festkörper- und Organometallchemie sowie über vertieftes Orientierungswissen bezüglich der Struktur- und Bindungsverhältnisse der jeweiligen Stoffgruppen. Sie sind in der Lage Synthesen zu planen und Reaktivitäten abzuschätzen sowie aufbauende Inhalte anhand weiterführender Fachliteratur selbständig zu erschließen und ihr Wissen in der experimentellen Laborpraxis kritisch reflektierend anzuwenden.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung (3 SWS) und einer begleitenden Übungsveranstaltung (1 SWS). Die Inhalte der Vorlesung werden in Vorträgen und Präsentationen vermittelt. Parallel sollen die Studierenden einschlägige Lehrbuchkapitel durcharbeiten, welche zur Vertiefung auch durch weitere Literatur ergänzt werden kann. In der Übung werden die Inhalte der Vorlesung beispielhaft vertieft und diskutiert, u. U. auch in interaktiver Form (z.B. Kurzvorträge der Studierenden).

Media:

Die in der Vorlesung verwendeten Medien setzen sich aus Präsentationen/Projektionen, Videos und Tafelaufschrieben zusammen. Die Übung dient der Anwendung und Vertiefung der in der Vorlesung erlernten Kenntnisse. Die Studierenden sollen zum selbstständigen Studium der Literatur und der inhaltlichen Auseinandersetzung mit den Themen angeregt werden.

Reading List:

Lehrbücher zu Teil I: U. Müller, Anorganische Strukturchemie, Teubner-Verlag, Wiesbaden; E. Riedel (Hrsgb), Moderne Anorganische Chemie, de Gruyter-Verlag, Berlin, 2003. A. West, Basic Solid State Chemistry, Jon Wiley&Sons, New York, 1984.

Lehrbücher zu Teil II: z.B. Elschenbroich, Christoph: Organometallchemie, Vieweg+Teubner; Bochmann, Manfred: Organometallics 1 und Organometallics 2, Oxford Scientific Publications. Ergänzend z. B. Hartwig, John F. (Hrsg.): Organotransitionmetal Chemistry - From Bonding to Catalysis, University Science Books; Fehlner, Thomas u. a.: Molecular Clusters - A Bridge To Solid State Chemistry, Cambridge University Press. Hartwig, John F. (Hrsg.): Organotransitionmetal Chemistry - From Bonding to Catalysis, University Science Books; Fehlner, Thomas u. a.: Molecular Clusters - A Bridge To Solid State Chemistry, Cambridge University Press.

Responsible for Module:

Fässler, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Anorganische Festkörperchemie und Organometallchemie (CH4107) (Vorlesung, 3 SWS)
Fässler T (Hlukhy V), Fischer R

Anorganische Festkörperchemie und Organometallchemie, Übung (CH4107) (Übung, 1 SWS)
Fässler T, Fischer R

For further information in this module, please click campus.tum.de or [here](#).

Electives from Electrical Engineering and Information Technology | Wahlfächer aus Elektro-/ Informationstechnik

Module Description

EI05551: Internet Communication | Internetkommunikation [INT]

Version of module description: Gültig ab summerterm 2017

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In a graded written exam (75 min) questions will be asked about basic principles and protocols etc. of Internet communication, which the students have to answer in a closed book fashion either with textual and/or graphical description or via calculations.

The students' acquired capabilities on practical design of communication protocols will be examined and graded via programming exercises. The students work on a concrete problem with respect to a communications application in the Internet in groups and demonstrate and present their results.

The final grade is composed of the following elements:

one exam consisting of two parts

- 60 % graded written final exam

- 40 % graded programming exercises

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic programming experience. In the programming exercises Python will be used.

Content:

Content

* Basic principles of communication networks

* Protocol layers and service models

- * Basic methods for network analysis (analytical performance analysis, simulation, prototyping)
- * Application Layer in the Internet (HTTP, FTP, P2P, Socket)
- * Transport Layer (TCP, UDP)
- * Network Layer (Routing, IP)
- * Link Layer and MAC (LAN, WLAN, MAC)
- * QoS mechanisms in the Internet (IntServ, DiffServ)

Intended Learning Outcomes:

After having taken this module successfully, a student is able to understand and apply the principles of the protocol-based communication in the Internet as well as to analyze Internet protocols and mechanisms.

Teaching and Learning Methods:

As learning method, in addition to the students individual methods, knowledge will be deepened through the solving of several exercises as part of the tutorial.

As a teaching method, in the lectures presentations will be given and in the tutorials exercises will be solved.

In addition, students acquire further knowledge based on reading scientific papers to train reading and understanding of scientific literature.

In the programming exercises (class project) students work independently on a solution (concept and programming) for a technical problem. The technical problem will be presented in the lecture/ tutorial and varies each semester.

Media:

The following media are used:

- Presentation
- Lecture notes
- Exercises with solutions for download
- selected scientific papers
- programming exercises

Reading List:

The following book is recommended:

- Kurose J. F., Ross W. K.: Computernetzwerke, Pearson Verlag

Responsible for Module:

Kellerer, Wolfgang; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI10003: Analog Electronics | Analog Electronics [AE]

Version of module description: Gültig ab summerterm 2018

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 100	Contact Hours: 50

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module will be assessed in a written final examination (90 min) after the teaching weeks. In this examination it is to verify that the candidates are able to understand the general principles of analog electronic circuits and to solve simple but relevant problems in the fields covered in this module in a limited time and without any resources. The examination will cover all parts of the lectures and exercises of this module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Subject matters as presented in the module "Principle of Electrotechnology"

Calculus; complex numbers and operations for ac signal analysis

Content:

Electronic signals

Circuit analysis (dc, ac)

Electrical characteristics of electronic devices

Electronic filters

Basics of semiconductor's physics

PN Junctions, pn diodes

Transistors

Basic Transistor circuits

Amplifiers

Intended Learning Outcomes:

After participating in the modules lectures and excercises, students are able to

- understand and apply the basic principles of analog electronic cicuits

- have acquired basic knowledge and understanding of some of the basic problem-solving methods of electronic circuits.

Teaching and Learning Methods:

Teaching methods in the lectures and exercises: frontal teaching with presentations and on the blackboard.

In solving relevant exercises a deeper knowledge of the subject matters of the lessons is sought.

Media:

The following media types are used in the lectures and exercises:

- Presentations (also for downloads on the Internet)
- Explanations and exemplifications on the black board
- Exercises are provided with the objective that the students first should solve the problems independent by themselves, the solutions to the problems will be demonstrated in subsequent exercise sessions, and subsequently will be made available also via download on the Internet.

Reading List:

Responsible for Module:

Schrag, Gabriele; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Electives from Information Technology and Electronics (advanced) | Wahlfächer aus Informationstechnik und Elektronik (advanced)

Module Description

EI73141: Brain, Mind and Cognition (Seminar) | Brain, Mind and Cognition (Seminar) [BMCSem]

Version of module description: Gültig ab winterterm 2016/17

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 105	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

At least 3 of 5 written homework tasks have to be handed in. With these and an active participation in the discussions students proof their understanding of literature (60%).

Students have to hand in a summarizing essay to proof their ability of interdisciplinary interrelations (40%).

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Sufficient English proficiency to comprehend literature and write essays.

Content:

Students read literature (up to 5 books) within the context of Brain, Mind, and Cognition and discuss in groups. The goal is to answer the question about how we learn from literature about the structure and function of Brain, Mind, and Cognition. Which inspiration can we get for technical tasks? A lecture accompanies the seminar with background knowledge about neuro- and cognition science in the context of cognitive robots.

Intended Learning Outcomes:

After successful completion of the module students have a broad and interdisciplinary access to the field of "Brain, Mind, and Cognition". They are able to understand and assess such concepts.

Based on literature students are able to identify scientific problems and device them.

Teaching and Learning Methods:

Students read the assigned literature within a given duration and write a statement about their individual understanding. A written guideline and a list of key questions supports the students.

During a contact hour students discuss the literature under the aspect of a given question.

Finally students qirte a summary of the discussion results and their own insights.

A lecture provides additional background knowledge.

Media:

Books and literature (patially in digital from as web download); lecture with PPTs

Reading List:

Literature is updated each semester and will be announced in www

Responsible for Module:

Diepold, Klaus; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Brain, Mind and Cognition (Seminar, 3 SWS)

Diepold K, Dötzer M, Lengl M

For further information in this module, please click campus.tum.de or [here](#).

Electives from Power Engineering (advanced) | Wahlfächer aus Energietechnik (advanced)

Module Description

EI7329: Energy Application Technology | Energieanwendungstechnik

Version of module description: Gültig ab summerterm 2017

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung wird in Form einer benoteten schriftlichen Klausur mit 60 Minuten Dauer erbracht. Zu dieser Klausur sind keine Hilfsmittel zugelassen.

Die Studierenden beantworten Verständnisfragen zu Grundlagen der Energieanwendung und der eingesetzten Technologien.

Anhand von Rechenaufgaben wird überprüft, inwieweit die Studierenden in der Lage sind, Effizienz und Energieeinsatz der vorgestellten Technologien zu analysieren und zu bewerten.

Rechenschritte müssen nachvollziehbar dargestellt sein.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

keine Voraussetzungen

Content:

Grundsätzliche Wege zur rationellen Energieanwendung. Gewinnung und Verarbeitung energetischer Daten. Betriebsverhalten, energetische Bilanzen und Kennzahlen von Anlagen und Maschinen. Grundlagen und Techniken der Anwendung im Bereich von Raumwärme, Klimatisierung, Prozesswärme und -kälte, Kraft, Verkehr, Licht und IKT.

Intended Learning Outcomes:

Der Studierende ist nach erfolgreichem Abschluss des Moduls in der Lage:

- Grundlagen der Energieanwendung zu verstehen und einen Überblick zu geben.
- Die Anwendungsarten in den einzelnen Verbrauchssektoren zu verstehen und zu erläutern.

- Die vorgestellten Anwendungstechnologien hinsichtlich Effizienz, Kummuliertem Energieaufwand und Treibhausgasemissionen zu analysieren und zu bewerten.

Teaching and Learning Methods:

Vorträge, Präsentationen und Tafelarbeit

Diskussion aktueller Literaturquellen

Vorlesung mit begleitenden Übungen, dabei werden Gruppenarbeiten angestrebt, zu vorgegebenen Aufgaben sollen Lösungen erarbeitet werden.

Media:

Folgende Medienformen finden Verwendung:

- Präsentation
- Tafelarbeit
- Übungsaufgaben mit Lösungen

Reading List:

M. Rudolph; U. Wagner: Energieanwendungstechnik. Wege und Techniken zur effizienteren Energienutzung. Springer Verlag

Responsible for Module:

Hamacher, Thomas; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energieanwendungstechnik (Vorlesung mit integrierten Übungen, 4 SWS)

Goebel C (Zinsmeister D), Tzscheutschler P

For further information in this module, please click campus.tum.de or [here](#).

Electives from Computer Engineering | Wahlfächer aus Computer Engineering

Module Description

CIT3230000: Advanced Concepts of Programming Languages | Advanced Concepts of Programming Languages

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments assess in how far students are able to reproduce the complex semantical behaviors of small example programs. Their knowledge and practical skills concerning programming constructs is further assessed by assignments, which ask to simulate programming language constructs of one kind by programming language constructs of another kind.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0001 Introduction to Informatics,
IN0002 Fundamentals of Programming (Exercises & Laboratory),
IN0003 Functional Programming and Verification,
at least one programming language

Content:

This is not a beginners programming course – Instead, this lecture focusses on the semantics of various programming language concepts, and their implementation from the point of view of a compiler engineer. Topics may include, among others:

- Relaxed Memory Models
- Wait-/Lock-free Programming
- Locks, Monitors & Condition Variables
- Transactional Memory

- Gotos, Co-Routines and Continuations
- Single/Multi-Dispatching
- (Multiple-) Inheritance
- Delegation and Prototype Based Programming
- Aspect Oriented Programming
- Meta programming

Intended Learning Outcomes:

After successful completion of this module, students are familiar with an assortment of programming language constructs from popular programming languages. They understand the semantics of these constructs as well as the implementation consequences, that they inflict on the implementation as well as the runtime behavior of compiler and runtime system. They are able to analyze and compare different language based approaches, to discuss their relative merits and potential workarounds in case certain language features are missing. By means of this knowledge, they are able to extend existing compilers to handle the aforementioned constructs as well as able to re-encode concepts from one language by means of another language.

Teaching and Learning Methods:

By means of pre-recorded lesson videos of around 15 minutes each, students can prepare the lecture content at their own pace. In the classroom, students can open discussion on unclear parts of the lesson videos. Additionally, illustrating examples and live programming enhance and deepen the student's insights into the topics. Selected problems that are then solved by the joined effort of the audience and the lecturer further illustrate the lessons with hands-on experiences.

In the additionally offered exercise course (2h), accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, train students to apply the learnt concepts in implementations and develop the skill to simulate the effect of missing language features by others.

Media:

Pre-recorded lesson videos, in-class programming experiments, quizzes, collaborative shared whiteboard, programming assignments

Reading List:

Selected literature of the area and appropriate conference or journal papers

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Concepts of Programming Languages (CIT3230000) (Vorlesung, 3 SWS)

Seidl H [L], Petter M

Exercise - Advanced Concepts of Programming Languages (CIT3230000) (Übung, 2 SWS)

Tilscher S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

CIT5230000: Introduction to Programming | Introduction to Programming

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 12	Total Hours: 360	Self-study Hours: 240	Contact Hours: 120

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

2-4 weekly programming tasks will be posed as homework and graded. Participants must solve and hand in these in electronic form. This ensures, that participants can program in the small by means of an object-oriented programming language such as Java, that they have understood fundamental concepts of programming, and are able to apply these to provide original solutions or programs. To identify the individual contributions of the participants, they must be able to defend their solutions interactively.

The test takes the form of 120 minutes computer-based test. Questions allow to assess acquaintance with concepts of programming, small programming tasks assess the ability to conceive appropriate algorithmic solutions and realize applications.

Homework and test are both equally weighed 50%.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

- Introduction
- Basic notions: Problem – algorithm – program
- Imperative programming constructs
- Object-oriented programming
- Objects, classes, methods
- Inheritance, abstract classes, and interfaces

- Polymorphism
- Generics
- Functional programming
- Iterators and collections
- Lambda expressions and streams
- Data structures
- Numbers, strings, arrays
- Lists, stacks, queues, trees
- Recursion
- Binary search
- Patterns of recursion
- Syntax and semantics
- Syntax of programming languages: regular expressions and context-free grammars
- Semantics of programs: control-flow graphs
- Programming in the large (perspectives)
- Graphical user interfaces
- Concurrency and Threads

Intended Learning Outcomes:

Upon successful completion of the module, participants understand the essential concepts of computer science on a basic, practical, but scientific level. Participants can solve manageable algorithmic problems and implement basic applications in Java or a similar object-oriented language on their own. They understand the underlying concepts and models and are therefore able to acquire skills in other object-oriented programming languages on their own.

Teaching and Learning Methods:

By means of a slide presentation with animations, the interactive lecture introduces the basic concepts and methods of programming and explains them using examples. Small exercises, e.g., quizzes and programming tasks, with individual feedback help students to identify whether they have understood the basic concepts and methods.

Accompanying tutor groups deepen the understanding of fundamental concepts explained in the lecture by means of suitable group exercises: participants develop small sample applications under guidance to develop their programming skills in an object-oriented programming language.

Homework exercises assess whether the students understand the learned concepts. The presentation of the own solution in the accompanying tutor group improves communication skills, which are essential in computer science. Individual feedback on homework allows students to measure learning progress and improve their skills.

Media:

Lecture with digital slides, livestream, online exercises (programming, quiz) with individual feedback, communication platform for the exchange between instructors, tutors, and students

Reading List:

Deitel, Harvey / Deitel, Paul: Java How to Program, Early Objects, Pearson, 11th edition, 2017

Evans, Ben / Flanagan, David: Java in a Nutshell O'Reilly, 7th edition, 2018

Sedgewick, Robert / Wayne, Kevin: Computer science: An interdisciplinary approach, Addison-Wesley, 2016

Sedgewick, Robert / Wayne, Kevin: Introduction to programming in Java: an interdisciplinary approach, Addison-Wesley, 2017

Responsible for Module:

Krusche, Stephan; Prof. Dr. rer. nat. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Introduction to Programming (CIT5230000) (Vorlesung mit integrierten Übungen, 8 SWS)

Krusche S [L], Krusche S, Milusheva S, Paulsen M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

EI04024: Python for Engineering Data Analysis - From Machine Learning to Visualization | Python for Engineering Data Analysis - From Machine Learning to Visualization [PyEDA]

Version of module description: Gültig ab summerterm 2022

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 75	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination consists of two parts:

- Homework [2/3 of final grade].
- Final project [1/3 of final grade].

Students may work in groups of two.

Periodical homework assignments (10 in total) are used to assess if students understood the learned methods and are able to apply them to simple problems.

The final project is used to assess if students are able to apply a larger subset of the learned methods in the context of a self-posed research task. The project will be documented in a report (~4 pages). The report should introduce the chosen problem setting, describe the used methods, and explain the results, assisted by clear figures in publication quality. The final project must be passed, in order to pass the module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic knowledge in data structures and programming.

- IN8009: Algorithms and Data Structures
- EI00110: Computer Technology and Programming

Content:

With the success of data-driven business models often built around machine learning (ML) and artificial intelligence (AI), data science and modeling have been pushed into the focal point of

various disciplines, reaching from factory automation through business analytics to materials science.

Today, data science paradigms are introduced as "the new way to do things" in all scientific and engineering domains. Unfortunately, often the sizable heritage of the "new" methods in engineering (see Forrester et al., 2008) is overlooked and new methods are applied uncritically.

This module aims to introduce the Python programming language as a tool for engineers and scientists to perform data analysis tasks typically arising in a lab (e.g., data cleaning, computing statistical measures, data visualization, and linear modeling). In addition, the relation between simple, statistical modeling and machine learning methods and their inherent capabilities and limits will be discussed.

The content is organized in five parts:

- Introduction to the Python programming language.
- Accessing data - interacting with lab equipment, text files, or databases.
- Data visualization - do's and don't's.
- Data modeling - simple, statistical techniques to create a data model.
- Introduction to machine learning methods.

Intended Learning Outcomes:

After successful completion of the module, students are able to

- solve algorithmic problems in Python.
- perform basic data analysis and statistics tasks on datasets.
- use the available python tools for 2D and 3D data visualization.
- understand various methods to model data (e.g., linear regression, neural networks).
- remember the capabilities and limits of these methods.

Teaching and Learning Methods:

The module consists of weekly tutorials. The theoretical foundations will be presented by a teacher in short lectures, supported by electronic presentations. After that, the students will learn the practical application by solving exercises and homework. Students may work in groups of two. The teacher is available for Q&A and provides help on implementation tasks.

In a final project, the students learn to apply a larger subset of the learned methods in the context of a self-posed research task.

Media:

The materials will be provided on moodle:

- Presentations
- Exercise sheets
- Access to computers/servers with preinstalled Python environment

Reading List:

- Python 3 documentation [<https://docs.python.org>]
- A. Sweigart: "Automate the Boring Stuff with Python" [<https://automatetheboringstuff.com>]

- A.I.J. Forrester et al.: "Engineering Design via Surrogate Modelling: A Practical Guide", John Wiley & Sons, 2008 [<https://onlinelibrary.wiley.com/doi/book/10.1002/9780470770801>]

Responsible for Module:

Gagliardi, Alessio; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Python for Engineering Data Analysis - From Machine Learning to Visualization (Praktikum, 5 SWS)

Gagliardi A [L], Mayr F

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN8029: Informatics Bachelor Practical Courses for Management | Informatik Bachelor-Praktika für Management

Version of module description: Gültig ab winterterm 2019/20

Module Level: Bachelor	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 10	Total Hours: 300	Self-study Hours: 210	Contact Hours: 90

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type of assessment: project work

The participants in teams will handle different phases of a software project. Individual teams may deal with only one or more selected phases of the project. By their work, the participants demonstrate that they can deal with a given project contract or subcontract within a given time and using appropriate tools in teams. During design and implementation, they demonstrate that they are able to apply methods and models of engineering. They can assess the risks and problems in the various phases of a software project and are able to deal with these difficulties. A written report is prepared and possibly presented orally in order to evaluate the communicative competence in documentation and presentation of results.

Oral presentations last from 10 to 20 minutes.

Written elaborations may vary in size, but should not exceed 10 pages.

The evaluation of the artefacts created, the evaluation of the cooperation in the teams as well as the written or oral presentations of the results flow into the grading.

This practical course is offered by several lecturers with different didactic concepts.

Before the start of the practical course the respective lecturer will announced which components are to be developed and how the individual components are weighted in the calculation of the module grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

IN0006 Introduction to Software Engineering, IN0008 Fundamentals of Databases, IN0009 Basic Principles: Operating Systems and System Software, IN0010 Introduction to computer networking and distributed systems, basic programming skills

Content:

- Implementation of a software project or subproject in teams
- Methods and models of engineering for software development in various areas of informatics
- Techniques for documentation and presentation of results or intermediate results in software development

This module is offered by different chairs. The chairs select the topic for the projects based on their research and education preferences (e.g., databases, information systems, networks, groupware, graphics, robotics, image recognition).

Intended Learning Outcomes:

Participants are able to design and implement small software systems in a team. They know how to apply engineering methods and models from different areas of informatics in order to realize the various phases of the project. They can judge the risks and typical problems encountered in software projects and know methods to cope with these. They are able to report about their project work in written as well as oral form.

Teaching and Learning Methods:

Participants exercise systematic software engineering for a small system in small teams with a precise task description with tight time constraints (design, implementation, test). Intermediate results of the team work have to be presented. Design, project plans and implementation have to be documented.

Media:

Beamer, slides, whiteboard, platform for collaborative work, software development environment

Reading List:

Dedicated literature according to the topic

Responsible for Module:

Neumann, Thomas; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

Praktikum - iPraktikum, iOS Praktikum (IN0012, IN2106, IN2175, IN2128, IN4049) (Praktikum, 6 SWS)

Krusche S [L], Krusche S, Linhuber M

Praktikum - Internet-Praktikum - iLabX (IN0012, IN2106, IN4240) (Praktikum, 6 SWS)

Pahl M [L], Carle G, Holzinger K, Stubbe H, Wüstrich L, Kirdan E, Gallenmüller S, Lübben C, Schwarzenberg C, Simon M

Bachelor-Praktikum - IT-basiertes Lernen gestalten (IN0012, IN4138) (Praktikum, 6 SWS)

Wittges H [L], Utesch M, Faizan N, Wittges H

For further information in this module, please click campus.tum.de or [here](#).

Electives from Computer Engineering (advanced) | Wahlfächer aus Computer Engineering (advanced)

Module Description

EI0636: Nanoelectronics | Nanoelectronics [NEL]

Version of module description: Gültig ab summerterm 2022

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 75	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination consists of two parts:

- A written exam [2/3 of final grade].
- A group work with oral presentation [1/3 of final grade].

The written exam is 60 minutes long and must be passed in order to pass the module. There are no books or notes allowed during the exam. The first half of the exam is made of theoretical questions to check if the students understood the discussed architectures and effects. The second half of the exam is made of exercises to check if students are able to apply the learned methods to solve problems.

In the group work (2-4 students), the students apply numerical simulations for a specific device architecture and vary some design parameters. The simulation results will be explained and discussed in a 15 minutes long presentation.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic physical concepts of semiconductor materials and devices.

- PH9009: Physics for Electrical Engineering
- EI00320: Solid State, Semiconductor and Device Physics

Content:

This module is focused on giving a comprehensive introduction on different material systems and device architectures at the nano-scale (below 100 nm in size), where both classical and quantum size effects are relevant.

The content is organized in four parts:

- Introduction on quantum physics and semiconductor materials.
- Working principles of state of the art electronic devices (MOSFETs).
- Introduction on novel device architectures, exploiting quantum effects (RTDs, SETs).
- Introduction of novel semiconductor materials: Carbon nanotubes (CNTs) and organic semiconductors.

Intended Learning Outcomes:

After successful completion of the module, students are able to

- apply basic concepts of quantum physics to solve simple problems.
- understand the architecture and functioning of MOSFETs.
- explain how quantum effects (confinement, tunneling) are used in novel nano-structured devices.
- understand the basic physics and chemistry of carbon nanotubes (CNTs) and organic semiconductors.
- identify and present the working principles of novel, nano-structured, (opto-)electronic devices (e.g., OLEDs, OPVs).

Teaching and Learning Methods:

The module consists of weekly lectures and tutorials.

In the lectures, the module contents will be presented by a teacher followed by discussions with the students. Lectures are supported by electronic presentations.

During the tutorials, students will learn to apply the theoretical knowledge on practical problems by solving weekly exercise sheets.

In addition, the students will learn to use numeric programs to simulate more complex device architectures and present the results.

Media:

The materials will be provided on moodle:

- Presentations
- Lecture notes
- Exercise sheets
- Access to numerical simulation tools

Reading List:

- R. Waser: "Nanoelectronics and Information Technology - Advanced Electronic Materials and Novel Devices", John Wiley & Sons, 2012
- S.R. Forrest: "Organic Electronics - Foundations to Applications", Oxford University Press, 2020
- S.M. Sze, K.K. Ng: "Physics of Semiconductor Devices", John Wiley & Sons, 2006 [<https://doi.org/10.1002/0470068329>]

Responsible for Module:

Gagliardi, Alessio; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2040: Virtual Machines | Virtuelle Maschinen

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment is by means of a written exam of 90 minutes. Individual assignments ask to apply the learnt translation schemes to small example programs. By that, the exam assesses how well the student is acquainted with various programming constructs and whether she or he is able to translate these into machine code. Further assignments reflect on the concept of virtual machines itself by proposing extra language concepts for which translation schemes should be provided. The successful completion of homework assignments may contribute to the grade as a bonus. The exact details for this are announced timely at the begin of the lecture.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

At least rudimentary knowledge of different programming languages.

Content:

While trying to produce code for a programming language like Prolog, one quickly realizes that one would like to use certain instructions during the translation which are not already available on concrete machines. On the other hand, instruction sets of modern computers are changing so quickly that it doesn't seem useful for the compiler to depend on some arbitrarily chosen instructions. Such a dependance would mean that in a few years one would feel obliged to rewrite the compiler anew.

With the implementation of the first Pascal compilers, one already arrived at the idea of first generating code for a slightly idealized machine, each of whose instructions then only need to be implemented on different target machines. Translation of modern programming languages like Prolog, Haskell or Java are also based on this principle. On one hand this facilitates portability of the compiler. On the other hand this also simplifies the translation itself since one can choose a

suitable instruction set according to the programming language to be translated. In particular, we consider:

- the translation of C;
- the translation of a functional language;
- the translation of Prolog;
- the translation of a concurrent dialect of C.

Intended Learning Outcomes:

Participants are acquainted with virtual machines for imperative, functional, logical and object-oriented programming languages. They know the principles by which various programming language concepts are translated into sequences of machine code. For sections of programs, they are able to generate code of some virtual machine, and they are able to apply the learnt principles to provide new translation schemes for given language constructs on their own.

Teaching and Learning Methods:

By means of a presentation, either by slides or whiteboard, the lecture presents schemata for the translation of various language constructs and illustrates these by means of small examples. Accompanying assignments for individual study deepen the understanding of the concepts explained in the lecture, and train students to apply the learnt schemata for the translation and to develop new schemata for selected language constructs.

Media:

Slide show, blackboard, possibly online programming and/or animations

Reading List:

Seidl, wilhelm: Compiler Design. Virtual Machines. Springer, 2010

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2101: Network Security | Netzsicherheit

Version of module description: Gültig ab winterterm 2011/12

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination will take the form of a 75-minute examination.

Questions of comprehension and arithmetic tasks check the familiarity with the technologies and methods of cryptographic procedures and protocols and mechanisms for network security covered in the module.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

IN0009 Basic Principles: Operating Systems and System Software, IN0010 Introduction to computer networking and distributed systems

Content:

The course provides an introduction to the field of network security. Starting with possible threats and attack scenarios, requirements for providing specific security services are derived. After introducing the basic concepts of security mechanisms, the integration of security mechanisms into network architectures and network protocols are discussed. Security vulnerabilities of existing network architectures are also discussed.

As a basis for the realization of security mechanisms, cryptographic algorithms (in particular symmetric cryptography, public key cryptography and cryptographic hash functions) are presented. Afterwards, the basics and methods for security protocols for authentication, authorization, access control, message integrity, confidentiality and non-repudiation are discussed. Subsequent sections present specific security mechanisms, in particular of the TCP/IP protocol family. The standard examples include PKI, Kerberos, IPSec, and TLS, Firewall-architectures and Intrusion Detection Systems.

Intended Learning Outcomes:

Participants understand security goals for the Internet and the components in which communication protocols are implemented. They understand the possibilities available to attackers in the network. They understand the protection offered by cryptographic and network security mechanisms, and have the knowledge to apply network security protocols and implement architectures that can achieve specific security goals.

Teaching and Learning Methods:

Lecture for content transfer, as well as tasks for self-study in order to deepen the subject, as well as programming challenges to test and apply the learned knowledge.

Media:

Lecture slides, whiteboard, exercise sheets, demos

Reading List:

- R. Bless, S. Mink, E.-O. Blaß, M. Conrad, H.-J. Hof, K. Kutzner, M. Schöller: "Sichere Netzerkcommunication", Springer, 2005, ISBN: 3-540-21845-9
- Niels Ferguson, B. Schneier: "Practical Cryptography", Wiley, 1st edition, March 2003.
- G. Schäfer. Netzsicherheit ? Algorithmische Grundlagen und Protokolle. Soft cover, 422 pages, dpunkt.verlag, 2003.

Additional references to articles and other resources are given in the slides.

Responsible for Module:

Carle, Georg; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Netzsicherheit (IN2101) (Vorlesung mit integrierten Übungen, 4 SWS)

Carle G [L], Carle G, Kinkelin H, von Seck R, Rezabek F, Aulbach J, Sattler P, Steger L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2105: Business Process Technologies and Management | Geschäftsprozesstechnologien und -management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written 90 minutes exam. The exam shall ensure that students understand and can apply terminology, challenges, and concepts of business process technologies. To reflect the understanding as well as the practical application, the examination comprises a question-oriented and an application-oriented part. The latter is based on the topics addressed by the exercises such as process mining algorithms and modeling of process choreographies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Bachelor

IN0021 Introduction to Information Systems

Content:

The course focuses on advanced aspects of business process management and business process technologies. Starting from the process-oriented development of applications the following topics are discussed:

- Management of resources and work lists
- Logging and monitoring of business process instances
- Introduction to process mining
- Business process compliance
- Runtime adaptations of business process instances and business process evolution
- Modeling and correctness aspects of process choreographies

Intended Learning Outcomes:

After successful completion of the module students are familiar with the different perspectives of business processes, i.e., control flow, data flow, and resources. Students can model these perspectives and implement them within a process-oriented application. The students understand how business process are monitored during runtime and how execution data (i.e., event-based data) is logged during process execution. Based on the logged process data, the students can apply basic process mining algorithms and interpret the results. Moreover, students are familiar with correctness and compliance notions for business processes. The students understand which and how side effects of changes and adaptations of running business process instances arise and can be controlled. Finally, students are able to model partner-spanning processes (so called process choreographies).

Teaching and Learning Methods:

The teaching format features a lecture and a content-aligned tutorial. The lecturer present the content of the lecture. In addition, videos of the lecture content are provided on the website of the lecture. The videos serve as means to repeat and deepen the presented contents. Moreover, the videos can be used for in a „flipped-classroom“ mode. The lecture content consists of the theoretical background of process-oriented technologies and business process management as well as their illustration based on practical examples from real-world applications and projects. The intention is to enable students to understand and assess process-oriented problems in a conceptual way as well as in an application context. The tutorial consists of deepening exercises on the theoretical parts of the lecture and of implementation exercises. The exercises are worked on in single person. The tutorial aims at enabling students in understanding and applying the concepts. Moreover, an overview on existing tools should be provided to students. Through the implementation exercises the students understand the paradigm of process-oriented application development and its application in practice.

Media:

Slides, videos, exercises, discussion

Reading List:

- M. Weske: Business Process Management - Concepts, Languages, Architectures, Third Edition. Springer 2019, ISBN 978-3-662-59431-5
- W. Grossmann, S. Rinderle-Ma: Fundamentals of Business Intelligence. Data-Centric Systems and Applications, Springer 2015, ISBN 978-3-662-46530-1
- M. Reichert, B. Weber: Enabling Flexibility in Process-Aware Information Systems - Challenges, Methods, Technologies. Springer 2012, ISBN 978-3-642-30408-8
- Wil M. P. van der Aalst: Process Mining - Data Science in Action, Second Edition. Springer 2016, ISBN 978-3-662-49850-7
- Zusätzlich wird am Ende jeder Vorlesung relevante Literatur zur Verfügung gestellt.

Responsible for Module:

Rinderle-Ma, Stefanie; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2359: Blockchain-based Systems Engineering | Blockchain-based Systems Engineering

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type: Written exam

The assessment is by means of a written exam of 90 minutes. Students are required to be able to answer questions regarding the contents of the lecture without further aids. Answering the questions requires partly own formulations, partly own calculations.

Amount of Work:

Comprehensive knowledge about the contents of the lecture and the exercises has to be gained. The completion of voluntary homework assignments is recommended for the successful passing.

Repeat Examination:

(Recommended) Prerequisites:

- IN0002: Fundamentals of Programming
- IN0006: Introduction to Software Engineering
- IN0009: Basic Principles: Operating Systems and System Software

Content:

Blockchain technology and, in general, distributed ledger technology (DLT) provide the technical foundation for the development and usage of innovative, decentralized distributed systems. In this lecture, we analyze the characteristics of these technologies. Additionally, students should be empowered to analyze and develop Blockchain-based solutions. Following contents are going to be covered:

- Cryptographic basics
- Peer to peer-networks
- Data structure and setup of Blockchain
- Consensus mechanisms

- Smart contracts & smart contract Engineering
- Use cases of digital ledger technologies
- Alternative DLT approaches
- Risks, challenges, and limitations of the technology
- Trends and developments in Blockchain

Intended Learning Outcomes:

After the successful participation in this module, the students are able to analyze Blockchain-based application systems. Further, they are able to create these systems for given use cases and to select appropriate technology. They understand the technological foundations such that they are enabled to comprehend and assess alternative distributed ledger technologies.

Teaching and Learning Methods:

Lecture, central exercise

Media:

Presentation with digital slides

Reading List:

Narayanan, A., Bonneau, J., Felten, E., Miller, A., & Goldfeder, S. (2016). Bitcoin and Cryptocurrency Technologies: A Comprehensive Introduction. Princeton University Press

Responsible for Module:

Matthes, Florian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN2406: Fundamentals of Artificial Intelligence | Fundamentals of Artificial Intelligence

Version of module description: Gültig ab winterterm 2022/23

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 105	Contact Hours: 75

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Written exam at the end of the semester lasting 90min. The questions will cover most of the learned material and are typically shorter than the problems solved in the exercise, but similar in difficulty.

As an incentive to create artificial intelligence oneself, we provide programming challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Previous attendance of

- IN0007 Fundamentals of Algorithms and Data Structures
- IN0015 Discrete Structures
- IN0018 Discrete Probability Theory

is beneficial. However, all content is taught from ground up and the listed lectures are not essential. Students who have not attended these lectures will have to invest additional time.

Content:

- Task environments and the structure of intelligent agents.
- Solving problems by searching: breadth-first search, uniform-cost search, depth-first search, depth-limited search, iterative deepening search, greedy best-first search, A* search.
- Constraint satisfaction problems: defining constraint satisfaction problems, backtracking search for constraint satisfaction problems, heuristics for backtracking search, interleaving search and inference, the structure of constraint satisfaction problems.

- Logical agents: propositional logic, propositional theorem proving, syntax and semantics of first-order logic, using first-order logic, knowledge engineering in first-order logic, reducing first-order inference to propositional inference, unification and lifting, forward chaining, backward chaining, resolution.
- Bayesian networks: acting under uncertainty, basics of probability theory, Bayesian networks, inference in Bayesian networks, approximate inference in Bayesian networks.
- Hidden Markov models: time and uncertainty, inference in hidden Markov models (filtering, prediction, smoothing, most likely explanation), approximate inference in hidden Markov models.
- Rational decisions: introduction to utility theory, utility functions, decision networks, the value of information, Markov decision processes, value iteration, policy iteration, partially observable Markov decision processes.
- Learning: types of learning, supervised learning, learning decision trees, reinforcement learning.
- Introduction to robotics: robot hardware, robotic perception, path planning, planning uncertain movements, control of movements, application domains.

Intended Learning Outcomes:

After attending the module, you are able to create artificial intelligence on a basic level using search techniques, logics, probability theory and decision theory. Your learned abilities will be the foundation for more advanced topics in artificial intelligence. In particular, you will acquire the following skills:

- You can analyze problems of artificial intelligence and judge how difficult it is to solve them.
- You can recall the basic concepts of intelligent agents and know possible task environments.
- You can formalize, apply, and understand search problems.
- You understand the difference between constraint satisfaction and classical search problems as well as apply and evaluate various constraint satisfaction approaches.
- You can critically assess the advantages and disadvantages of logics in artificial intelligence.
- You can formalize problems using propositional and first-order logic.
- You can apply automatic reasoning techniques in propositional and first-order logic.
- You understand the advantages and disadvantages of probabilistic and logic-based reasoning.
- You can apply and critically assess methods for probabilistic reasoning with Bayesian networks and Hidden Markov Models.
- You understand and know how to compute rational decisions.
- You have a basic understanding on how a machine learns.
- You know the basic areas and concepts in robotics.

Teaching and Learning Methods:

The module consists of a lecture and exercise classes. The content of the lecture is presented via slides, which are completed during the lecture using the blackboard and/or an electronic writing pad. Students are encouraged to additionally study the relevant literature. In the exercise classes, the learned content is applied to practical examples to consolidate the content of the lecture. Students should ideally have tried to solve the problems before they attend the exercise. To encourage more participation, students are regularly asked questions or encouraged to participate in online polls. As an incentive to create artificial intelligence oneself, we provide programming

challenges: if students solve a required number of programming challenges, they obtain a 0.3 grade bonus for their exam.

Media:

Slides, blackboard, electronic writing pad, exercise sheets;

Reading List:

- P. Norvig and S. Russell: Artificial Intelligence: A Modern Approach, Prentice Hall, 4th edition. (English version)
- P. Norvig and S. Russell: Künstliche Intelligenz: Ein moderner Ansatz, Pearson Studium, 4. Auflage. (German version)
- W. Ertel: Grundkurs Künstliche Intelligenz: Eine praxisorientierte Einführung, Springer, 4. Auflage.
- P. Zöller-Greer: Künstliche Intelligenz: Grundlagen und Anwendungen, composia, 2. Auflage.
- D. L. Poole and A. K. Mackworth: Artificial Intelligence: Foundations of Computational Agents, Cambridge University Press.
- P. C. Jackson Jr: Introduction to Artificial Intelligence, Dover Publications.

Responsible for Module:

Althoff, Matthias; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

Fundamentals of Artificial Intelligence (IN2406) (Vorlesung mit integrierten Übungen, 5 SWS)

Althoff M [L], Althoff M, Gaßner J, Kulmburg A, Meyer E, Würsching G

For further information in this module, please click campus.tum.de or [here](#).

Electives from Industrial Engineering | Wahlfächer aus Industrial Engineering

Module Description

BGU56058: Travel Behavior and Environmental Impacts | Verkehrsverhalten und Umweltauswirkungen [TBEI]

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module examination is a written, closed book test with the duration of 120 minutes. In the exam, the students demonstrate - without aids and under time constraints that they know the most important environmental effects of transportation, can classify emissions in a transportation context, understand their production mechanisms, their local and global impact and know standards for their measurement and limitation. They also demonstrate that they understand the contribution of transportation in global challenges, such as climate change and the exploitation of resources and can critically analyse different transportation solutions that aim into tackling those problems. Furthermore, they demonstrate that they understand the foundations of descriptions of transportation data. Based on practical tasks, they demonstrate that they understand fundamental travel behavior theories and are able to apply them to transport problems. Finally, students show that they know how to apply basic rules of multiple regression analyses and logit model estimation.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic competences in transportation planning, e.g. BV000029 "Traffic Engineering and Transport Planning Basic Module" or comparable bachelor level modules

Content:

The module covers the following topics:

-- Transport and Air Pollution

- Vehicle Emissions Standards
- Noise
- Consumption of energy
- Climate change
- Sustainable transport
- Travel behavior theory
- Transportation data description
- Statistical learning to describe transportation data
- Linear regression to explain travel behavior
- Logit models to explain travel behavior
- Land use/transport interactions

Intended Learning Outcomes:

After the completion of the module, students are able to:

- know the main environmental effects of traffic
- know the main traffic related emissions, their sources and their health impacts
- understand the common emission standards for vehicles and their measurement
- understand the relation of sound and noise as well as the health impact of noise
- understand the cause and impact of global climate change
- know definitions and measures for a sustainable transport system
- know and describe fundamental theories of travel behaviour
- describe the interactions of land use and transport systems
- know the guidelines for estimation of regression and logit models
- apply independently regression and logit models to explain travel behavior.

Teaching and Learning Methods:

The module consists of lectures and discussions. During the lectures, the theoretical background is presented through presentations and PowerPoint slides. Current debates and developments are topics for interactive discussions. For special topics, there will be also used group games and interactions. Furthermore, exercise in R will be handed out to statistically explore travel behavior in household travel surveys.

Media:

PowerPoint presentation, open discussions, small group assignments, exercises in R

Reading List:

Edwards-Jones, G.; Davies, B.; Hussain, S. [2000]: Ecological Economics - An Introduction. Blackwell Science, Oxford.

Hensher, D.; Rose J. M. and W. H. Green [2015]: Applied Choice Analysis. University Press, Cambridge.

Schönfelder, S.; Axhausen, K.W. [2010]: Urban Rhythms and Travel Behaviour: Spatial and Temporal Phenomena of Daily Travel. Ashgate, Farnham.

Responsible for Module:

Dr.-Ing. Antonios Tsakareostos

Courses (Type of course, Weekly hours per semester), Instructor:

Verkehr und Umwelt (Vorlesung, 2 SWS)

Bogenberger K [L], Tsakareostos A (Bachmann F, Dandl F, Dumler K, Ilic M)

Verkehrsverhalten (Vorlesung, 3 SWS)

Moeckel R [L], Moeckel R

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU68007: Applied Transport Modeling | Angewandte Verkehrsmodellierung [Applied transport modeling]

Version of module description: Gültig ab summerterm 2017

Module Level:	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for the module is in the form of a take-home assignment.

The aim of the exam is to demonstrate that the students understood modeling concepts and methods, and that they can develop a travel demand model, use models to assess the impacts of proposed developments, and describe modeling procedures and results in a documentation. The nature of the exam ensures that students are able to independently use the VISUM software in applying the four-step modeling techniques.

Each student submits an Excel file showing the calculations done on the input data, a Visum version file showing the model output, and a written report detailing the modeling procedures and results.

Repeat Examination:

(Recommended) Prerequisites:

Transport Planning Models (240744419) by Gebhard Wulfhorst and Chenyi Ji

Content:

This module introduces students to the practical application of transport modeling concepts using the VISUM transport modeling software. Topics covered include:

- Conduct of household travel survey and data processing
- Processing of transport network data
- Trip generation modeling

- Trip distribution modeling
- Mode choice modeling
- Traffic assignment modeling
- Scenario management
- Extension of modeling software capabilities with scripts

Intended Learning Outcomes:

Upon completion of the course, students are able to use the VISUM software to model travel demand in order to reconstruct existing traffic conditions in an area and assess the effects of future developments and planned traffic measures. Specifically, they are able to...

- understand modeling concepts and methods
- develop a travel demand model
- use models to assess the impacts of proposed developments
- describe modeling procedures and results in a documentation

Teaching and Learning Methods:

A hands-on computer training approach where students complete real-world tasks with the support of the tutor(s). The tasks mimic the modeling process and subsequent tasks build upon previous tasks such that by the end of the final task, each student would have developed a complete travel demand model from scratch using the VISUM software.

For each task, an introduction is given in the form of a short lecture to help students understand the modeling concepts and methods. After the introductory lecture, students use the VISUM Software and put the theory into practice in order to deepen the knowledge that has been learned during the lectures. Here, the capabilities of the VISUM software for each modeling task are learned.

Media:

- PowerPoint Presentations
- PTV VISUM Transport modeling software
- Microsoft Excel and Access

Reading List:

- Ortúzar, J. de D., and Willumsen, L. G. (2011). Modelling Transport (4th ed.). Chichester: John Wiley & Sons.
- Cambridge Sytematics Inc. (2010). Travel Model Validation and Reasonableness Checking Manual Second Edition.
- PTV AG (2016). PTV VISUM 16 Manual.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Applied Transport Modeling with VISUM

Matthew Okrah

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU68011: Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments | Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]

Version of module description: Gültig ab winterterm 2019/20

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 45	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

One report must be submitted at the end of the semester (80%). Students need to show that they understood the range of mobility concepts that could be implemented at a mixed-use residential development and develop one from the perspective of one stakeholder (real estate developer, mobility service provider, resident, etc.). Special focus will be given to shared mobility services as a complement of public transport and non-motorized modes. Students must demonstrate that they are able to discuss different case-based perspectives on integrated mobility planning and mixed-use residential development and apply them to actual new real estate development projects. The written report will be complemented by a short 10-minute presentation (20%), through which the student will demonstrate their ability to present their main findings and communicate to an audience in the form of a mock client pitch.

The final grade is composed of the grade of the report (80%) and the presentation (20%).

Repeat Examination:

(Recommended) Prerequisites:

Transport Sociology and Psychology (Course number 240834759)

Content:

The aim of this course is to introduce students to mobility concepts that could be required in mixed-use residential developments.

The first half of this course aims to provide students with an overview and critical discussion of current and future urban and district planning best practice and the relevance of transport and mobility planning for district developments and building structures. The initial sessions will

introduce the students to how to quantify and qualify user types and user demands through urban and socio/cultural-demographic analysis as well as trip assessments. Basic principles of user centered design, user mapping, formal and informal mobility mapping will be presented. The module offers the theoretical basis and tools for the development and realization of new approaches and methods towards integrated urban planning. Real case studies will be presented and discussed. The case studies will be selected from international research literature. The discussion will cover the perspectives of different stakeholders (real-estate developer, mobility service provider, resident, city urban planners, etc.).

In the second half of the course, the focus turns on the students, who will apply the gained knowledge to design integrated mobility service solutions. Through cost estimates, analysis of the specific regulatory and stakeholder framework and basic business modeling, the students learn how to conceptualize operative models and specify integrated service packages that add value to the end user and also the real estate developer. This is usually achieved through space gains (less parking) and financial gains (less car dependency).

Intended Learning Outcomes:

After completion of the course, the students understand the methodological basis for the development of mobility concepts for mixed-use residential developments. The students will apply familiar and new interdisciplinary assessment tools and methods from transport planning to problem solving and business modelling in urban planning.

The aim of this course enable the students to design with the principals of transport planning and create integrated, user centered mobility solutions. Students will learn the skill sets necessary to consult potential clients on the benefits of shared mobility solutions, economic implications and operative risks.

Teaching and Learning Methods:

The course is based around weekly interactive seminars. The course will apply different teaching methods from traditional lectures to discussions, group work, desktop research, in-class exercises, and presentation skill training. Students are expected to come prepared and engage actively throughout the semester.

In the first half, the lecturer will present the students literature and case studies, followed by discussion between students. Discussions will be facilitated by short PowerPoint presentations with key aspects, structured questionnaires and group work on some examples.

In the second half, the students will perform group work in teams to develop a mobility concept for a real-life large scale mixed use development. The project – in its early planning stage – is set in an urban/ peripheral location with substantial mobility and transportation demands. Each team will assume the perspective of a different stakeholder, and therefore a unique focus area (i.e. business plan, spatial planning, user segmentation etc.). The lecturer will supervise the students and discuss their intermediate results in the weekly interactive seminars. The outcome of the exercise is the development of different mobility concepts with different focus areas. At the end of the course, students will present their concepts in form of a mock client pitch.

Media:

Various reading materials and handouts, scientific articles, planning documents and websites.
PowerPoint presentations, whiteboard and exercise sheets may be used in sessions.

Reading List:

Federal Ministry for Economic Cooperation and Development. (2016). Urban Mobility. Strategies for Liveable Cities.

Bormann, R., Gross, M., Holzapfel, H., Luehmann, K., Schwedes, O. (2017). Shaping urban change and promoting sustainable mobility. Friedrich-Ebert-Stiftung ISBN 978-3-95861-952-4.

Eleftheriou, V., Knieling, J. (2017). The urban project HafenCity. Today's Urban and Traffic profile of the area. Executive summary of methodology and traffic research conducted in the region. Transportation Research Procedia 24, 73-80.

Meurs, H.J., van Wee G.P. (2003). Land Use and Mobility: a Synthesis of Findings and Policy Implications. European Journal of Transport and Infrastructure Research 3(2), 219-233.

Banister, D. (2008). The sustainable mobility paradigm. Transport Policy 15(2), 73-80.

Bridge, G., Butler, T., Less, L. (2012). Mixed Communities: Gentrification by Stealth? Policy Press, 372 pp.

Jarass, J., Heinrichs, D. (2014). New Urban Living and Mobility. Transportation Research Procedia 1(1), 142-153.

Cirianni, F.M.M., Leonardi, G. (2006). Analysis of transport modes in the urban environment: an application for a sustainable mobility system. WIT Transactions on Ecology and the Environment 93, 637-645.

Circella, G., F. Alemi, K. Tiedeman, S. Handy and P. Mokhtarian (2018). The Adoption of Shared Mobility in California and Its Relationship with Other Components of Travel Behavior Report, National Center for Sustainable Transportation, United States
<http://www.urban-transport-roadmaps.eu/>

Responsible for Module:

Moeckel, Rolf; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70004: Discrete Choice Methods for Transportation Systems Analysis | Diskrete Wahlmethoden für Verkehrssystemanalyse

Discrete Choice Methods for Transportation Systems Analysis

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The learning outcomes be examined by excercises (Übungsleistungen).

The coursework and examination requirements will will be based on 3 individual homeworks that will aim at demonstrating that the students have understood the concepts presented in the lectures and are able to specify and evaluate discrete choice models using freely available software (such as pythonbiogeme and R). Each exercise will be conceptually stand-alone, i.e. will include one or more related questions/problems, aiming at demonstrating that the participants have grasped the material. Each homework will be graded individually and the final grade will be obtained as the weighted average of the individual grades. The weight of each homework will be indicated on the assignment.

This module is also available to the participants of the TUM Skills Excellence Program. For the participants of this programme there are 20 places available.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

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Content:

The module provides the participants with an overview of the tools and methods that are available to specify and estimate discrete choice models for transportation systems analysis. The following key areas will be covered:

- Mathematical Modeling of Behavior

- Logit and probit models
- Model estimation and specification tests
- Model specification
- Experimental design and data collection
- Mixtures/simulation based estimation
- Latent class and hybrid models
- Panel data and models
- Forecasting and aggregation
- Bayesian procedures

Intended Learning Outcomes:

After the completion of the module, the participants will have established a solid knowledge of the theoretical foundations of choice modelling, and they will be able to specify, estimate and interpret a wide range of discrete choice models, such as logit, probit, nested logit, mixed logit, latent class models. They will be able to obtain revealed-preference and stated-preference data as well as create a suitable experimental design, including the questionnaire. The participants will also be able to use available software tools, such as pythonbiogeme and R to evaluate these models.

Teaching and Learning Methods:

Format: Lecture with integrated practical exercises.

Lectures provide the students with the theoretical basics of Discrete Choice Methods, e.g. the various building parts of the models, related experimental designs and the survey data, as a Powerpoint presentation, supported by pictures, possibly films and discussions. Practical calculation tasks from realistic studies and models provide the quantitative methods for the data analysis and modelling of different Discrete Choice Methods and the calculation and interpretation of the model results.

Media:

Presentation slides, whiteboard, readings

Reading List:

Train, Kenneth E. Discrete choice methods with simulation. Cambridge University Press, 2009.

Ben-Akiva, Moshe E., and Steven R. Lerman. Discrete choice analysis: theory and application to travel demand. Vol. 9. MIT Press, 1985.

Louviere, Jordan J., David A. Hensher, and Joffre D. Swait. Stated choice methods: analysis and applications. Cambridge University Press, 2000.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Discrete Choice Methods for Transportation Systems Analysis (Vorlesung mit integrierten Übungen, 4 SWS)

Antoniou C [L], Abouelela M, Antoniou C, Lu Q, Moghavem Ghaffari S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70006: Statistical Learning and Data Analytics for Transportation Systems | Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]

Version of module description: Gültig ab summerterm 2018

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework is evaluated based on 4 problem sets (Übungsleistung), aimed at assessing the students' achievement of the learning outcomes. This method of evaluation has been chosen based on the nature of the module (working with real data, and exploring the applicability of alternative analysis methods).

Each individual problem set/homework assignment will aim at demonstrating that the students have understood the concepts presented in a specific topical set of lectures. The students will use synthetic and real data to demonstrate that they have learned the presented material. The module uses the freely available R software, but the students will be allowed to complete the problem sets in other environments (e.g. matlab, python), if they prefer that. Each problem set will be graded individually and the final grade will be obtained as the weighted average of the individual grades (the weights will be determined based on the work-load associated with each problem set).

This module is also available to the participants of the TUM Skills Excellence Program. For the participants of this programme there are 20 places available.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

linear algebra, applied statistics

Content:

The module provides the participants with an overview of the advanced methods that are available to perform statistical learning and big data analytics for transportation systems analysis. The following key areas will be covered:

- Visualization of high dimensional data
- Dimensionality reduction and data mining techniques
- Clustering and classification for high dimensional data
- Statistical Learning
- Going beyond (linear) regression
- The EM Algorithm
- Time series modeling and forecasting
- State space model and solution approaches, e.g. Kalman Filters

Intended Learning Outcomes:

After the completion of the module, the students will have established a solid theoretical foundation and knowledge base for statistical learning and data analytics. The aims of this module enable the students to:

- identify appropriate statistical learning and data analytics methods for a given transportation systems data set and research question;
- understand the ideas behind the methods, their purposes, their assumptions and their limitations;
- apply statistical learning and data analytics techniques using R (or another suitable software tool, e.g. matlab or python, if they so choose), and interpret the results;
- critically evaluate statistical learning and data analytics results from the literature.

Teaching and Learning Methods:

Format: Lecture with integrated practical exercises;

Lectures introduce the students to the concepts of statistical learning and data analytics using slide presentations, supported by whiteboard writing and discussions, and provide an overview of the available quantitative methods for statistical learning, big data analytics, and interpretation of the results. All methods and the calculation will be illustrated with real data sets, using open source statistical software. The given problems sets will be completed individually by each participant.

Media:

Presentation slides, whiteboard, readings

Reading List:

- Wolfgang Karl Härdle (2011) Applied Multivariate Statistical Analysis 3rd Ed.
- Brian Everitt, and Torsten Hothorn, (2011) An Introduction to Applied Multivariate Analysis with R. Springer
- Robert H. Shumway, David S. Stoffer, (2017) Time Series Analysis and Its Applications, 4th Ed. Springer

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU70008: Urban Transportation Systems: Operations Research and Emerging Mobility Technologies | Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination of the module consists of 2-3 problem sets on operations research and one take-home essay to be written for emerging mobility technologies.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Applied probability and statistics (e.g. BGU70009)

Content:

The module provides students with an overview of the advanced mathematical analytics for modeling operations of urban transportation systems. The module covers the following components:

- Probabilistic modeling (Poisson Processes, Geometric Probability, Perturbation, Crofton's Method)
- Queueing Theory and Its Applications (Birth-and-Death Process)
- Network Optimization Models (Shortest-Path, Maximum Flow, Minimum Cost, Facility Location)
- Linear Programming (Network Simplex Method)

Besides, this module provides its students with an overview of the effects of emerging forms of transportation, such as ride-hailing and Mobility-as-a-Service (MaaS). The literature on behaviour effects and traffic externalities is analysed in detail, and then the elements for the regulation of these technologies are discussed. The following key areas will be covered:

- The concept of sharing economy
- Ride-hailing: effects on travel behaviour and traffic externalities
- Ride-hailing and substitute modes: competition and increased efficiency
- Regulation of ride-hailing: pricing and optimal fleet size.
- Shared fleet optimal deployment and optimal routing.
- Mobility-as-a-service: bundling future transportation modes.
- Shared mobility and vehicle ownership: future scenarios and the role of the regulator.

Intended Learning Outcomes:

After completion of the module, the students will understand the methodological and empirical basis for the analysis of emerging transportation technologies such that ride-hailing, shared ride-hailing and mobility as a service. The students will have established a solid theoretical foundation and knowledge base for modeling of urban transportation and service systems. Therefore, the students are able to:

- understand the mathematics behind urban operation research methods, their assumptions and limitations;
- apply modern techniques to formulate a mathematical operations research model and interpret the results;
- identify the main analytical models (e.g., optimization models) and econometric tools for the analysis of behaviour and traffic effects of such technologies.
- design an economic model for the regulation of ride-hailing and to solve it.
- discuss the latest research on merging transportation modes and identify the main elements that a regulation should have.

Teaching and Learning Methods:

The module consists of lectures with integrated exercises.

Lectures introduce the students to the concepts of probabilistic analysis and modeling, queueing models, graph theory, and linear programming methods for modeling urban transport systems or network-wide optimization.

Besides, integrated practical exercises provide the students with the theoretical basics of the assessment of emerging modes, e.g. the various parts of appropriate optimization and econometric models presented in the literature. A social welfare maximization model for the regulation of ride-hailing will be solved in the lectures by the students with support from the lecturer, and applied to realistic scenarios using empirical values for input variables and attributes. State-of-the-art papers will be presented and discussed.

Along the course, lectures will use slide presentations, supported by whiteboard writing. Student discussion and active participation will be encouraged throughout the lectures. All methods and calculations will be illustrated with practical examples. Exercises will be given to students following each major topic, and the solutions will be presented and explained in the lectures.

The module will be shifted to the winter term, starting with winter semester 2022/23.

Media:

The contents are provided with presentation slides, whiteboard, exercises, readings.

Reading List:

- Circella, G., F. Alemi, K. Tiedeman, S. Handy and P. Mokhtarian (2018). The Adoption of Shared Mobility in California and Its Relationship with Other Components of Travel Behavior Report, National Center for Sustainable Transportation, United States.
- Docherty, I., G. Marsden and J. Anable (2018). The governance of smart mobility. Transportation Research Part A: Policy and Practice 115: 114-125.
- Hall, J. D., C. Palsson and J. Price (2018). Is Uber a substitute or complement for public transit? Journal of Urban Economics 108: 36-50.
- Henao, A. and W. E. Marshall (2018). The impact of ride-hailing on vehicle miles traveled. Transportation <https://doi.org/10.1007/s11116-018-9923-2>.
- Hillier, S. F., Lieberman, J. G. (2001) Introduction to operations research, 7th ed., McGraw-Hill
- Kamargianni, M. and M. Matyas (2017). The Business Ecosystem of Mobility-as-a-Service. 96th Transportation Research Board (TRB) Annual Meeting, 8-12 January 2017, Washington DC.
- Larson, R. and Odoni, A. (1981) Urban Operations Research, Prentice Hall, (available at: http://web.mit.edu/urban_or_book/www/book/)
- Matyas, M. and M. Kamargianni (2018). The potential of mobility as a service bundles as a mobility management tool. Transportation.
- Rader, J. D. (2010) Deterministic Operations Research: Models and Methods in Linear Optimization. John Wiley and Sons
- Shaheen, S. (2018). Shared Mobility: The Potential of Ridehailing and Pooling. Three Revolutions. Island Press, Washington, DC: 55-76.
- Tirachini, A. and A. Gómez-Lobo (2018). Does ride-hailing increase or decrease vehicle kilometers traveled (VKT)? A simulation approach for Santiago de Chile. International Journal of Sustainable Transportation. Forthcoming.

Responsible for Module:

Antoniou, Constantinos; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

IN8005: Introduction into Computer Science (for non informatics studies) | Einführung in die Informatik für andere Fachrichtungen

Version of module description: Gültig ab summerterm 2015

Module Level: Bachelor	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 5	Total Hours: 150	Self-study Hours: 90	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Type of Assessment: written exam (90 minutes)

The exam takes the form of written test. Knowledge questions allow to assess acquaintance with and understanding of the basic concepts of Computer Science. Small programming and modelling problems allow to assess the ability to practically apply the learned programming- and query-languages and modelling-techniques for the solution of small problems.

Homework will be scored and upon achieving a minimum required number of points, a 0,3 bonus for the final grade is granted.

In case of epidemiologic emergencies, the exam may be substituted by a graded electronic exercise or a proctored exam.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Recommended requirements are Mathematics modules of the first year of the TUM-BWL bachelor's program as well as the module WI000275 'Management Science'.

Content:

The module IN8005 is concerned with topics such as:

- Database Management Systems, ER models, Relational Algebra, SQL
- Java as a programming language:
 - ++ basic constructs of imperative programming (if, while, for, arrays etc.)
 - ++ object-oriented programming (inheritance, interfaces, polymorphism etc.)
 - ++ basics of Exception Handling and Generics
 - ++ code conventions

- ++ Java class library
- Basic algorithms and data structures:
 - ++ algorithm concept, complexity
 - ++ data structures for sequences (arrays, doubly linked lists, stacks & queues)
 - ++ recursion
 - ++ hashing (chaining, probing)
 - ++ searching (binary search, balanced search trees)
 - ++ sorting (Insertion-Sort, Selection-Sort, Merge-Sort)

Intended Learning Outcomes:

Upon successful completion of the module, participants understand important foundations, concepts and ways of thinking of Computer Science, in particular object-oriented programming, databases and SQL, and basic algorithms and data structures, have an overview over these topics and be able use them for the development of own programs with a link to a database in a basic way.

Teaching and Learning Methods:

Lecture and practical tutorial assignments. A central tutorial deepens the understanding of the concepts introduced in the lecture using example assignments in regard to being able to solve given problems. In the tutorials, the students solve basic assignments under intensive supervision, which contributes to providing them with the basic skills in programming, in order to be able to apply the knowledge acquired by self-study of the accompanying materials of lecture and central tutorial for autonomously solving the programming assignments of the homework. During the second half of the semester, the students work on a small practical project, which aims at deepening the connected understanding of the desired learning outcomes. Programming aspects of this project are distributed over tutorial and homework assignments and are aligned with the topics of the respective week.

Media:

Slides, blackboard, lecture- and central tutorial recording, discussion boards in suitable e-learning platforms

Reading List:

Chapters from textbooks, which are closely associated with the module content and are provided to the students online.

Responsible for Module:

Seidl, Helmut; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Einführung in die Informatik für andere Fachrichtungen (TUM BWL) (IN8005) (Vorlesung, 2 SWS)
Groh G

Übung zur Einführung in die Informatik für andere Fachrichtungen (TUM BWL) (IN8005) (Übung, 2 SWS)

Groh G [L], Dall'Olio G, Groh G, Steinberger C

For further information in this module, please click campus.tum.de or [here](#).

Other Electives in Management and/or Technology | Sonstige wirtschaftswissenschaftlich-technische Wahlmodule

Module Description

AR30372: Core Topic: Publics & Participation | Core Topic: Publics & Participation

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 150	Self-study Hours: 120	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Students are required to write a research paper (1500-2500 words, 70% of the final grade) and give a 10-minute presentation (30% of the final grade).

In the research paper, students demonstrate that they are able to design a participation process in response to a set controversy and understand both the practicalities of designing participatory methods and relevant theoretical contexts. Furthermore, they show that they are able to engage with key social science readings and to distinguish between a range of contemporary approaches to participation and their relations to democratic forms and procedures. The paper has to include a theoretical discussion appropriate to the chosen participation method and can include sketches, diagrams etc.

In the presentation of their proposed participatory method and theoretical considerations, students demonstrate that are able to present their ideas to an audience in a clear and concise manner and react to questions and feedback from both the lecturer and their peers.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

This module introduces students to challenges that science and technology raise for contemporary democracies. Students explore a range of participation methods, including citizen juries and consensus conferences, developed to democratize science and technology. The module looks

at both the practical design of these participation methods and the democratic political theories informing them. It focuses on debates in the field of science and technology studies (STS), but also draws on democratic theory from the 20th century.

Intended Learning Outcomes:

Upon successful completion of this module students are able to:

- read analytically and engage with key social science readings
- distinguish between a range of contemporary approaches to participation and their relation to democratic forms and procedures
- evaluate different concepts of participation in relation to debates about democracy in the field of science and technology studies (STS)
- assess the public value of participation and develop participation experiments
- understand both the practicalities of designing participatory methods and relevant theoretical contexts
- design a participation process in response to a set controversy

Teaching and Learning Methods:

Teaching methods include readings, lectures, in-class discussions of key texts, group work and student presentations. Students are expected to read and engage with key readings in order to examine the design and practice of a range of contemporary participation approaches and methods developed by activists, policy makers, social scientists and designers. Through close analysis and discussion, students evaluate the aims of certain methods designed to democratize science and technology, how they relate to existing participation processes and, more generally, to the theory and history of democracy. In group activities, they explore the democratic theory informing the design of the participation methods, and design a participation process themselves. Giving oral presentations trains students to present their ideas to an audience in a clear and concise manner. Regular discussions with the lecturer ensure the students' ability to develop different insights for the completion of the final essay.

Media:

Texts, slide presentations, flipchart/whiteboard, worksheets, Moodle

Reading List:

Students will be provided with a reading list at the beginning of the course.

Responsible for Module:

Takahashi, Makoto; M.A.

Courses (Type of course, Weekly hours per semester), Instructor:

Co-Creation Lab (SCALINGS) (Seminar, 2 SWS)

Graner J, Renninger J

For further information in this module, please click campus.tum.de or [here](#).

Module Description

BGU52021: European Mobility Venture - euMOVE. Mobility Benchmark across Europe | European Mobility Venture - euMOVE. Mobilitätsbenchmark in Europa [euMOVE] *euMOVE*

Version of module description: Gültig ab summerterm 2021

Module Level: Bachelor/Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 45	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module is examined by a project work and an associated final presentation (approx. 30 min). The project work is submitted in the form of a project report (approx. 75,000-100,000 characters, ~ 50 pages).

The project work takes the form of group work. The groups are composed of an interdisciplinary team. Through the group work, students demonstrate that they can successfully navigate interdisciplinary and intercultural teamwork. Furthermore, the students prove with the project work that they are able to work on a topic area in the field of mobility and traffic and to apply the theories and concepts of sustainable mobility planning, taking into account current research results on innovative mobility measures from the regional context (metropolitan region of Munich) and the international context (a selected European city). For the development of the concepts, interviews and location analyses, among other things, are to be conducted and evaluated in advance. Hereby the students prove that they can apply methods of empirical social research as well as reflect ethical, legal, cultural, economic, historical and social implications of mobility innovation in the respective urban context.

With the written elaboration in the form of a project report, the students prove that they can present their results in a scientifically sound manner. With the presentation of the project work, students demonstrate that they can present results to an expert audience and explain them in a comprehensible manner.

The overall grade results from the project report (70%) and the final presentation of the project work (30%). The individual performances of the group members will be taken into account accordingly.

The assignment for the project report includes a detailed listing of all researched sustainable and innovative mobility offers in the form of a benchmark. The report should reflect the following contents:

- Explanation of the applied methods of empirical social research
- Factsheets of the research areas
- Mobility measures differentiated into three different fields of innovation (Electrification and automation of traffic systems, Development and integration of mobility options, Redesign and network of mobility spaces)
- Evaluation and comparison within the benchmark research results on specific criteria (Quality of Air, Time and Space)
- Recommendations for action for the Munich Metropolitan Region

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Ideally, the euMOVE module is to be completed in conjunction with a thematically linked scientific paper (Bachelors/Masters Thesis, ...) or a study project. Therefore, it is recommended that students are already advanced enough in their studies to be able to manage the required time commitment.

Due to the explicitly desired interdisciplinarity of the student teams, a simple selection procedure will be used. That is, care will be taken to ensure that there is any balance in terms of the students' faculty backgrounds.

The requirement for participation in euMOVE is linked to a written letter of motivation including a 30-minute personal interview. In this selection process, the motivation and prior knowledge of the students with regard to mobility topics as well as, in particular, the fit with regard to the study progress and the required time commitment are to be determined.

Content:

The following contents will be covered:

- Basic categorical classification of mobility measures.
- Characteristics of sustainable and innovative mobility
- Benchmark analysis
- Application of methods of empirical social research
- Project planning and management methods
- Statistical analysis of surveys in the field of mobility and transport
- Preparation of maps/diagrams

Intended Learning Outcomes:

After successful participation in the elective module euMOVE students are able to:

- * Understand urban challenges in the field of mobility, urban and transport planning.
- * Identify new trends and business models in the field of mobility innovation.
- * Evaluate mobility innovation in different European cities in terms of its contribution to improving the qualities of time, space and air.

- * Reflect on ethical, legal, cultural, economic, historical and social implications of mobility innovation in the respective urban context
- * Understand the steps within a benchmarking process and conduct the process itself
- * Draw comparative conclusions between different locations
- * Successfully navigate interdisciplinary and intercultural collaboration in teams
- * Apply methods of empirical social research (interviews, observations)
- * Present findings to a professional audience and present them in the form of a coherent report

Teaching and Learning Methods:

The module consists of a seminar accompanying the project work. The seminar includes lectures, an excursion and supervision of the project work. At the beginning of the module, lectures by practice partners who are active in the field of mobility and transport in the Munich Metropolitan Region will serve to introduce the students to the broad practical landscape in the working field of mobility. In addition, the student groups complete an approx. 2-week excursion to a selected European city in order to interview relevant stakeholders from science, business and society on the topic of mobility on site and also to conduct independent research. Students will conduct independent project work in small groups and create a mobility benchmark for innovative and sustainable mobility.

During the development of the project work, the individual interdisciplinary teams are accompanied and supervised by the lecturers within the framework of the seminar.

With regard to the teaching methods, a balanced ratio of attendance time, i.e. supervision by the supervisors, and self-study, i.e. individual or group work, is aimed for.

The self-study is partly given with concrete work instructions, but for the most part (especially with regard to the preparation for the excursion) it is to be designed freely.

Media:

Literature (OPAC), presentations (PowerPoint), cartographic and design software, field trip, reports (MS Office, InDesign), (online) whiteboard

Reading List:

The literature depends on the respective topic of the project and can therefore not be given as a general rule.

Responsible for Module:

Wulfhorst, Gebhard; Prof. Dr.-Ing.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

ED120053: AND Foundation Seminar | AND Foundation Seminar

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Modulprüfung wird in Form einer Projektarbeit erbracht. Sie besteht aus zwei Teilen: PITCH – Die Systemanalyse erfolgt in transdisziplinären Teams von Studierenden der Fachrichtung Architektur gemeinsam mit Studierenden anderer Schools der TUM, z.B. der School of Management und der School of Social Sciences and Technology. Das Format der Analyse ist text-, sowie medienbasiert. Mindestanforderung sind 10 DIN A4 Seiten inkl. Abbildungen, die der Beschreibung der Systemanalyse dienen.

Im zweiten Teil, dem DESIGN SPRINT, werden die der Analyse herauskristallisierten Fragestellungen in ein Designkonzept überführt. Dabei wird geprüft, ob ein umfassendes Verständnis für die Problemstellung erreicht wurde und resiliente Designansätze konzipiert wurden, die an Hand der 17 Nachhaltigkeitsziele (Sustainable Development Goals, kurz SDGs) evaluiert werden. Ökonomische, ökologische und soziale Aspekte spielen hierbei hinein und dienen als Grundlage zur Entwicklung von Ideen, die ein menschenwürdiges Leben in Zukunft ermöglichen und dabei ebenso natürliche Lebensgrundlagen dauerhaft bewahren.

In einer erweiterten Reflektion bestehend aus 900-1200 Wörtern, sollen die Anwendung kollaborativer Arbeitsweisen und die Ergebnisse der Design-Sprints zu kreislaforientierten Designansätzen analysiert und reflektiert werden.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Keine besonderen inhaltlichen Voraussetzungen sind notwendig.

Content:

Während einer fachübergreifenden Lehrkooperation werden nachhaltige und kreislaforientierte Designansätze erarbeitet und resiliente Positionen in den Themenfeldern

Politik, Wirtschaft und Projektentwicklung gefördert. Ergänzend finden Inputs in Form von Vorträgen und Diskussionen mit ExpertInnen aus dem Bereich Entrepreneurship, Lobbyismus und Policy Making statt. Die ExpertInnen werden auch in einer Projektwoche die Kleingruppen bei ihren Projekten unterstützen. Dabei werden im Format von Design Sprints vorangegangene Annahmen und Beobachtungen im Rahmen der Systemanalyse, in zukunftsweisende und kreislaforientierte Strategien und Szenarien für die Baubranche übersetzt. Als interdisziplinäres Werkzeug dient Design zur Entwicklung ganzheitlicher Ideen.

Intended Learning Outcomes:

Nach der erfolgreichen Teilnahme am „AND Foundation Seminar“ sind die Studierenden in der Lage, die Zusammenhänge der Baubranche zu verstehen. Fundierte Kenntnisse der Themenfeldern wie Lobbyismus, Policy Making, Money, Legal Structures und Entrepreneurship sind vorhanden und können zu kritischen und reflektierten Analysen befähigen. Wechselseitiges Verständnis und Kenntnis von und für andere Disziplinen schafft die Arbeit in transdisziplinären Teams. In den Workshops wird proaktives und selbstgesteuertes Lernen vermittelt.

In Präsentationen, die Bestandteil der Projektarbeit sind, werden die kommunikative Kompetenz bei der Darstellung von wissenschaftlichen Themen vor einer Zuhörerschaft überprüft.

Teaching and Learning Methods:

- Systemanalysen
- Co-Creating und Co-Design Prozesse mit ExpertInnen und Studierenden anderer Schools der TUM
- Design-Thinking
- Kritische Reflektionen und Diskussionen von Themen an Round Tables
- Investigative Recherchearbeit
- Transdisziplinäre Gruppenarbeit in Design Sprints

Media:

Themenabhängig

Reading List:

Eine Literaturliste mit der jeweiligen Schwerpunktgewichtung steht den Studierenden zur Verfügung.

Responsible for Module:

Courses (Type of course, Weekly hours per semester), Instructor:

AND Foundation Seminar (Übung, 4 SWS)

Fanelsa N [L], Schweyer V

AND Foundation Seminar for Management Students (Übung, 4 SWS)

Fanelsa N [L], Schweyer V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

POL64100: Game Theory for Political Scientists | Game Theory for Political Scientists [GT]

Version of module description: Gültig ab winterterm 2020/21

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Students will submit a learning portfolio at the end of the semester with two components: problem sets and a model application. Final grades will be weighted in the following way.

- 60 percent - problem sets
- 40 percent - model application

The problem sets are used to demonstrate the students' knowledge of standard game theory models. The problem sets may be completed at any point during the semester, but they will be graded as part of the final portfolio submission. It will likely be much easier to complete the problem sets and keep up with the coursework if they are completed during the relevant week.

There will be six problem sets. Each problem set will provide 10% of the student's final grade.

The model application allows students to demonstrate their ability to apply the concepts they have learned to a political question of their choice and to make predictions for similar interactions. The application should be between eight and ten pages in length (one inch or 2.5 cm margins, double-spaced, standard font, e.g., Times) and will make up 40% of the students' final grade. It will include a political question that is situated in relevant literature and motivates the analysis (5% of the grade; about one page; and at least five, academic citations); a theory that clearly and formally identifies the actors, strategies, and preferences or utility functions (15%, about five pages); the model solution and proof (10%, about one page); and the derivation and discussion of comparative statics (10%, about two to three pages).

Repeat Examination:

Next semester

(Recommended) Prerequisites:

There are no prerequisites for this course. However, game theory relies heavily on the use of math. The only math that students need to know in order to be successful in this course is high-school

level algebra (manipulating and solving equations and inequalities, for example). There will be a lot of algebra and logical reasoning.

Content:

The course will present the core concepts of game theory, as applied to the study of politics and governance. Game theory is used to study strategic interactions, where the decision of one actor depends on decisions made by others. Game theory uses mathematical models to describe and understand political and social phenomena.

Intended Learning Outcomes:

Upon the successful completion of this module, students will be able to solve standard game theory models, to tailor these models to questions that they are interested in, to derive predictions for strategic behavior and outcomes from the models, and to present and discuss game theoretic methods in a professional manner.

Teaching and Learning Methods:

The course will include a lecture and tutorial. The first class will take place synchronously on Zoom. After the first class, the lectures will frequently be recorded and posted on Moodle. In the lecture, the Professor will communicate the fundamentals of game theory. Students will also be given sample problems in lecture and problem sets via Moodle to verify that they understand the content of the lecture. The problem sets will be included in each student's portfolio. To the extent that students have questions about the problem sets, we will discuss the questions and solutions in the tutorial. The tutorial will take place synchronously on Zoom. In the tutorial, the Professor will go over the problem sets, encourage students to discuss their ideas and applications, and be available to answer any questions the students have. During the final week of class, students will present their model applications via Zoom. The presentation gives students experience presenting game theoretic methods and allows them to get feedback on and to further develop their model application. The application need not be complete at the time of the presentation. Presenting students should know what question they seek to answer and the beginning of the theoretical conceptualization (actors, strategies, preferences). They can also discuss the equilibrium and comparative statics, but it is not necessary.

Media:

Zoom, PPT presentations, Moodle, exercise sheets, textbooks, and other reading materials.

Reading List:

There is one required textbook for the course: Tadelis, Steven. 2013. *Game Theory: An Introduction*. Princeton University Press - called "Tadelis" hereafter.

A number of additional readings are also required; these will be available on Moodle. Students are expected to have completed the reading by the day for which it has been assigned.

Other textbooks may be of use for additional examples or explanation, but they are not required.

Some textbooks that may be useful for reference are: Martin J. Osborne, *An Introduction to Game Theory* (2004); Robert Gibbons, *Game Theory for Applied Economists* (1992); and Nolan McCarty and Adam Meirowitz, *Political Game Theory: An Introduction* (2007). If you're looking for a more

advanced treatment, see Martin J. Osborne and Ariel Rubinstein, A Course in Game Theory (1994) or Drew Fudenberg and Jean Tirole, Game Theory (1991).

Responsible for Module:

Pond, Amy; Prof. Prof. Dr. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

(POL64100) Game Theory for Political Scientists (Master) (Seminar, 4 SWS)

Pond A (Herrnböck C)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001148: Technology, Society and International Security | Technology, Society and International Security [Technology, Society and International Security]

Version of module description: Gültig ab winterterm 2016/17

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module assessment consists of a research paper, which is combined with 2 small midterm assessments.

Mid-term assessments: 2 x 1 page reaction paper. The aim is to identify and wrestle with major themes, problems, challenges, etc. posed by the reading / analysis to raise questions and challenges for fellow seminarians. The reaction paper is not a summary of the reading.

In the term paper (2000-3000 words) the students demonstrate that they can apply the acquired concepts and knowledge to a current issue related to technologies and security. The term paper is accompanied by a presentation (15-30 minutes), in which students present their findings at the end of the term. The midterm assessment takes place during the semester. The course grade is composed as follows: 30% oral presentation and 70% written report.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in issues related to national and international security politics

Content:

Course description

Security has become a major issue in contemporary societies - not just after 9/11 - and is spreading into an increasing number of areas in daily life. Notions as securitization or the surveillance state are slipping into academic as well as political and everyday discourses. Thus, whole fields of study are researching this restructuring of societies towards a paradigm of security on several levels, e.g. security studies, surveillance studies, critical criminology, to name just a few. However, technology plays an increasingly important role in these shifts, may it be through

surveillance in border control regimes, satellite technologies impacting international relations, or predictive analytics in police work and trials, enabling and being shaped by the rationalities and ideologies of these distinct fields. In this module we will therefore explore the different areas of social life in which security technologies are embedded and thus reflect on the manifold issues raised and functions fulfilled by them in their specific arenas. We will also touch upon the question of responsibility and accountability for such technologies and how technology implementation and usage yield political qualities. In each of the sessions, a distinct area of security technologies will be discussed drawing on concepts from STS, sociology, security studies, providing a broad range of perspectives on the matter.

We want to explore the following questions in particular:

- Do security technologies have politics?
- What are the relations between technology, security and responsibility?
- How are security technologies related to issues of democracy?
- And what are the social and political implications of innovation in security technologies?

Intended Learning Outcomes:

Students will be able to apply and work with key concepts from the fields of STS, International Relations, Sociology, Security Studies. They will discuss theoretical concepts and methodological approaches which prepares them to operationalize and apply these to empirical cases in the field of satellite technologies. The focus on security technologies brings students to creatively interweave concepts from these two fields of study which accounts for the interdisciplinary setting of the study program. The modul conveys the basic relations between and mutual influences of technology, security, and society, and students are equipped to explain current developments in this field from a wider social science point of view. Finally, students are able to analyze the role of technology in (inter)national security politics and to explore the problems and challenges arising in the process of technological securitization due to cultural, social and political factors and apply this knowledge situationally.

Teaching and Learning Methods:

The modul requires students to read four journal articles or book chapters for each session. Discussions are then guided along a set of text-based questions announced online (moodle) in advance. Students engage with analytical literature from a number of fields, including political science, science and technology studies, innovation studies, and security studies. The classes are predominantly interactive and include group as well as individual exercises. Students define a problem and discuss possible solutions, hold presentations, including the preparation of an academic poster, discuss and give peer-to-peer feedback, and do reserach on reference material.

Media:

Moodle, presentations, research paper, academic books, videos, websites

Reading List:

Winner, Langdon. 'Do Artifacts Have Politics?' Daedalus 109, no. 1 (1980): 121-136. <http://www.jstor.org/stable/20024652>

Bijker, Wiebe (2010): How Is Technology Made? - That is the Question. In: Cambridge Journal of Economics, 34, 63-76

Sismondo, Sergio (201): An Introduction to Science and Technology Studies. 2nd edition, chapter 9

Jasanoff, S. (ed.) (2004). States of Knowledge: The Co-Production of Science and Social Order. London: Routledge.

Williams, C. M. (2003) 'Words, Images, Enemies: Securitization and International Politics', International Studies Quarterly, 47/4: 511-31.

Campbell, D. (2007a) Tele-Vision: Satellite Images and Security, david-campbell. https://www.david-campbell.org/wpcontent/documents/Tele_Vision.pdf

Livingston, S., & Robinson, W. L. (2003). Mapping Fears: The Use of Commercial High- Resolution Satellite Imagery in International Affairs. Astropolitics, 1/2, 3-25.

Aday, Sean & Livingston, Steven (2009): NGOs as intelligence agencies: The empowerment of transnational advocacy networks and the media by commercial remote sensing in the case of the Iranian nuclear program, Geoforum, 40(4), 514-522.

Herscher, Andrew (2014): Surveillant Witnessing: Satellite Imagery and the Visual Politics of Human Rights. In: Public Culture, 26(3), 469-500.

Harris, C., The Omniscient Eye: Satellite Imagery, 'Battlespace Awareness,' and the Structures of the Imperial Gaze. Surveillance & Society, 2006. 4(1/2): p. 101-122.

Shim, D. (2014a) 'Remote Sensing Place: Satellite Images as Visual Spatial Imaginaries' Geoforum, 51/1: 152- 60.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001181: Advanced International Experience | Advanced International Experience

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 180	Contact Hours: 0

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Students have to pass a written single-choice exam. The module examination consists of a written 90-minute single-choice exam. The test examine deeper knowledge of the meaning of culture, cultural differences and resulting difficulties. Tasks which refer to scientific cultural concepts verify that students are able to distinguish between different cultural dimensions and standards, for example the cultural dimensions of Geert Hofstede's concept. Tasks which refer to different management styles and working cultures examine that students are able to analyse how different cultural backgrounds influence working in an international business context, for example a Western Management style. Tasks which refer to country-specific cultural differences proof that students are able to interpret critical intercultural situations correctly and offer adequate behavioral patterns. Tasks which refer to intercultural communication check that students are able to distinguish between different communication styles influenced by culture and know how to communicate adequately with members of different cultures, for example cultures with a direct communication style.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Students have to complete a stay abroad relevant to their subject of studies before they can be admitted to the module. In general, for this purpose international study experience, practical training abroad as well as the completion of a project study or master's thesis is accepted. (Details see: <https://www.mgt.tum.de/download-center>)

Content:

This module gives an introduction to basic theoretical knowledge in scientific conceptualisation of culture, cultural differences and difficulties as well as their overcoming. During the module

various scientific definitions of culture and different scientific approaches of cultural dimensions are outlined. By means of selected cultural characteristics and practical examples it is explained how to deal with different matters occurring when people with different cultural background interact. Additionally, different management styles in view of different cultures are declared. During the module explanatory approaches to difficulties which result from different cultural backgrounds in an international business environment are elaborated on. Further approaches how to overcome these difficulties are outlined by means of practical examples in a global working environment and in international teams. In addition, basic theoretical knowledge in communication and different models of communication are provided. Furthermore, it is defined how to deal with different communication styles of different cultures and how to communicate adequately in an international context. For this purpose, selected cultural characteristics and practical examples are used. Within the framework of the course students are asked to reflect, analyse and evaluate already experienced situations in view of the discussed theoretical models. Additionally, ethically relevant problem areas in international/intercultural businesses are outlined.

Intended Learning Outcomes:

After attending this module students are able to apply basic scientific approaches to culture and cultural differences. On basis of appropriate knowledge about cultural theories, particular cultures, as well as general knowledge about the issues occurring when people with different cultural backgrounds interact the students are able to analyse cultural differences and difficulties in an intercultural business context, as well as to interpret and overcome them. Additionally, students are aware of different communication styles in different cultures and know to apply this knowledge in intercultural communication situations. Furthermore, students will bear integrity, ethics and responsibility in mind when making management decisions in a multicultural business environment. Students are also able to reflect their experience abroad with scientific intercultural knowledge and develop an open-mindedness and sensitivity with respect to cultural differences.

Teaching and Learning Methods:

The module is created as an online-course. It is divided in various thematic areas which contain basic theoretical knowledge. In addition, practical examples, case studies and videos illustrate relevant concepts and their application in an international (business-) environment. Further exercises are provided at the end of each thematic area in order to encourage students to tackle with specific intercultural subjects and to develop kind of intercultural sensitivity. Additionally, a bibliography is prepared for students' self-study. Practice questions for exam preparation are also offered.

Media:

Digital Scripts (PowerPoint Slides, PDF files), scientific literature and exercise questions

Reading List:

Standard references (amongst others):

Hall, Edward T.; Hall, Mildred Reed (1990): Understanding Cultural Differences. Maine: Intercultural Press.

Hill, C.W.L. and Hernández-Requejo, W. (2011): Global Business Today, Seventh edition

Hofstede, Geert (2001): Culture's Consequences. Comparing Values, Behaviors, Institutions, and Organizations Across Nations. 2nd edit. Thousand Oaks: SAGE Publications Inc.

Thomas, Alexander; Kinast, Eva-Ulrike; Schroll-Machl, Sylia (Hg.) (2010): Handbook of Intercultural Communication and Cooper. Basics and Areas of Application : Volume 1: Basics and Areas of Application. 2nd revised edition. Göttingen, Berlin: Vandenhoeck & Ruprecht GmbH & Co. KG

Trompenaars, Fons; Hampden-Turner, Charles (2012): Riding the waves of culture. Understanding diversity in global business. Revised and updated 3rd edition. New York: Mc Graw Hill.

Responsible for Module:

Moog, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced International Experience (WI001181, WIHN1181) (Vorlesung, 4 SWS)

Moog M [L], Moog M, Miladinov T, Richards M, Zösmair S, Safieh M

For further information in this module, please click campus.tum.de or [here](#).

Ethics (max. 2 exam in 2 different modules can be counted) | Ethik (max. 2 Leistungen aus 2 verschiedenen Modulen können eingebracht werden)

Module Description

POL70044: Business Ethics | Unternehmensethik

Version of module description: Gültig ab winterterm 2010/11

Module Level: Bachelor	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Prüfungsdauer (in min.): 60.

Die Prüfungsleistung wird in Form einer Klausur erbracht. In dieser soll nachgewiesen werden, dass in begrenzter Zeit und ohne Hilfsmittel ein Problem erkannt wird und Wege zu einer Lösung gefunden werden können. Die Prüfungsfragen gehen über den gesamten Vorlesungsstoff.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Die Vorlesung führt in Grundprobleme, Argumentationsformen und Theorieansätze einer Unternehmensethik ein. Sie untersucht die Chancen der Realisierung moralischer Normen und Forderungen im Spannungsfeld von Ökonomie und Ethik. Zentralanliegen ist dabei die Analyse ethischer Entscheidungsprozesse in Unternehmen vor dem Hintergrund einer differenzierten Untersuchung von Handlungssituationen und Handlungsstrategien sowie den Grundlagen einer Handlungsethik. Zu den Themen sollen Reputation, Vertrauen und Sozialkapital ebenso gehören wie die Probleme Korruption, Umweltschutz und Fragen globaler Ethikkonzepte. Den Abschluss bildet eine kritische Darstellung der verschiedenen Forschungsansätze in der unternehmensethischen Debatte.

Intended Learning Outcomes:

Nach der Modulveranstaltung sind die Studierenden in der Lage, wirtschaftsethische Fragestellungen zu reflektieren, ethische Theorien anzuwenden und den ethischen Gehalt ökonomischer Theorien zu verstehen.

Teaching and Learning Methods:

Das Modul besteht aus einer Vorlesung. Die Inhalte werden durch Vortrag und Präsentationen vermittelt. Studierende sollen zum Studium der Literatur und der inhaltlichen Auseinandersetzung mit den Themen angeregt werden. Diskussionen während der Vorlesung sind erwünscht und tragen zu einem noch intensiveren Verständnis bei.

Media:

Skript in Form von Power-Point

Reading List:

"Karl Homann/Christoph Lütge: Einführung in die Wirtschaftsethik, 2. Aufl., Münster 2005., Andrew Crane/Dirk Matten: Business Ethics: A European Perspective, Oxford 2003., Karl Homann/Franz Blome-Drees: Wirtschafts- und Unternehmensethik, Göttingen 1992"

Responsible for Module:

Lütge, Christoph; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

(POL70044) Business Ethics (Master) (Vorlesung, 2 SWS)

Lütge C [L], Kriebitz A, Max R

For further information in this module, please click campus.tum.de or [here](#).

Project Studies | Projektstudium

Module Description

WI900685: Project Studies (Master in Management and Technology) | Project Studies (Master in Management and Technology)

Version of module description: Gültig ab summerterm 2018

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 12	Total Hours: 360	Self-study Hours: 330	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a project work. The project work consists of a written project report (20 pages, 50% of Grade) and of a final presentation (30 minutes, 50% of grade). A student team of at least 2 students works on a specific problem set within a company or any other similar institution. The team runs through several project stages: problem definition, division of work/tasks, decision making processes, and realization. In that the students show that they can develop appropriate strategies to cope the set of problems. They show that they are able to compose the state of research. In addition they demonstrate their ability to develop their own specific approach for a solution based on scientific knowledge as well as methodical skills. Students demonstrate their ability within a team to manage resources, and deadlines through timely submission of the enumerated tasks. Students demonstrate that they are able to complete the tasks of their project in a team environment. By presenting their project report students show their ability to summarize and communicate the evolvement of the project in a clear, well-structured and convincing manner to the supervisors from the company as well as the university. Additionally they show that they are able to respond competently to questions and discussions related to their suggested solutions brought by the audience.

Grading will especially take into account the overall working outcome of the project with respect to the initial problem set, the selection and application of the chosen methodology as well as the analyses and discussion of the main findings. The project work is set up in a way which enables the identification and evaluation of each student's individual contribution to the project's success.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic knowledge in Business Administration

Content:

The project study consists of a specific problem statement or challenge which a company or any other similar institution is confronted with. This challenge may have a research related or practical character.

- Analyzing potential sales volumina of a new market,
 - identifying potential optimization actions regarding a supply chain,
 - creating a financing concept for a company,
 - the explanation of problems out of the logistic sector and the development of appropriate optimization solutions,
 - the development of specific Use-Cases for new electronic payment procedures and deduction of appropriate product specifications,
 - the capturing and processing of KPIs in controlling and the development of recommended actions,
 - or the development and explanation of a marketing strategy and the development of recommendations for implementing them in the given market- or company environment
- are just a few examples of what may be subject of a project study. The project study and its findings regarding the outlined problem set are based on students' academic knowledge gained through their study programs.

Intended Learning Outcomes:

After successful participation in the module students are able work on a project in a systematic and academic manner. They can contribute an own part to a team's work output. Students are able to exchange in a professional and academic manner within a team. They show that they are able to integrate involved persons into the various tasks considering the group situation. Furthermore the students conduct solution processes through their constructive and conceptual acting in a team. They can make this contribution in a time limited environment. The students can capture and identify problem sets. Furthermore they can analyze appropriate methodologies for problem solving. They are able to infer the appropriate methodologies and to adapt these. On this basis they can develop analytical solution finding. Finally they can and evaluate the developed solutions regarding the problem set. Finally students are able to summarize and clearly and convincingly communicate the evolvement of their project and the developed solutions to an audience of professionals and academics.

Teaching and Learning Methods:

The team-based development (at least 2 students) of the project solution encourages the students to deal soundly with an academic or practical subject based on their previously acquired academic knowledge. Team work is particularly suitable for tackling problem sets and writing a report, for developing constructive critique to others and for implementing appropriate solutions to these critiques. The project may happen at the premises of the respective company/institution or from a remote location. They are able to communicate the evolvement of the project by composing a project report and preparing a presentation of their solutions to the supervisors from the company

as well as the university. The project is supervised jointly by mentors from the respective company/institution and the professor of the TUM School of Management. With regards to content the project study takes an approximate time of three month.

Media:

literature, presentations

Reading List:

Project Management Institute (2013): A Guide to the Project Management Body of Knowledge (PMBOK® Guide) - Fifth Edition

Wilson, A. M., Jones, R., Miller, K., & Pentecost, R. (2009). Marketing research: An integrated approach. Pearson Australia.

Further specific literature based on the topic

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-EE: Catalogue of Elective Modules: Economics & Econometrics | Wahlkatalog: Economics & Econometrics

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of existing process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given research questions, which process measures can be collected with the methods, and how to

interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:

Reading List:

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelsen, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Economics, Policy & Econometrics: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001353: Advanced Seminar Economics, Policy & Econometrics: The Economics of Central Banking | Advanced Seminar Economics, Policy & Econometrics: Die Ökonomik von Zentralbanken

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Seminarteilnehmer:innen bearbeiten in Teams aus je zwei Studiernedne selbständig ein Thema zur Ökonomie der Zentralbanken. Die Prüfungsleistung besteht aus zwei Teilen:

- 1) Präsentation des vom jeweiligen Teilnehmer ausgewählten Themas inkl. anschließender Diskussion.
- 2) Seminararbeit zum behandelten Thema (max. 12 Seiten)

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Principles of Micro- and Macroeconomics

Content:

This module provides students with an in-depth insight into the various tasks and objectives of national and supranational central banks. The focus is in particular on the Deutsche Bundesbank and its business areas and tasks. The seminar is divided into three thematic blocks: (1) Monetary Policy (2) Financial Stability and (3) Money & Non-Cash Payments.

Intended Learning Outcomes:

After participation in the module event, the students are able to understand both the theoretical and the applied view of the role of central banks in the general economy and are able to discuss them before the background of current topics. Students can therefore (1) identify and (2) conceptualize various important issues related to central banking. Students will be able to (3) identify gaps in understanding of the focus topic and (4) develop suggestions to improve understanding of the field.

In addition, they will be able to improve their presentation skills by presenting their topic to their fellow students (5) and their scientific writing skills by writing the seminar research paper (6). By working in groups, (6) students will also improve on their teamwork skills.

The aim of the seminar is also to build a bridge to the research project "Effects of the EBA stress tests on the assignment of credit ratings to European banks", which is currently being carried out in cooperation with the Deutsche Bundesbank. The seminar will help to transfer the theoretical and empirical research findings to teaching and will possibly serve as a basis for possible future final theses or research work.

Teaching and Learning Methods:

The seminar consists of several lecture dates (on selected practical topics by employees from the Deutsche Bundesbank). These serve as the basis for the subsequent analysis, presentation and creation of a seminar paper by the seminar participants (in teams of two/group work) on a self-selected topic on the economics of central banks. The examination consists of the seminar presentation and the seminar paper.

Media:

Slides, presentation, literature

Reading List:

Mayes, Siklos, Jan-Egbert Sturm (2019). The Oxford Handbook of the Economics of Central Banking. Oxford University Press

Responsible for Module:

Hottenrott, Hanna; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics (MGT001353): The Economics of Central Banking (Limited places) (Seminar, 4 SWS)

Hottenrott H, Gschnaidtner C, Römer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

POL62200: Energy Transformation | Energy Transformation

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

For this module, evaluations will be based on written work and a presentation. The written assignment for the module will be of a length of approximately 20-25 pages. The topic of the module paper is to be developed in consultation with the seminar leaders and will deal with a specific topic of the seminar (energy transformation) and its technological, political, and social dimensions. The paper will be introduced with a precise question and then analyzed in depth. The methodology of research needs to be indicated and a comprehensive bibliography included. Students will be expected to prepare and give a presentation of at least 20 minutes tied to a session topic. Group presentations of up to three students are possible as long as individual contributions are discernible.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Ring lecture „Politics & Technology“

Content:

For a variety of reasons, including energy security, environment and climate concerns, and the potential to develop new technologies and processes, cities, countries and entire regions are pursuing low-carbon energy transitions. Understandings of what the best approach to a low carbon energy transition is, however, vary widely. The extent to which energy transitions are occurring in various sectors (power, heating/cooling, transportation) differs significantly. Why is this the case? What factors support or inhibit the scaling-up of policy solutions? What are the challenges associated with large scale energy system transformations? How similar or different are energy system transformations to other major transformations which have occurred in the past or which may need to occur in the future? This module will consider these and other questions in the context of Germany, at the European level and internationally.

Intended Learning Outcomes:

After participating in this module, students will understand the arguments underpinning decisions to pursue low carbon energy transitions, how low carbon energy transitions are affected by broader economic, technological, and political factors, and the ways in which actors at the local, national, or international level may act to promote or inhibit change. They will have gained insights into system transformation thinking, understand aspects of the production, distribution and utilization of energy and their interplay; apply methods of comparative policy analysis to energy policy in different political systems; be able to identify challenges of policy-making in national politics and the European multi-level system; to critically analyze energy policy in Germany, Europe, and internationally (for example in China, Japan, India, the United States as well as at the global level); to analyze the factors determining German, European, and international energy politics, and to evaluate the effects of different energy policy governance instruments (like legal regulation, planning, incentive design, taxes, subsidies, etc.).

Teaching and Learning Methods:

The module is offered in the form of two seminars, each dealing with different, but complementary thematic areas. One will be focused more on the transition of the energy systems in Germany and Europe while the other will concentrate more on the international and global level. To obtain a deeper understanding of the module's topics a combination of independent work and general discussion will be used in the seminar. Seminars will include both direct input from the instructor and a wide variety of active learning methods. During the seminars, there will be in-depth discussions and inputs by students. Concrete examples will be used to practice, analyze, and evaluate the material which has been presented. Both the technical and scientific aspects of issues as well as their political and social implications will be discussed. The presentations developed and given by the students and ensuing discussions will contribute to the students' understanding of the seminar materials and instructor's inputs.

Media:

Online-Reader, PowerPoint

Reading List:

Moe, Espin. 2015. Renewable Energy Transformation or Fossil Fuel Backlash: Vested Interests in the Political Economy. Palgrave MacMillan.

Araújo, K., ed. 2022. Routledge Handbook of Energy Transitions. Routledge.

A reader of seminar texts with up-to-date and cutting edge scientific literature will be made available at the start of the semester.

Responsible for Module:

Schreurs, Miranda; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

(POL62200) Energy Transformation (Seminar 1 + 2) (Seminar, 4 SWS)

Cetkovic S (Mohammed N)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000258: Empirical Research in Economics and Management | Empirical Research in Economics and Management

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final written exam (120 minutes) is a means to assess students' understanding of the basic and advanced theories of empirical research in economics and management research. Students have to show that they understand different research designs. They have to prove that they are familiar with the basic concepts of different empirical methods, therefore they have to analyze data as well as to interpret the results of these different methods.

The exam is 100% based on multiple choice questions.

Students may use a non-programmable calculator and a non-electronic dictionary for the exam.

Students have the possibility to improve their final grade by taking a voluntarily midterm assignment. The final grade can be improved by 0,3. The midterm assignment consists of handing in two practice sheets. The completion of the practice sheets is not mandatory, but highly recommended. The exercise sheets are a means to assess students' understanding learning progress of the basic theories of empirical research for the further course of the module.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

This module prepares students for qualitative and quantitative research (e.g. for their Master's Thesis) by introducing them to basic and advanced topics of empirical research.

Amongst others, the topics are:

- Experiment design
- Correlation analysis
- Linear and multiple regression models

- Qualitative methods
- Factor- and cluster analysis
- Conjoint analysis

The acquired skills are important for students' Master's Thesis but are equally important to understand and analyze data and statistics in their future career and everyday life.

Intended Learning Outcomes:

After the successful participation in the module Empirical Research in Economics and Management, students will be able to understand the most important methods of empirical research, covering basic as well as advanced aspects of research design, data collection, data analysis, and interpretation. Students will learn how to understand and analyze academic empirical research and be in a position to critically question in-press reports which refer to empirical studies. Students will learn to apply basic methods of empirical research. Students will learn the basics of how to plan, set up, and conduct an empirical research project themselves (e.g., for their seminar paper or their final thesis). Finally, students will learn to interpret empirical research results.

Teaching and Learning Methods:

The module consists of lectures and integrated exercises (both will be recorded on Lecturio - but active participation is recommended).

The lectures serve to build a thorough theoretical understanding of the related scientific concepts and methods.

In the exercises students learn to apply the methods, they have learned in the lectures, in concrete analyses and interpretations. In addition to the examples of the integrated exercises, two practice sheets are provided on which the student can practice individually. The practice sheets include various topics, such as regression analysis, factor analysis, cluster analysis, and conjoint analysis, which are relevant for the exam. Both practice sheets will be discussed in detail during the tutorial sessions.

Media:

Lecture slides are available via Moodle.

Reading List:

- Eisenhardt, K (1989). Building Theory from Case Study Research. The Academy of Management Review, 14(4), 532-550.
- Singleton Jr, R., Straits, B. C., Straits, M. M., & McAllister, R. J. (2010). Approaches to social research. Oxford University Press.
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 10: Regression with Panel Data,
- Stock, J., M, Watson (2007) Introduction to Econometrics - Chapter 14: Introduction to Time Series Regression and Forecasting.

Responsible for Module:

Hirsch, Stefan; Prof. Dr. agr.

Courses (Type of course, Weekly hours per semester), Instructor:

Empirical Research in Economics and Management - Exercise (WIHN0258) (MiM Campus Heilbronn) (Übung, 2 SWS)

Förderer J

Empirical Research in Economics and Management - Lecture (WIHN0258) (MiM Campus Heilbronn) (Vorlesung, 2 SWS)

Förderer J, Kircher T

Empirical Research in Management and Economics (WI000258) (Vorlesung, 2 SWS)

Pachur T, Erben A

Empirical Research in Management and Economics (WI000258) - Exercise (Übung, 2 SWS)

Pachur T, Zilker V, Hof L, Erben A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001145: Energy Economics | Energy Economics

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module entails a final written exam (120 minutes). The exam is a closed-book exam. By answering the questions students show their ability to differentiate and evaluate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Moreover students show their ability to discuss and apply theoretical and empirical methods to selected topics in energy markets. They show that they are able to analyze and assess recent energy market developments, such as for instance the energy transition, using the theoretical and empirical tools they have acquired.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses at TUM or elsewhere in microeconomics and introductory statistics or econometrics

Content:

This module covers the following topics:

- Economics of energy markets
- Analysis of producer strategies
- Analysis of consumer behavior
- Fundamentals of primary energy markets
- Fundamentals of electricity markets
- Analysis of network industries
- Network regulation
- Microeconomics
- Game theory
- Econometrics
- Energy policy

Intended Learning Outcomes:

Students are able to explain and to differentiate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Furthermore, they are able to summarize and compare different strategies and behavior of producers and consumers, as well as on different forms of regulation of network industries. Students are also able to discuss and apply theoretical and empirical methods to selected topics in energy markets. With these tools student will thus be able to analyze and assess recent energy market developments, such as for instance the energy transition.

Teaching and Learning Methods:

The module is a lecture consisting of PowerPoint presentations so as to offer and explain to students all different topics covered in this module. A guest lecture is planned in which practitioners present on selected topics in energy markets. The exercise course comprises different problem sets that discuss problems covered during the lecture. Problem sets are solved individually or in group work and, supported by a presentation, derived and solved jointly with the tutor.

Media:

PowerPoint, exercise sheets, whiteboard, reader

Reading List:

Viscusi, W. et al. (2005): Economics of Regulation and Antitrust, MIT Press. Stoft, S. (2002): Power System Economics, Wiley. Selected journal articles.

Responsible for Module:

Schwenen, Sebastian; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energy Economics - Exercise (WI001145) (Übung, 2 SWS)
Schwenen S, Kiszka A

Energy Economics (WI001145) (Vorlesung, 2 SWS)
Schwenen S, Kiszka A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more seriously. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-EM: Catalogue of Elective Modules: Modules Energy Markets | Wahlkatalog: Energy Markets

Module Description

MGT001365: Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective | Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final grade is based on the presentation, which counts with 30%, and the report, assigned 70%.

Case study report: The final study team-report, written in English, should consist of max. 15 pages (excl. references and the title page). Students' work may be theoretical/analytical, empirical, or a literature survey but should include own thoughts and suggestions on the proposed solution. Giving a short (intro)overview regarding the relevant (and topical) literature is always required.

Final presentation: 30 minutes per presentation, 15-20 for a talk and 10 minutes for class-wide discussion.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Students learn the problematics and frameworks for the energy transition analysis, considering challenges and solutions for individual firms across various industries, e.g. steel, power, O&G.

Intended Learning Outcomes:

The aim of this seminar is to

1. Introduce and provide the understanding of: the decarbonisation; its associated challenges and problems (technical, economic, financial) faced by companies; and investment and market opportunities emerging in Germany and internationally;
2. Explain the scope 1, 2, 3 emissions, emission calculation, standards, and introduce possible decarbonization frameworks through examples;
3. Equip the students with the analytical tools and facts critical in making energy transition decisions and allow them to test their learned skills on the real-world problems.

Teaching and Learning Methods:

Project examples, Intro on analytical tools and important facts, Interactive workshop discussing case studies, Hand-on session about decarbonization modeling approaches, analysis frameworks, solution discussion, In-progress consultation

Media:

Reading List:

- Dejuán, Ó., Lenzen, M., & Cadarso, M. Á. (Eds.). (2017). Environmental and economic impacts of decarbonization: Input-output studies on the consequences of the 2015 Paris Agreements. Routledge.
- Johnston, R. J., Blakemore, R., & Bell, R. (2020). The role of oil and gas companies in the energy transition. Atlantic Council.
- Lenox, M., & Duff, R. (2021). The Decarbonization Imperative: Transforming the Global Economy by 2050. Stanford University Press.
- Peszko, G., Van Der Mensbrugghe, D., Golub, A., Ward, J., Marijs, C., Schopp, A., ... & Midgley, A. (2020). Diversification and cooperation in a decarbonizing world: climate strategies for fossil fuel-dependent countries. World Bank Publications.
- Harvey, H., Orvis, R., & Rissman, J. (2018). Designing climate solutions: a policy guide for low-carbon energy. Island Press.
- Ghosh, N., & Gupta, D. (2022). Decarbonization strategy of businesses, stock return performance and investment styles: a systematic review. Benchmarking: An International Journal.
- Jenkins, J. D., Luke, M., & Thernstrom, S. (2018). Getting to zero carbon emissions in the electric power sector. Joule, 2(12), 2498-2510.
- Green, J., Hadden, J., Hale, T., & Mahdavi, P. (2021). Transition, hedge, or resist? Understanding political and economic behavior toward decarbonization in the oil and gas industry. Review of International Political Economy, 1-28.
- De Cian, E., Dasgupta, S., Hof, A. F., van Sluisveld, M. A., Köhler, J., Pfluger, B., & van Vuuren, D. P. (2020). Actors, decision-making, and institutions in quantitative system modelling. Technological Forecasting and Social Change, 151, 119480.
- Rissman, J., Bataille, C., Masanet, E., Aden, N., Morrow III, W. R., Zhou, N., ... & Helseth, J. (2020). Technologies and policies to decarbonize global industry: Review and assessment of mitigation drivers through 2070. Applied Energy, 266, 114848.

- Eckerle, K., Whelan, T., DeNeve, B., Bhojani, S., Platko, J., & Wisniewski, R. (2020). Using the Return on Sustainability Investment (ROSI) Framework to Value Accelerated Decarbonization. *Journal of Applied Corporate Finance*, 32(2), 100-107.
- Rockström, J., Gaffney, O., Rogelj, J., Meinshausen, M., Nakicenovic, N., & Schellnhuber, H. J. (2017). A roadmap for rapid decarbonization. *Science*, 355(6331), 1269-1271.
- Peñasco, C., Anadón, L. D., & Verdolini, E. (2021). Systematic review of the outcomes and trade-offs of ten types of decarbonization policy instruments. *Nature Climate Change*, 11(3), 257-265.
- Skoczkowski, T., Verdolini, E., Bielecki, S., Kocharński, M., Korczak, K., & Węglarz, A. (2020). Technology innovation system analysis of decarbonisation options in the EU steel industry. *Energy*, 212, 118688.

Responsible for Module:

Ikonnikova, Svetlana; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Energy Market: Applied Economic Analysis of Decarbonization Strategies: Firm's Perspective (MGT001365) Limited places (Seminar, 4 SWS)

Ikonnikova S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001145: Energy Economics | Energy Economics

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module entails a final written exam (120 minutes). The exam is a closed-book exam. By answering the questions students show their ability to differentiate and evaluate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Moreover students show their ability to discuss and apply theoretical and empirical methods to selected topics in energy markets. They show that they are able to analyze and assess recent energy market developments, such as for instance the energy transition, using the theoretical and empirical tools they have acquired.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses at TUM or elsewhere in microeconomics and introductory statistics or econometrics

Content:

This module covers the following topics:

- Economics of energy markets
- Analysis of producer strategies
- Analysis of consumer behavior
- Fundamentals of primary energy markets
- Fundamentals of electricity markets
- Analysis of network industries
- Network regulation
- Microeconomics
- Game theory
- Econometrics
- Energy policy

Intended Learning Outcomes:

Students are able to explain and to differentiate different market structures (at wholesale, transportation and retail level) in energy markets, e.g. in gas, coal, oil and power markets. Furthermore, they are able to summarize and compare different strategies and behavior of producers and consumers, as well as on different forms of regulation of network industries. Students are also able to discuss and apply theoretical and empirical methods to selected topics in energy markets. With these tools student will thus be able to analyze and assess recent energy market developments, such as for instance the energy transition.

Teaching and Learning Methods:

The module is a lecture consisting of PowerPoint presentations so as to offer and explain to students all different topics covered in this module. A guest lecture is planned in which practitioners present on selected topics in energy markets. The exercise course comprises different problem sets that discuss problems covered during the lecture. Problem sets are solved individually or in group work and, supported by a presentation, derived and solved jointly with the tutor.

Media:

PowerPoint, exercise sheets, whiteboard, reader

Reading List:

Viscusi, W. et al. (2005): Economics of Regulation and Antitrust, MIT Press. Stoft, S. (2002): Power System Economics, Wiley. Selected journal articles.

Responsible for Module:

Schwenen, Sebastian; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Energy Economics (WI001145) (Vorlesung, 2 SWS)

Schwenen S, Kiszka A

Energy Economics - Exercise (WI001145) (Übung, 2 SWS)

Schwenen S, Kiszka A

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-FA: Catalogue of Elective Modules: Finance and Accounting | Wahlkatalog: Finance & Accounting

Module Description

MGT001352: Applied Sustainability Reporting | Angewandte Nachhaltigkeitsberichterstattung

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfungsleistung besteht aus einer Übungsleistung. Diese besteht aus drei Bestandteilen: (1) einem 60minütigen schriftlichen Test (50%), (2) einer Präsentation der empirischen Analyse (25%) sowie einem dazugehörigen Executive Summary (25%). Im schriftlichen Test zeigen die Studierenden ihre Kenntnisse zu Sustainability Reporting sowie dem regulatorischen Umfeld auf sowie, dass sie in der Lage sind Sustainability Reporting Standards sowie deren Anwendung zu analysieren und konzeptionell-normativ zu beurteilen. Im Rahmen der empirischen Analyse demonstrieren die Studierenden ihre Fähigkeiten zur empirische Analyse von Sustainability Reports anhand ausgewählter Unternehmen. Die Studierenden werden ihre Ergebnisse im Rahmen einer 15minütigen Präsentation mit anschließender Diskussion vorstellen sowie ein schriftliches Executive Summary zu ihren Forschungsergebnissen erstellen.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

keine

Content:

Das Seminar führt in die aktuellen Entwicklungen der Nachhaltigkeitsberichterstattung ein und behandelt insbesondere folgende Themengebiete:

- aktuelle Sustainability Challenges sowie deren Effekte
- Regulatorische Rahmenbedingungen (z.B. European Green Deal)
- aktuelle Forschungsergebnisse zur Nachhaltigkeitsberichterstattung

- aktuelle Entwicklungen im Bereich der Sustainability Reporting Standards und Frameworks
- Nachhaltigkeitsberichterstattung nach den weltweit verbreiteten Standards der Global Reporting Initiative (GRI), den Standards/Entwürfen des International Sustainability Standards Board (ISSB) sowie den Standards/Entwürfen der Europäischen Union
- Empirische Analyse der Nachhaltigkeitsberichterstattung ausgewählter Unternehmen

Intended Learning Outcomes:

Nach dem Besuch der Lehrveranstaltung sind die Studierenden in der Lage

- die wichtigsten sozialen und ökologischen Sustainability Challenges sowie deren Effekte auf globaler, nationaler und regionaler Ebene zu beschreiben und einzuordnen
- aktuelle Entwicklungen im Bereich Sustainability Reporting zu erläutern sowie diese in das übergeordnete regulatorische Umfeld einzuordnen
- die Effekte von Sustainability Reporting auf Basis aktueller Forschungsergebnisse zu beurteilen
- verschiedene Standards und Frameworks zu Sustainability Reporting zu beschreiben und wesentliche Unterschiede aufzuzeigen
- Sustainability Reporting Standards konzeptionell-normativ zu analysieren und zu beurteilen
- Nachhaltigkeitsberichte empirisch zu analysieren und kritisch zu vergleichen
- die Anwendung von Sustainability Reporting Standards zu analysieren und zu beurteilen

Teaching and Learning Methods:

Der Kurs beinhaltet ein interaktives Seminar zu Sustainability Reporting bei dem das gemeinsame Erarbeiten von Kenntnissen und Fähigkeiten sowie die gemeinsame Diskussion und Erörterung im Vordergrund stehen. Hierbei werden die Studierenden in Einzel- und Gruppenarbeiten sowie gemeinsam im Plenum die zentralen Konzepte und Fähigkeiten zur konzeptionell-normativen Analyse von Sustainability Reporting Standards erarbeiten und anwenden. Im Rahmen der empirischen Analyse werden die Studierenden unter Anleitung die Nachhaltigkeitsberichterstattung ausgewählter Unternehmen empirisch analysieren und anschließend präsentieren, wobei eine aktive Diskussion der Ergebnisse mit allen Teilnehmenden erfolgt.

Media:

Moodle; Folien; Flipchart; Berichterstattungsnormen; Übungen; Fallstudien.

Reading List:

- European Financial Reporting Advisory Group. 2022. Sustainability Reporting Standards. Online available at: <https://www.efrag.org/lab3#subtitle1>
- International Sustainability Standards Boards. 2022. Sustainability related disclosures. Online available at: <https://www.ifrs.org/projects/work-plan/#sustainability>
- Global Reporting Initiative. 2021. The global standards for sustainability Reporting. Online available at: <https://www.globalreporting.org/standards>

Responsible for Module:

Ernstberger, Jürgen; Prof. Dr. rer. pol. habil.

Courses (Type of course, Weekly hours per semester), Instructor:

Applied Sustainability Reporting (MGT001352) (Seminar, 2 SWS)

Keiling M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001356: Managing Challenges in the BioTech Industry | Managing Challenges in the BioTech Industry

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written exam (60 minutes) with open questions. The exam serves to assess whether students (1) understand causes and the relevance of problems faced by firms in practice, (2) are able to compare and evaluate different approaches for solving these problems, and (3) can apply basic concepts and theories to solve these problems. There are no aids permitted in the exam.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Specialization/ Major in Finance & Accounting

Content:

The chair for Management Accounting offers different courses for "Advanced Topics in Finance & Accounting" which are mainly offered in cooperation with companies or guest lecturers with a long standing experience in management positions. The courses cover problems and questions which are highly relevant in practice. Topics of each individual course will be announced at the beginning of the semester and can change from semester to semester. This cover will broadly cover challenges for successful management, particularly with regard to R&D budgets, effective boards, and corporate social responsibility. In addition, it will highlight the special features of automation and innovation in a BioTech company.

Intended Learning Outcomes:

At the end of the module, students will have thorough knowledge of the topics covered by the chosen seminar. Students understand daily challenges of firms, the relevance as well as causes of problems faced by firms in practice. They are able to apply basic concepts and theories in practice.

to solve these problems and to compare and evaluate different approaches for solving these problems. These concepts and theories consider processes and analyses of the firm as well as increases in firm value.

Teaching and Learning Methods:

Experienced lectures discuss practical topics and challenges. They provide basic theories that help to overcome these challenges. Presentations based on PowerPoint and further lecture notes help for the understanding.

Media:

Presentations, lecture notes, discussions

Reading List:

Will be announced in the first lecture

Responsible for Module:

Friedl, Gunther; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Managing Challenges in the BioTech Industry (MGT001356) (limited places) (Seminar, 2 SWS)

Pötting S, Schoonjans E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001358: Advanced Seminar Finance & Accounting: Data Science in Finance | Advanced Seminar Finance & Accounting: Data Science in Finance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written report of the final project accounts for 70% of the final grade, and the presentation of the project accounts for 30% of the final grade. The students are required to generate a project idea after consultation with the course instructor and develop it over a period of six to eight weeks. Students are to demonstrate their command of the methodologies covered in the first part of the course.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Interest in application of data science techniques in a finance setting; basic knowledge of python is recommended but not required.

Content:

The main blocks are: 1. Basic semantics of Python 3. 2. Data processing packages and techniques. 3. Data visualisation tools. 4. An Introduction to machine learning. 5. Alternative data sources in finance (NLP based textual analysis, etc.)

Intended Learning Outcomes:

After completion of the course, students should have generated a generic workflow, how upon being confronted with a finance- related topic, to develop a hypothesis, find proper data sources, process the raw data, run statistical instruments on the dataset, and draw conclusions from the outcome. They should also learn how to communicate their ideas and results in an academic manner.

Teaching and Learning Methods:

For the first stage of the course, there will be 6-8 sessions of lectures. The final presentations will be held in a seminar style over one or two days depending on the number of participants.

Media:

Exemplary codes, websites, etc.

Reading List:

Python for Finance - Analyze Big Financial Data by Yves Hilpisch.

Responsible for Module:

Braun, Reiner; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Finance & Accounting (MGT001358): Data Science in Finance (Limited places)
(Seminar, 4 SWS)

Braun R, Dong Y

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-IE: Catalogue of Elective Modules: Innovation & Entrepreneurship | Wahlkatalog: Innovation & Entrepreneurship

Module Description

SOT10028: Social Entrepreneurship Education at Vocational Schools | Social Entrepreneurship Education an und mit beruflichen Schulen

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Auf Basis der Inhalte der Seminarsitzungen, erstellen die interdisziplinären Studierendengruppen (Projekt-)Unterricht für eine berufliche Schulart zum Themenbereich "Social Entrepreneurship Education". Die konzeptionierten Unterrichtssequenzen werden die Studierenden in ihren Gruppen nach Rücksprache mit den betreuenden Lehrkräften sowie den Dozierenden an der jeweiligen Schule durchführen sowie die Schülergruppen bei ihren eigenen Umsetzungsideen unterstützen. Die Studierenden organisieren gemeinsam mit den jeweiligen Lehrkräften der Schule ein geeignetes Präsentationsformat, um die Schülerergebnisse gekonnt in Szene zu setzen. Weiter wird die Umsetzung an der Schule durch die Schülerinnen und Schüler sowie die Lehrkräfte evaluiert. Die Studierenden weisen in einer (unbewerteten) Zwischenpräsentation den zwischenzeitlichen Arbeitsstand nach und erhalten von ihren Mits Studierenden und den Dozenten Rückmeldung. In einer (Projekt-)Abschlusspräsentation diskutieren die einzelnen Studierendengruppen den Umsetzungsverlauf und gehen reflektiert auf die eigenen Erfahrungen sowie die Ergebnisse an den beruflichen Schulen ein. Im Projektbericht bereiten die Studierenden gemeinsam die einzelnen Phasen der Lehrveranstaltungen nach. Der Projektbericht wird in der jeweiligen Gruppe verfasst und umfasst pro Person 4-6 Seiten. Gemeinsam mit der Abschlusspräsentation wird dann die Endnote des Moduls gebildet.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Die Lehrveranstaltung wird in vier Phasen unterteilt. Die erste Phase befähigt die Studierenden inhaltlich, damit diese nach dem Grundgedanken des Social Entrepreneurship-Ansatzes Unterricht bzw. Veranstaltungen planen, durchführen und evaluieren können. In Phase zwei wird (Projekt-)Unterricht für eine berufliche Schule nach Vorgaben der Schule (Challenge) entwickelt. In diesem Zeitraum werden die Studierenden von den Lehrkräften sowie Dozent*innen betreut und beraten. Die Phase drei ermöglicht es den Studierenden, den selbst entwickelten (Projekt-)Unterricht ein- und umzusetzen sowie Schülerinnen und Schülern bei deren Konzepterstellung als Antwort auf die gestellten schulischen Challenges zu unterstützen und zu beraten. Am Ende dieser Phase präsentieren die Schülerinnen und Schüler im Rahmen einer Konferenz ihre Konzepte und Ergebnisse. In einer Abschlusspräsentation (Phase 4) diskutieren die Studierenden die Umsetzung in der Schule sowie die Evaluationsergebnisse und reflektieren ihre Erfahrungen und die Lernergebnisse der Schülerinnen und Schüler.

Intended Learning Outcomes:

Nach dem erfolgreichen Absolvieren des Moduls sind die Teilnehmer in der Lage, eigenständig im Kontext der Social Entrepreneurship Education Unterricht zu planen, gestalten, durchzuführen und zu evaluieren. Sie können adressatenbezogen die entsprechenden Methoden sowie Sozial- und Aktionsformen auswählen und mit Bezug auf theoretische Hintergründe Handlungsalternativen darstellen. Überdies können sie alleine und im Team sowie unter Einbezug externer Vorgaben Unterricht sowie Curricula qualitativ weiterentwickeln. Sie erkennen die vielfältigen Anforderungen, um den Social Entrepreneurship Education Ansatz an der beruflichen Schule zu implementieren, umzusetzen sowie passende Evaluationen zu entwickeln und anzuwenden. Zuletzt entwickeln die Studierenden ihre Projektmanagementkompetenzen.

Teaching and Learning Methods:

Dozentenvortrag, Seminar, Train-the-Trainer, Präsentation, Challenge-Based-Learning, Methoden- und Medientraining, etc.

Media:

Dozentenvortrag, Skript, Powerpoint, Eigenlektüre, Tafelanschrieb / Whiteboard, Online-Plattformen (z.B. Moodle, Kollaborations-Tools, ...); Lernvideos; Train-The-Trainer-Seminar

Reading List:

wird zu Beginn der Lehrveranstaltung bekannt gegeben

Responsible for Module:

Förster, Manuel; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Social Entrepreneurship Education an und mit beruflichen Schulen (Seminar, 2 SWS)

Förster M, Kiefer K

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001341: Prototyping Entrepreneurial Ideas in New Technology | Prototyping Entrepreneurial Ideas in New Technology

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a group project (60%) and a presentation (40%) . Please note that dropping the course after topics of group projects have been chosen and announced will have consequences.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

The module consists of lectures, class discussions, groupwork, group project and individual feedback sessions where students share their progress and receive feedback. The students are supervised by the instructors in different stages of the class.

Intended Learning Outcomes:

After completing this module, students should be able to:

- understand the connection between technological features, entrepreneurial opportunities and business ventures in new technologies
- identify and evaluate entrepreneurial ideas in new technologies
- apply concepts and tools to discover customer problems and formulate a solution-based approach using new technologies
- demonstrate a set of skills including, but not limited to analytical skills, critical thinking, planning, building, and presenting a pitch deck
- develop abilities to work in an entrepreneurial team: communication, coordination, continuous improvement, goal management, rapid prototyping

Teaching and Learning Methods:

Action-oriented learning, interactive teaching, group project, group discussions

Media:

PowerPoint, journal articles, videos

Reading List:

Gruber, M., & Tal, S. (2017). Where to Play: 3 steps for discovering your most valuable market opportunities. FT Publishing International

Christensen, C. M., Hall, T., Dillon, K., & Duncan, D. S. (2016). Know your customers' "jobs to be done": is innovation inherently a hit-or-miss endeavor? Not if you understand why customers make the choices they do. Harvard Business Review, 94(9), 54–62.

Mullins, J., & Komisar, R. (2010). A business plan? Or a journey to plan B? MIT Sloan Management Review, 51(3), 1–5.

Responsible for Module:

Zhao, Ding; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Prototyping Entrepreneurial Ideas in New Technologies: Blockchain (MGT001341) (Limited places) (Seminar, 4 SWS)

Shetty S, Zhao D

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001346: Impact School | Impact School

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The final examination of the project consists of two components. The first is the presentation prepared by the students at the end of the intensive phase. The second is a final report that must be submitted at the end of the semester. Both count for 50% of the grade.

At the end of the intensive phase, the teams present the approaches that they developed for solving the challenges set beforehand. This includes the presentation of a simple prototype, for example a mock-up or a document. The presentation is approximately 10 minutes in length. The students thus show that they are able to translate the information they have received into developing independently a solution and to present it in an appropriate manner. During the intensive phase, they are accompanied and supported by their coaches and the accompanying instructors.

The second part of the grade consists in the report to be submitted at the end of the semester. The report covers the preliminary sessions, the intensive phase as well as the follow-up session. It documents in a structured way how the information received was used to develop the solution. Furthermore, feedback received from the partner who provided the challenge should be considered and incorporated. The report ensures that instead of simply documenting their findings students structure and reflect on them. The final report should not exceed 27,000 characters and must be submitted by the end of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- Basic understanding of entrepreneurship and its principles, such as from attending an introductory lecture on the topic, founding experience, or closely following the media on the topic

- Interest in the creation of societal and ecological impact by developing technology-based solutions

Content:

The seminar is divided into several phases. In the course of two preliminary sessions, the students gain basic knowledge about the focused technology and its opportunities and risks based on existing approaches in the field of climate protection, ecology or society. Ethical implications are also discussed at this point. Furthermore, they get to know the concept of impact as well as the first basics for creating an impact logic. With the help of self-learning materials, they deepen this knowledge until the beginning of the intensive phase.

The core of the Impact School is the five-day intensive phase, during which students work in teams on challenges that are provided by cooperation partners. The challenges focus on social and/or ecological problems that are to be solved using technology-based approaches. During the week, the participants learn the practical application of innovation methods as well as the basic principles of business modelling and develop a simple prototype of their solution. They also receive input from experts in the field. Companies, public administration, non-governmental organizations, student organizations and other partner universities and organizations can be involved as cooperation partners. They also contribute by offering thematic inputs, excursions or similar. The participants form teams at the beginning of the intensive phase and each team is accompanied by a coach. The coaches support the application of the tools and methods learned and ensure a healthy feedback and discussion culture within the teams. The intensive phase ends with an event in which the teams present the solutions they have developed.

There will be a follow-up session, which will introduce participants to the opportunities and resources for pursuing start-up projects within TUM. The first part is a short presentation followed by a Q&A session with start-up consultants. Furthermore, an exchange with a tech start-up that focuses on solving a social or ecological problem is planned.

Intended Learning Outcomes:

The goal of the impact school is to enable students to develop practice-oriented solutions to reach the UN Sustainable Development Goals by using technologies of the future. The students will gain knowledge regarding these technologies from an interdisciplinary perspective. They will learn:

- to assess the benefits and risks of technologies with regard to the generation of social and ecological impact
- to understand and apply the concept of impact and its implications
- to implement the entrepreneurial innovation process in interdisciplinary teams in order to generate concrete solutions.

By developing solutions in teams, students improve soft skills such as creativity, perseverance and communication skills. In addition, they get to know the Munich ecosystem for impact/social entrepreneurship as well as TUM's resources and opportunities for implementing their own start-up projects.

Teaching and Learning Methods:

Lectures, discussions, development of challenge-based solutions, excursion, team coaching sessions, feedback discussions, presentations, Q&A session. The variety of methods ensures that the right method is chosen for each learning content to be taught. For example, new material is presented by experts in the field in keynote speeches and then discussed in large or small groups before it is incorporated into the development of solutions. Feedback discussions and team coaching sessions ensure that the tools and methods presented are correctly understood and applied. Furthermore, the teams are supported in working together in a respectful and effective manner and to develop an appreciative feedback culture. The final presentation at the closing event gives the participants the opportunity to practice their communication skills. Through the final report students consolidate the knowledge gained during the seminar and reflect on it. The exchange with start-up consultants and start-ups provides the participants with an impression of how social and ecological impact can be generated in practice through the implementation of their own start-up projects.

Media:

Videos, presentations, online materials, quiz, exercise sheets, Power Point, flip charts, mural boards

Reading List:

Garette, B./ Phelps, C./ Sibony, O. Cracked it!: How to solve big problems and sell solutions like top strategy consultants. Palgrave MacMillan, 2018

Martin, L. Design of Business: Why Design Thinking is the Next Competitive Advantage. Harvard Business Press, 2009

Kurz, B./ Kubek, D.: Social Impact Navigator, Phineo, 2017, verfügbar auf <https://www.social-impact-navigator.org/>

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Impact School (MGT001346) (Seminar, 4 SWS)

Alexy O [L], Alexy O (Krauss J, Vogel C)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001347: Innovation Facilitator | Innovation Facilitator

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 130	Contact Hours: 50

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Combination of group and individual project assignment - the assignment consists of two components: (1) Instructors will observe students' efforts of preparing, executing and postprocessing Innovation Sprints as well as the support of innovation teams through moderating workshops and team sessions, carrying 80% of the final course grade and (2) an individual reflection paper of up to 1,200 words describing the personal learning journey as innovation facilitator, carrying 20% of the final course grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Practical experience in applying Design Thinking and Business Design as well as distinct ability to work in a team and great interest in working with individuals and teams

Content:

In this train-the-trainer format experienced students learn to design and lead innovation sprints and workshops for student participants. As part of their education students will design Innovation Sprints as well as additional workshops and thereby become Innovation Facilitators who provide other students with an innovative mindset and tools that help them to create innovation and shape a sustainable future. Students will cover all aspects of conducting an innovation sprint, from preparing the content, acquiring participants, communicating with partners, creating a fun workshop atmosphere to conducting the workshop sessions and evaluating them. Next to Innovation Sprints, students will also design and facilitate sessions for other student innovation teams who need support, inspiration and methods on their journey. These sessions revolve around synthesis of insights from qualitative research, ideation and prototyping as well as individual consultations with the teams.

The Innovation Facilitators are part of a self-organized, self-responsible team with clear roles and responsibilities. They have a lot of free space to design and organize the workshops and sprints in a way that makes them successful and valuable for the participants.

Throughout the course they themselves participate in workshops and receive intensive support by experienced facilitators who provide input, feedback, impulses and retrospectives. The facilitators start with a train-the-trainer and team building workshop at the beginning of the semester where they learn how to conceptualize trainings and stimulate different motivational types. In weekly roundtables they get impulses and support from experienced facilitators as well as direct feedback during the sprints. After the first sprint they have a retrospective to derive learnings for the next sprint. They also attend a storytelling workshop to improve their training skills. After the second sprint they will get a workshop on how to facilitate sustainability in innovation when working with teams. At the end of the semester they will have a final retrospective to reflect on their individual strengths and team learnings for future projects.

Intended Learning Outcomes:

By the end of the semester students will have gained hands-on experience as a trainer and facilitator and the ability to design and conduct workshops and trainings with the best possible learning outcome for the participants. They will have deepened their methodological knowledge in Design Thinking and sustainable business design and have the ability to apply it in following founding projects or a lead role in an innovation team. At the same time, they will have experienced working in a diverse, self-organized team and they will have learned to actively create a setting in which teams can work together effectively by giving and receiving feedback, moderating discussions, defining project goals and reacting to changes. Students will be able to actively prioritize and delegate tasks and manage the expectations of different stakeholders.

Teaching and Learning Methods:

This module relies on a combination of input sessions, workshops, teamwork, reflection and individual feedback and support. While input sessions will stimulate students' engagement with relevant tools and topics and prepare them to carry out workshops themselves, team discussions and regular reflection sessions will support the implementation of the knowledge with student innovation teams. Live feedback and support during innovation sprints will allow students to directly improve their training skills.

Media:

Presentations, Canvas, handywork

Reading List:

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation Facilitator (MGT001347) (Seminar, 4 SWS)

Alexy O [L], Schuster J (Guttleber S)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001349: How Digital Platforms Compete – Building and Sustaining Competitive Advantage | How Digital Platforms Compete – Building and Sustaining Competitive Advantage

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

This module is examined via exercises (“Übungsleistung & Testate”), using two elements to assess the different learning goals of this course.

- Oral, individual: 50%. For each session of class, you will be given in advance a set of Assignment Question to prepare for case study discussion. We will assess your contributions to solving these question in class when we discuss the case study to see whether you can define, explain, and apply key elements of the subject matter; describe, compare, and appraise platform business models for a given situation; and build and sustain competitive advantage. Students do not have to be present in every session to achieve full marks; given to-be-defined, legitimate circumstances, such as health matters, and instructor permission, students may also submit written solutions prior to class as a basis of grading. Each student should attend a feedback session around the middle of the term to be informed about their current performance
- Written, individual: 50%. in the last session of class, students will be provided an exercise sheet, in which students will individually highlight in written, condensed form that they understood the key learnings emerging from a synthesis of the class discussions from the entire course

Repeat Examination:

Next semester

(Recommended) Prerequisites:

English proficiency for case preparation and class discussion is critical. Adapting the case specific terminology is necessary for meaningful class discussions. Weekly time budget no less than 5 hours per case (depending on language skills). No specific prior courses necessary. Cases will be provided.

Content:

With the advent of the internet in the early 1990s, digital platforms have become the fastest growing and most valuable businesses of the economy. Based on new high-speed (mobile) telecommunication networks, access to digital platforms has become universal and facilitated opportunities for innovative services, from online searches to social networks, online auctions to music streaming, real-time news distribution to ubiquitous video entertainment, and so on. All corporate entities, or firms, engaged in this market are fairly young and indeed created a different type of 'competitiveness' compared to traditional industries. So 'how digital platforms compete', i.e. how they are building and sustaining competitive advantages, is what we are discussing in this seminar.

Using the Case Study Method, developed by Harvard Business School (HBS) to educate graduate students, we look at one case at a time in the form of a fact-based case description paper, provided to all participants one week prior to class. Each (weekly) class focuses on one digital platform providers' competitive performance and discusses its competitive options at the time of the case, covering three broad topic areas: 1) How successful firms build and sustain competitive advantages; 2) Digital platforms' specific 'network effects' and resulting business models and their economic results; 3) Dependence of digital platforms on facilitating network infrastructures. With about 12 different cases, e.g. on Amazon, Google, Spotify and WhatsApp, the variety/multitude of competitive actions for digital platform firms will become apparent during of the seminar. This shall enable students, when later in life confronted with real-life competitive issues, to apply their judgement based on the experience of the variety/multitude of cases discussed in the classroom. That is how close a classroom discussion can come to the 'real world'. In addition, the active case discussions provide a good exercise of 'disagreeing in an agreeable manner', which is good practice.

Intended Learning Outcomes:

Knowledge-related outcomes

Upon completion of this module, students will be able to:

- Define, explain, and apply in practice key theories related to platforms and platform business models
- Interpret, classify, and assess the conduct and performance of firms trying to establish, actively deploying, or fighting against platform business models
- Describe, compare, and appraise different platform designs for a given situation
- Distinguish the newly learned theories of platforms, platform business models from previously learned perspectives
- Evaluate how environmental change may affect existing platforms and theories around platform (business models)

Skill-related outcomes

- Improve diagnostic and analytical skills (i.e., structured problem-solving)
- Build up critical thinking and interpretation skills
- Enhance verbal and argumentation skills via presentations and group discussions

Teaching and Learning Methods:

The course will mainly draw on the Case Method, most famously used at Harvard Business School. Since the selected cases were not specifically written for this seminar (Strategy, General Management), 'assignment questions' are added to the case preparation in order to provide the specific focus on the seminar theme of competitiveness. There is no objective to 'solve' a case and the aim is to show various options from which to choose a preferred way of action. A 'vote' on the best 'strategy' at the end of a class discussion usually presents the principal options, not 'right' versus 'wrong', rather a 'competition' of the strong against the weak argument presented by the participants.

Media:

The largest share of this course will be co-developed by all of us through discussions of course materials. In each session, we will help facilitate and guide the course discussion by taking notes on whiteboards. We strongly encourage you to take notes yourselves, and to consider not bringing laptops (they are not as bad as phones [NO PHONES!], but will still inhibit your learning). Specific topics and definitions may be introduced using PowerPoint slides. Finally, note how a large share of learning will occur through you preparing individually and in groups for the in-class session. Techniques to do so will be introduced in the first session of class.

Reading List:

An up to date reading list will be distributed around the first session of class each semester.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

How Digital Platforms Compete – Building and Sustaining Competitive Advantage (MGT001349)
(Limited places) (Seminar, 4 SWS)

Alexy O [L], Melcher H

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001351: Yes we can! - Empowerment as composition | Yes we can! - Befähigung als Komposition

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German/English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination performance falls into the category of exercises and consists of two parts.

- Written and oral homework (70% of the grade): Students demonstrate their theoretical understanding of the concepts and ideas covered by regularly preparing short written reports and discussing them with the group.
- oral test (30% of the grade) The ability to contextually apply the concepts learned, as well as demonstrating the social skills acquired, such as stress resilience, leadership and analytical skills, will be evidenced by a prepared oral presentation in front of an audience (15 min.)

Repeat Examination:

Next semester

(Recommended) Prerequisites:

- curiosity
- motivation
- (Interest in) thinking out of the box
- Music/instrumental playing not required, but enjoyable

Content:

How many times have we heard this: As future value-driven managers and social entrepreneurs, as servant leaders and social role models, etc., we prudently ensure sustainable innovation and invention, foster meaningful creativity, communicate constructively, work efficiently in balance, negotiate wisely, design clearly, practically and aesthetically,...
yes, we can(could) be those charismatic changemakers, IF!!!!...

To fathom the conditionality behind this auspicious IF, we will make use of the most intense teaching language mankind has used since the beginning: Music. Music like that of J. S Bach

lets us hear the vision of a society striving for perfection and its equivalent economy in its contrapunctus - and at the same time it gives us an idea of how and by what this becomes possible: Why the music by Bach, Mozart, Schubert, etc. is able to do this is revealed in this course, by a look at a wide variety of disciplines - from neurobiology, to quantum mechanics, to philosophy. Here we find amazing answers to questions about how sustainable learning and (re)thinking become possible, why Design Thinking is an important tool for human development, why and how we need to decelerate in order to have more time and power, how relationship and connection/connectedness work in all areas, why without comprehensive (heart) education as the single most important empowerment ever, prosperity as well as political and economic peace will never be possible.

We reflect together, supported by discussion and music, where good leadership begins and what forms it could take. Topics discussed thus include:

- Neural processes and their usefulness/control by a person (embodiment and priming) to maximize efficiency in daily and professional life
- Music composition processes
- Philosophy and ethics of responsible action
- Effective transmission of messages, supported by stage presence and body posture

Can we? Yes we can!

Intended Learning Outcomes:

At the end of the course, students will be able to:

- understand socially competent (self-)leadership and apply it in various situations
- to analyze in a networked manner and to develop sustainable approaches to problem solving for personal, concrete and general economic issues
- to combine economic and ethical aspects
- to use the acquired soft skills (e.g. self-awareness, presentation skills, negotiation skills, personal initiative) for negotiation situations
- apply practical exercises to create a calm and stable work environment and thereby increase performance/efficiency
- deal with stress (resilience)
- to evaluate their entire thinking, perception and actions from different ethical points of view

Teaching and Learning Methods:

The content of the course is designed interactively with the students in groups as well as in individual exercises, e.g. through discussions, piano recitals, presentations. New material and subject areas are also taught through various techniques such as lecture, self-study or flipped classroom. The course usually takes place on two days in units of max. 3h in presence. The location of the course will be announced in time, but will probably be one of the rooms at TUM where a grand piano is available (e.g. at TranslaTUM at Rechts der Isar).

Media:

Presentations, movies and concerts

Reading List:

Stone, Zander: The art of possibility 2002;

Hofstadter: Gödel, Escher, Bach - ein endloses geflochtenes Band 2016;

Muhammad Yunus: Creating a world without poverty 2009;

additional literature when course starts

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Yes we can! - Befähigung als Komposition (MGT001351) (Seminar, 6 SWS)

Alexy O [L], Sonnek (Zeis) C

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001354: Artificial Intelligence for Innovation and Entrepreneurship | Artificial Intelligence for Innovation and Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module grade is based on a group presentation. During the seminar, students will ideate their own AI use cases, and assess them in terms of value and ease of implementation. In a group they will prioritize one use case and work on the implementation along the machine learning lifecycle taking into account ethical considerations. The group work has to be presented in the seminar and ends with a written report.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Artificial intelligence (AI) holds tremendous promise to benefit nearly all aspects of our society, including the economy, healthcare, security, the law, transportation, even technology itself. For organizations as well as for entrepreneurs there is no way around this technology, if they want to be and stay competitive. This module covers:

- Introduction to AI, algorithms, and machine learning
- The technology behind AI
- AI for innovation and entrepreneurship
- Ideating, assessing, prioritizing AI use cases
- Introduction to MLOps and building AI along the machine learning lifecycle
- Ethics and human centric design

Intended Learning Outcomes:

Students gain understanding of the state of the art in artificial intelligence and how it is and can be applied in organizations and startups. Students will develop a solid and jargon free understanding of the technology and concepts such as AI, machine learning and which opportunities and challenges it brings to organisations and society. Students gain the ability to ideate and assess their own AI use cases and learn what it takes to implement them bring them into production

Teaching and Learning Methods:

The module is taught as a 2 SWS seminar. New concepts will be presented as lecture and then applied in group work in exercises which prepare students for the group presentation. To build bridges between course work and self-studying blended learning is applied.

Media:

Whiteboard, Slides, Code-Examples, Textbook, journal articles and papers

Reading List:

Agrawal, A., Gans, J., & Goldfarb, A. (2018). Prediction machines: The simple economics of artificial intelligence.

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Artificial Intelligence for Innovation and Entrepreneurship (MGT001354) (Seminar, 2 SWS)

Post T

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001355: Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship | Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination for this seminar is based on a final written seminar paper (65%), the final presentation of the seminar paper (20%), and feedback on a peer's seminar paper (15%). Please note that dropping the course after topics have been chosen and announced leads to grade 5.0 (failed). While the grade for your final seminar paper (10 / 15 pages +/- 10%) will be determined purely on the last version you hand in before the final submission deadline (see "course outline"), you will also have to iterate on this throughout the class, by writing a draft paper earlier in the semester and giving a 10-15 minutes presentation on this earlier version (worth 15% of your grade).

Please note that we will require you not only to submit your paper to us via Moodle, but also to TurnItIn, for an automated citation check.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None

Content:

The module consists of an introduction to problematization methods for academic research/ process of scientific writing. Early on in the course, the topics for each student's seminar paper will be decided. Based on their topic students prepare their term paper which they will present at the end of the module.

The module also involves multiple (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The students are supervised by the instructors of the module who are members the chair. Within the module the topics will be discussed after the final presentations.

Intended Learning Outcomes:

After the successful completion of this module, students are able to:

1. Understand the scientific research process
2. Understanding the steps in writing a scientific seminar paper, including how to evaluate academic literature, engage in an academic debate, and prepare and defend academic arguments.
3. Develop critical thinking and several soft-skills, including but not limited to: analytical skills, presentation, argumentation, storytelling, and synthesis.

Teaching and Learning Methods:

The goal of this module is for students to understand key concepts relevant to academic research on environmental entrepreneurship. This body of research focuses on market-based mechanisms to address environmental problems (e.g. entrepreneurship in the context of sectors such as renewable energy). Through the course they will develop specialist knowledge on their selected topic of interest.

More broadly the seminar work also prepares students for academic work (e.g. Masters Thesis, preview into PhD work). Students will write a seminar paper on a specific topic, present this topic to the class, discuss papers, and be involved in scientific discussions on a variety of topics in class. Students are provided with an overview of important readings and literature. Over the course, students will develop their own research questions and identify relevant readings in advancing their seminar paper.

Media:

Presentations, videos, interactive team-work templates

Reading List:

York, Jeffrey G., and Sankaran Venkataraman. "The entrepreneur–environment nexus: Uncertainty, innovation, and allocation." *Journal of business Venturing* 25.5 (2010): 449-463.

Vedula, Siddharth, et al. "Entrepreneurship for the public good: a review, critique, and path forward for social and environmental entrepreneurship research." *Academy of Management Annals* 16.1 (2022): 391-425.

*A full list of readings will be provided at the course introduction

Responsible for Module:

Vedula, Siddharth; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship: Environmental Entrepreneurship (MGT001355)
(Seminar, 4 SWS)

Vedula S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law | Advanced Seminar Innovation & Entrepreneurship: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations | Advanced Seminar Innovation & Entrepreneurship: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001364: Family Businesses | Family Businesses

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The module will rely on an exam (100% of the overall mark), asking students questions on the core topics discussed in class. Each question requires a reflective and elaborate response from the students drawing on the course content and showing critical thinking skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This foundation course “Family Businesses” deals with the particularities of family businesses and includes the core topics of succession, finance, governance, entrepreneurship, innovation, and corporate social responsibility.

Students will explore the advantages and disadvantages of family owned enterprises compared to non-family firms. The module will also discuss the definition and prevalence of family firms around the world and help students understand the heterogeneity of family businesses.

The module will draw from theory and practice, as we will rely on both, academic literature and practical insights through case studies and guest lectures.

Intended Learning Outcomes:

After completing the module students will be able to:

- Understand and critically reflect on the role of family firms in Germany and worldwide
- Understand family owners’ non-financial and financial goals that drive decision making in family firms
- Reflect on possible advantages and disadvantages of family firms
- Compare theoretical insights on family firms with practical insights through guest lectures

- Apply the learning of the module on real world case studies
- Evaluate specific family firms' actions to address contemporary and emerging opportunities and challenges

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Berrone P, Cruz C, Gomez-Mejia LR. Socioemotional Wealth in Family Firms: Theoretical Dimensions, Assessment Approaches, and Agenda for Future Research. *Family business review*. 2012;25(3):258-279.

Gomez-Mejia LR, Cruz C, Berrone P, De Castro J. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*. 2011;5(1):653-708.

Kellermanns FW, Eddleston KA, Zellweger TM. Article Commentary: Extending the Socioemotional Wealth Perspective: A Look at the Dark Side. *Entrepreneurship theory and practice*. 2012;36(6):1175-1182.

Richards M, Kammerlander N, Zellweger T. Listening to the Heart or the Head? Exploring the "Willingness Versus Ability" Succession Dilemma. *Family business review*. 2019;32(4):330-353.

Zellweger T. Managing the Family Business#: Theory and Practice.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB14002: Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations | Advanced Seminar Innovation & Entrepreneurship: Sustainable Entrepreneurship - Theoretical Foundations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a research paper (max. 7.500 words). The students show that they are able to apply theoretical perspectives to the context of life sciences. Moreover, they develop an argument matching the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general and in the field of life sciences in particular. In the research paper students show that they can evaluate different approaches and develop their own ideas for life science-related sustainable ventures.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Courses in entrepreneurship, corporate sustainability and/or sustainability marketing are recommended.

Content:

Whether it is tackling climate change, resource degradation or social inequalities - responding to sustainability issues constitutes the biggest challenge for businesses in the 21st century. Embracing a great range of industries including food, energy or textiles, the field of life sciences is a key area for sustainability. Since the production of these goods accounts for an extensive use of resources, there is great potential for effecting real improvements on a way towards more sustainable production and lifestyles. The course "Advanced Seminar Life Sciences and Management" will investigate this exciting and ongoing industrial transformation. It will deal with the following topics (all topics will be explained in general and then discussed in the context of life sciences in particular):

- 1) Introduction to Sustainability and Entrepreneurship
- 2) Sustainable Entrepreneurship
- 3) Opportunity Identification
- 4) Development of Double and Triple Bottom Line Solutions
- 5) Forming and Funding of New Sustainable Ventures
- 6) Market Entry
- 7) Sustainable Entrepreneurship and Life Sciences - Reflections and Discussion

Intended Learning Outcomes:

Upon successful completion of this module, students will be able to (1) summarize and (2) evaluate the socio-economic problems society is facing. They will (2) match the concept of sustainable entrepreneurship as a promising approach for addressing complex sustainability issues in general, and in the field of life sciences in particular. More specifically, students will (3) be able to identify the venture creation process from opportunity identification to market entry in the context of sustainability and life sciences. In addition, participants will be able to (4) apply this knowledge to the field of life sciences. Finally, the students will be able to (5) critically evaluate case studies from the field of life sciences and to (6) create own ideas for sustainable ventures in this context.

Teaching and Learning Methods:

The module is a seminar which intends to familiarize the student with the relevant literature and follows an interactive course format with group work assignments and guest lectures. This is the appropriate format for this advanced level module because it encourages the students to go into further detail and to deal with the issues in an integral, interactive and independent way.

Media:

Presentations, slides, cases, links and further literature will be provided via www.moodle.tum.de

Reading List:

Muñoz, P., & Cohen, B. (2018). Sustainable entrepreneurship research: taking stock and looking ahead. *Business Strategy and the Environment*.

The module is based on key scientific papers on each topic. These form the basis for classroom discussions and are to be used for developing an argument in the reflection essay. All articles are provided as pdf files in TUM Moodle (<https://www.moodle.tum.de>).

Responsible for Module:

Belz, Frank-Martin; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Life Sciences, Management & Policy / Innovation & Entrepreneurship
(WIB14002): Sustainable Entrepreneurship - Theoretical Foundations (Limited places) (Seminar, 4 SWS)

Belz F, Salvi E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WIB26995: Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design | Advanced Seminar Innovation & Entrepreneurship: Innovation and Organization Design

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 135	Contact Hours: 45

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a seminar paper (65% of grade) and a set of presentations (35% of grade). Drawing on the seminar paper, we will examine the degree to which students are able to engage in an academic discussion in the field of innovation, organization design, or strategic entrepreneurship; define and structure a complex problem from that field, and describe and analyze it academically. Two presentations will further highlight whether students are able to present their findings comprehensively and precise (seminar paper presentation: 15 minutes; 25% of total grade) and whether they are capable of applying and connecting their insights in the form of feedback on another seminar paper (discussion of another paper: 8 minutes; 10% of total grade). Across both presentations, we will further evaluate if students are available to communicate clearly and to perform professionally.

Repeat Examination:

Next semester / End of Semester

(Recommended) Prerequisites:

Introductory courses on research methods (for example, "Empirical Research in Management and Economics").

Content:

The module prepares students for the scientific work in their master theses and provides them with deepening insights into academic literature on innovation, organization design, or strategic entrepreneurship. Besides writing a seminar paper, this involves presenting their final results.

Accordingly, students in this seminar may choose from a broad range of topics around the development of new and established businesses, the strategies managers devise and execute

including questions of positioning, and the organizational design choices they have to deal with. Potential areas questions of study may include:

- Venture creation: How are new businesses created and how do they evolve?
- Organization design: How do their structures develop and change?
- Growth strategies: Are there different paths to consistent configurations and if yes, how do they differ from each other?
- New forms of organizing: What role do supposedly more novel approaches to conducting business (ecosystems, crowdsourcing, open innovation...) or funding companies (incubators, crowdfunding...) play, when should be used, by whom, and how?
- Role of environmental conditions: How does the business environment influence the decision-making of new or established ventures, such as through membership in categories?

Intended Learning Outcomes:

Upon successful completion of this module, students will be able (1) to read and (2) understand academic literature on the topic of innovation, organization design, or strategic entrepreneurship. Furthermore, students are able (3) to create their own academic paper. Additionally, they will be able (4) to present their paper and (5) summarize their findings. Moreover, students learn how (6) to lead a academic discussion. Finally, they (7) understand the process of scientific publication.

Teaching and Learning Methods:

The module consists of an introduction to scientific writing and several sessions about academic problem definition and solving, based on which students may select and continuously refine their topic. The topic choice will further be discussed in individual feedback meetings with the seminar instructors.

Based on their topic, students will prepare their term paper which they will present at the end of the module. The students are continuously supervised by the instructors of the module. The module involves (group and/or) individual feedback sessions, where students can share their progress and receive feedback. The seminar topics may also be discussed after the final presentations.

Media:

MS Office, PowerPoint, Whiteboard, Flipchart

Reading List:

- Davis, M. S. 1971. That's interesting. *Philosophy of the Social Sciences*, 1(2): 309-344. (Note: the first and last sections are particularly "interesting")
- Sutton, R. I. & Staw, B. M. 1995. What theory is not. *Administrative Science Quarterly*, 40(3): 371-384. (Note: this article has several responses in the same issue of the journal which you may also find helpful.)

Further readings will be detailed in the respective course syllabi before the first session of class.

Responsible for Module:

Alexy, Oliver; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

Innovation and Organization Design (WIB26995) (Limited places) (Seminar, 4 SWS)

Alexy O [L], Reetz D (Huber D)

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001126: Designrecht | Designrecht

Version of module description: Gültig ab winterterm 2016/17

Module Level: Master	Language: German	Duration: one semester	Frequency: summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

In the final assessment students will need to demonstrate to what extent they have met the Learning Objectives. This assessment will be held as a written exam of 60 minutes.

Students will be asked theoretical questions. This will demonstrate to what extent they have memorised and understood principles of German and European intellectual property law.

Students will also be asked to apply their knowledge of German and European design law, copyright law, trademark law, and supplementary protection under unfair competition law to known and fictional cases. This second part demonstrates if students have developed the required legal analytical skills. Students also need to demonstrate their ability to apply their knowledge to fact settings not discussed in the lecture, and to evaluate the legal consequences.

Theoretical questions count for approximately 40 per cent, while case studies count for approximately 60 per cent.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

-

Content:

This module provides an introduction to basic concepts of German and European design law, copyright law and trademark law.

Topics covered are:

- Introduction to Intellectual Property Law in Germany and the EU
- Design Law
- Copyright Law
- Trademark Law
- Supplementary Protection under Unfair Competition Law

Intended Learning Outcomes:

At the end of this subject students will be able

- (1.) to understand the basic principles of German and European intellectual property law,
- (2.) to grasp the legal framework of business activity, in particular regarding design protection,
- (3.) to analyse legal implications of typical business situations and to identify their options,
- (4.) to present the results of their analysis in a written memorandum.

Teaching and Learning Methods:

The lecture will cover the theoretical aspects of the module in a discussion with the lecturer. It will also provide the opportunity to work individually or in groups on case scenarios (known and unknown), covering issues of design protection. The purpose is to repeat and to intensify the content discussed in the lecture and to review and evaluate legal issues. Students will develop the ability to present these findings in a concise and well-structured written analysis.

Media:

Presentations (PPT), Cases studies

Reading List:

Rehmann, Designrecht
Götting, Gewerblicher Rechtsschutz
Pierson/Ahrens/Fischer, Recht des geistigen Eigentums
Rehbinder/Peukert, Urheberrecht
Sosnitza, Deutsches und europäisches Markenrecht
Ahrens, Geistiges Eigentum und Wettbewerbsrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Designrecht (WI001126) (Vorlesung, 2 SWS)

Dubov B

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001141: Principled Entrepreneurial Decisions | Principled Entrepreneurial Decisions [PED]

How to make game-changing decisions

Version of module description: Gültig ab winterterm 2017/18

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 140	Contact Hours: 40

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

(1) presentation of their team values and principles for their company/project (focus in SS) and/or presentation of their principles to empower formal instruments of company/project culture, craft strategy and scale with metrics (focus in WS)
and

(2) written reflection on those principles or role-play exercises

As individuals hand in an exercise on personal values and principles and written reflection on principles or role-play exercises

The seminar is on application

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Application & willingness for active participation

being or becoming part of a Startup or project team

Students who are interested in Venture Capital and decision-making of founders are also welcome

Content:

This course will challenge the next generation of leaders and entrepreneurs to think critically about how their personal values and principles inform the difficult decisions they will have to make as they grow their business. The course will first equip students with frameworks to crystalize their own values and principles. Students will learn to apply their own core values. A selection of readings and case studies will provide students with tangible examples of the challenges other entrepreneurs have faced. Each class will be highly immersive, featuring conversations with entrepreneurial guest speakers and break-out sessions. Through conversations with case

protagonists and each other, students will leave the class more prepared to navigate the ethical dilemmas that they may encounter during their professional lives.

Intended Learning Outcomes:

- 1_ students are able to brave difficult situations in the startup context
- 2_ Enable students to begin to craft their own framework – personal and company
- 3_ Discuss case examples (i.e. Flixbus, Konux, ProGlove, ...) and conduct exercises to help them on their journey

Teaching and Learning Methods:

lectures
group works
role plays
real Start-up cases with the founders in class
discussions

Media:

presentations
founders in class
video

Reading List:

Dalio, R. (2017). Principles: Life and work. New York, NY
Horowitz, B., & Kenerly, K. (2014). The hard thing about hard things: building a business when there are no easy answers. New York, NY: Harper Business.
More literature will be provided in class

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001194: Who is responsible for food and health? Social and cultural perspective on food, health, and technology | Who is responsible for food and health? Social and cultural perspective on food, health, and technology

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading will be based on a presentation (~20 minutes) and a final paper consisting of a 2-page outline and the paper at the end of the term itself. Additionally, students get the opportunity to write comments/responses on the readings as a voluntary midterm assessment. Students will be assessed on their understanding of the course material, their application of relevant social science concepts to real-life events, and discussion of controversies raised by the readings. The topic of the final paper should relate to food and health and questions of responsibility. Students will receive feedback on their outline of their final paper in due time. This will assure students find a feasible topic, and use an appropriate key concept (or concepts) and literature from class. The final paper will be assessed on the incorporation of this key concept(s) and knowledge from the module (3000-4000 words).

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

How to eat and live healthily are important topics and central values within contemporary societies, particularly in industrialized countries. Here, being healthy has become an important goal and source of personal as well as shared identity for many, which people often also define through the types of food that they eat. Health and food are also important governance issues as governments across the world face challenges like rising obesity rates, environmental pollution or the climate crisis. At the same time, techno-scientific reconfigurations of food, such as the

example of genetically modified food, are often very contentious and the source of heavily debated controversies as purported healthier and/or more sustainable solutions. Along the way, different actors, collectives and institutions claim responsibility for themselves or others over who gets to, and should decide on health and (healthy) food. This module explores social and cultural perspectives on food, health and related technologies and innovations to inquire what role the practice, normative approach, and policy of 'responsibility' takes on. We will ask: who is responsible for food and health? Is it the individual, the family, the state, medicine, the market, or all of these actors to different degrees? What is good food and health, anyways? And what role do scientific knowledge and technological innovations play in settling these types of questions? The module foregrounds critical discussions on the ways in which scientific knowledge and technological innovations play a role in how we perceive (healthy) food and our own (healthy) bodies. It traces how and why being healthy has become such a central value particularly in societies of industrialized countries. Health has turned not only into a central source of personal identity, but also into an important object of governance, with states investing in the health of their populations. The module further emphasizes the discussion on how (scientific) knowledge related to questions of food and health is produced but also contested. These issues will be discussed in relation to specific contemporary topics, such as the obesity epidemic, microplastic pollution, agricultural biotechnology, vertical farming or epigenetics. Throughout the course, students get to know relevant social science concepts, such as biopolitics, neoliberal orders and responsabilization, nutritional scientism, healthism, among others, which will enable them to think critically about the social and cultural aspects of food, health, innovation and technology.

Intended Learning Outcomes:

Students will understand and apply a range of key concepts, theoretical frameworks, and analytic tools from the domains of Science and Technology Studies (STS), Sociology, Anthropology, and related social science disciplines (biopolitics, nutritional scientism, healthism, as well as responsabilization and neoliberal orders, technological determinism). They will be able to analyze the complex interactions between food, health and questions of responsibility (e.g. food as a form of health identity; health paradigms in society, policy, research & innovation; food regulation/ labeling and notions of health and sustainability). Students will further:

- Discern how food and health relates to questions of social order (gender, religion, state, etc.)
- Gain a critical understanding of techno-scientific innovation in what comes to be understood as 'healthy,' and how this relates to wider political, economic and other social orders
- Comprehend how regulatory systems (policy, food and drug labeling, etc.) shape our understanding of what counts as "healthy" (food)
- Research interdisciplinary literature and write a paper on a health- and/or food-related issue that inquires who is considered responsible (state, industry, researchers, consumer activists, etc.)

Teaching and Learning Methods:

Students will receive input and benefit from the expertise of six university teachers who will individually or in teams present specific topics and key concepts. Students will also engage in extensive in-class discussions based on the reading, and do practical mini-workshops with their peers to learn how to reflect and position themselves with regard to these issues. Seminar sessions and discussions are based on assigned readings provided in the syllabus at the

beginning of the term. A key part of instruction is the close reading of weekly assigned texts and reflections of key arguments and concepts. Moreover, the course will use regular exercises to achieve learning progress and practice the application of course content to real-life cases.

Media:

Reader (literature provided in course moodle); power point presentations; flipcharts; video clips; newspaper articles

Reading List:

Clarke, A. E., Shim, J. K., Mamo, L., Fosket, J. R., & Fishman, J. R. (2003). Biomedicalization: Technoscientific Transformations of Health, Illness, and U.S. Biomedicine. *American Sociological Review*, 68(2), 161-194.

Crawford, R. (1980). Healthism and the Medicalization of Everyday Life. *International Journal of Health Services*, 10(3), 365-388.

Nettleton, S. (1997). Governing the Risky Self: How to Become Healthy, Wealthy and Wise. In A. Petersen & R. Bunton (Eds.), *Foucault, Health and Medicine* (pp. 207-222). London/New York: Routledge.

Rose, N. (2006). *The Politics of Life Itself: Biomedicine, Power, and Subjectivity in the Twenty-first Century*. Princeton, NJ: Princeton University Press.

Scrinis, G. (2008). On the Ideology of Nutritionism. *Gastronomica: The Journal of Critical Food Studies*, 8(1), 39.

Responsible for Module:

Penkler, Michael; Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001211: Understanding Regional Innovation Cultures | Understanding Regional Innovation Cultures [InnoCultures]

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The instructors base their assessment on three assignments spread throughout the term. The weighing of each assignment is indicated in parentheses. The instructors only grade the written outcomes. Oral presentations are optional and meant to enhance in-class discussions. All exercises allow students to use learning aids (academic literature, notes, web sources, etc.).

The first take-home exercise (20%) requires a written response to one of the course readings (500-1000 words), which the student also presents in class. These reaction papers identify key ideas of the course and enhance the discussion in the classroom. The instructors assess the ability to summarize and appraise academic literature, which the student has studied on his/her own.

The second take-home exercise (20%) requires an analysis of a recent event, ongoing controversy or general problem related to regional innovation. The participant documents his/her findings in a brief report (500-1000 words) and present his/her analysis in class, which the instructors assess in terms of the student's application of the acquired concepts and analytical skills to the case material.

The final take-home exercise (60%) is a written report in which students combine and apply their competencies to a complex topic related to regional innovation (5000-6000 words). The instructors assess the report with regard to the student's overall ability to independently systematize, evaluate, and reflect a specific case based on the attained skills.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

The student should have a basic academic understanding of social, political, and cultural issues. Ideally, he/she has previously taken a course in sociology, political science, history, philosophy, anthropology or related disciplines. Previous experience with qualitative/interpretative research, independent study with theoretical literature, and advanced academic writing are highly recommended.

Content:

Courses in this module introduce the students to current issues and conceptual questions around the notion of regional innovation cultures from a qualitative social science perspective. The teaching follows the “cultural turn” in innovation theory and offers new possibilities for looking at how and where cultural imagination matters in innovation policy. We start from a simple diagnosis: Innovation as a public discourse is more prominent than ever for regions at different scales – such cities, the nation state or the European Union. Yet, the geography of innovation is thoroughly unequal. Repeated failures to spur economic and technological progress in so-called developing or underperforming regions have revealed the limits of thinking about innovation in terms of quasi-universal models (e.g. innovation systems) or best practice transfer (e.g. Silicon Valley). Courses in this module explore how regions bring global innovation imperatives in alignment with unique local social, cultural, and political contexts. The students acquire competencies to analyze and explain the ways in which regions imagine the purpose, meaning, and limits of innovation differently. This perspective allows the participants to understand the situatedness and inter-regional diversity in the rationalization and practice of innovation policy.

Intended Learning Outcomes:

When completing the module, the students are able to identify and discuss key concepts from the social sciences, particularly Science and Technology Studies (STS), and apply them to problems around regional innovation and the cultural forces that shape it. They have the capability to systematize, compare, and generalize complex empirical material in a reflexive and critical way. Students are able to interpret and explain technological innovation as a social process, including the sociomaterial co-production of physical infrastructures and artifacts with regional institutions, political histories, and regional identities. They are proficient in creating conceptually informed arguments that identify region-specific patterns and recurring tensions in a world shaped by technology, and speak about them with confidence in the context of their own academic and professional interests. Upon completion of this module, participants can develop and justify better kinds of innovation policy that take the normative, political, and epistemic underpinnings of the economy more serious. Students can also demonstrate how to reconceive established notions of “success” of governmental and corporate innovation strategies. Such a reflexive perspective will allow them to evaluate the generalizability of seemingly universal solutions and to imagine new inroads for inclusive and democratic governance in innovation.

Teaching and Learning Methods:

Courses in this module are conceptually dense, reading-heavy, interdisciplinary, and student-driven. They require an exceptional degree of commitment, intellectual curiosity, and time investment.

Guided by the course instructors, the participants acquire a number of conceptual lenses and analytical skills through self-study of the literature from a number of fields, including sociology, political science, human geography, science and technology studies, and innovation studies. In class, the students discuss interactively different approaches to the particular issues and cases under consideration to develop their creative and reflexive capabilities. The classes are predominantly interactive and include group as well as individual teaching methods.

Media:

Powerpoint and flipchart presentations in class. Communication and distribution of materials via Moodle: academic literature, discussion forums, additional web resources, course documentation, etc.

Reading List:

Jasanoff, S., Kim, S.-H., 2009. Containing the Atom: Sociotechnical Imaginaries and Nuclear Power in the United States and South Korea. *Minerva* 47 (2), 119–146. doi:10.1007/s11024-009-9124-4.

Engels, F., Wentland, A., Pfotenhauer, S.M., 2019. Testing future societies?: Developing a framework for test beds and living labs as instruments of innovation governance. *Research Policy* 48 (9), 103826. doi:10.1016/j.respol.2019.103826.

Pfotenhauer, S., Jasanoff, S., 2017. Panacea or diagnosis?: Imaginaries of innovation and the 'MIT model' in three political cultures. *Social Studies of Science* 47 (6), 783–810. doi:10.1177/0306312717706110.

Responsible for Module:

Pfotenhauer, Sebastian; Prof. Dr. rer. nat.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-LSMP: Catalogue of Elective Modules: Life Sciences Management & Policy | Wahlkatalog: Life Sciences Management & Policy

Module Description

MGT001337: Process tracing: Methods and applications | Process tracing: Methods and applications

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

To examine the psychological processes underlying decision making, several process-tracing methods have been developed—such as information boards, eye tracking, verbal protocols, skin conductance measurement, and functional neuroimaging. The methods allow researchers to track people's predecisional information search and information processing, and to measure attentional processes and emotional reactions. This module gives an overview of existing process-tracing methods and discusses applications of the methods. In addition, we will discuss the use of process data for developing and testing cognitive process models of behavior.

Intended Learning Outcomes:

At the end of the module, students have knowledge of existing process-tracing methods and their functionality. Students also know which process-tracing method is most appropriate for a given

research questions, which process measures can be collected with the methods, and how to interpret the measures. In addition, the students are familiar with the criticisms and limitations of the various process-tracing methods. Finally, they know exemplary cases illustrating how process data can be used to develop behavioral interventions—for instance, to improve people's decision making.

Teaching and Learning Methods:

In short presentations, the students present empirical articles that illustrate applications of the various process-tracing methods. The module also involves small-group exercises, in which students develop experimental study designs with the process-tracing methods and get some hands-on experience operating them.

Media:**Reading List:**

Schulte-Mecklenbeck, M., Johnson, J. G., Böckenholt, U., Goldstein, D. G., Russo, J. E., Sullivan, N. J., & Willemsen, M. C. (2017). Process-tracing methods in decision making: On growing up in the 70s. *Current Directions in Psychological Science*, 26(5), 442–450.

Schulte-Mecklenbeck, M., Kühberger, A., & Johnson, J. G. (Eds.). (2019). *A handbook of process tracing methods*. Routledge.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001338: The replication revolution | The replication revolution

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments; in addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The current replication crisis that has shaken several disciplines in the behavioral sciences raises many important questions about current research and publication practices. In this module, we discuss the history and possible causes of the replication crisis and get to know recent methodological developments and proposals towards a more reliable, robust, and transparent science (e.g., Bayesian data analysis, replication research, preregistration, open data).

Intended Learning Outcomes:

At the end of the module, the students will understand the current research practices and other problems that have contributed to the replication crisis (e.g., p-hacking, HARKing, underpowered studies, publication bias). The students will be able to set up a preregistered study, implement practices of open science (e.g., open data, open analysis code) and know about approaches in data analysis (e.g., Bayesian statistics) that promise greater robustness in statistical inference.

Teaching and Learning Methods:

There will be presentations in which students present empirical investigations and analyses that have shaped the recent discussion on the replicability of behavioral research. In group

discussions, the students will analyze seminal empirical articles and discuss methods for improving the robustness, replicability, and transparency of empirical research. In small-group exercises, students will get hands-on experience with drafting a preregistration document and preparing a repository for making data and analysis code publicly available.

Media:

Reading List:

Nelson, L. D., Simmons, J., & Simonsohn, U. (2018). Psychology's renaissance. *Annual Review of Psychology*, 69, 511–534.

Ritchie, S. J. (2020). *Science fictions: Exposing fraud, bias, negligence and hype in science*. London: The Bodley Head.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001344: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Literature Review and Presentation Skills

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a literature review) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the literature review and the oral presentation are worth 50% of the grade. The literature review and the oral presentation will verify that students can conduct in-depth research and present their results to a wider audience. They will also confirm that they are prepared for their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships
- European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

- Exploratory and Qualitative research methods
- Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to analyze the scientific literature and present a scientific paper on the governance, fairness and sustainability in agro-food systems. Moreover, students will be able i) procure and screen relevant literature, ii) conduct a systematic review of the scientific literature; iii) present scientific findings in front of their peers and v) entering and moderating a scientific discussion on their topic. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on selected topics concerning the governance, fairness and sustainability of food system.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel and in coordination with one or more foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course hence takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Scientific Writing and Exploratory Research Methods”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barrett, Christopher B. (2021): Overcoming Global Food Security Challenges through Science and Solidarity. In American Journal of Agricultural Economics 103 (2), pp. 422–447. DOI: 10.1111/ajae.12160.

Béné, Christophe; Fanzo, Jessica; Prager, Steven D.; Achicanoy, Harold A.; Mapes, Brendan R.; Alvarez Toro, Patricia; Bonilla Cedrez, Camila (2020): Global drivers of food system (un)sustainability: A multi-country correlation analysis. In PloS one 15 (4), e0231071. DOI: 10.1371/journal.pone.0231071.

Bowie, N. E. (1988). Fair markets. Journal of Business Ethics, 7(1-2), 89-98.

Christopher B. Barrett, Thomas Reardon, Johan Swinnen and David Zilberman (2020): Agri-food Value Chain Revolutions in Low-and Middle-Income Countries. In Journal of Economic Literature, Clapp, Jennifer (2018): Mega-Mergers on the Menu: Corporate Concentration and the Politics of Sustainability in the Global Food System. In Global Environmental Politics 18 (2), pp. 12–33. DOI: 10.1162/glep_a_00454.

Giuliano Martiniello and Ricardo Azambuja: Contracting Sugarcane Farming in Global Agricultural Value Chains in Eastern Africa: Debates, Dynamics, and Struggles.

Glavee-Geo, Richard; Engelse, Per; Buvik, Arnt (2021): Power Imbalance and the Dark Side of the Captive Agri-food Supplier-Buyer Relationship. In *Journal of business ethics* : JBE, pp. 1–20. DOI: 10.1007/s10551-021-04791-7.

Gudbrandsdottir, Ingunn Y.; Olafsdottir, Gudrun; Oddsson, Gudmundur Valur; Stefansson, Hlynur; Bogason, Sigurdur G. (2021): Operationalization of Interorganizational Fairness in Food Systems: From a Social Construct to Quantitative Indicators. In *Agriculture* 11 (1), p. 36. DOI: 10.3390/agriculture11010036.

Hamann, Steffi (2020): The global food system, agro-industrialization and governance: alternative conceptions for sub-Saharan Africa. In *Globalizations* 17 (8), pp. 1405–1420. DOI: 10.1080/14747731.2020.1730050.

Koen Deconinck (2019): New evidence on concentration in seed markets. In *Global Food Security* 23, pp. 135–138.

Singh, Sukhpal (2019): The Export Value Chain of Baby Corn in India: Governance, Inclusion and Upgrading. In *Agrarian South: Journal of Political Economy* 8 ((1–2)), pp. 172–207.

Thompson, Merisa S.; Cochrane, Alasdair; Hopma, Justa (2020): Democratising food: The case for a deliberative approach. In *Rev. Int. Stud.* 46 (4), pp. 435–455. DOI: 10.1017/S0260210520000017.

Wood, Benjamin; Williams, Owain; Nagarajan, Vijaya; Sacks, Gary (2021): Market strategies used by processed food manufacturers to increase and consolidate their power: a systematic review and document analysis. In *Globalization and health* 17 (1), p. 17. DOI: 10.1186/s12992-021-00667-7.

Hansman, Christopher; Hjort, Jonas; León, Gianmarco; Teachout, Matthieu (2017): Vertical Integration, Supplier Behavior, and Quality Upgrading among Exporters. Cambridge, MA.

Burchardi, Konrad B.; Gulesci, Selim; Lerva, Benedetta; Sulaiman, Munshi (2019): Moral Hazard: Experimental Evidence from Tenancy Contracts*. In *The Quarterly Journal of Economics* 134 (1), pp. 281–347. DOI: 10.1093/qje/qjy023.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Economics, Policy & Econometrics /Life Sciences, Management & Policy (MGT001344): Economics of Food Systems in Transition (Governance, Fairness and Sustainability) (Seminar, 4 SWS)

Ola O

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading will be based on a written report (consisting of a research protocol and related research findings) and an oral presentation (20 min) with subsequent discussion, both with an individual and a teamwork component. Both the written report and the oral presentation are worth 50% of the grade. The report and the oral presentation will demonstrate that students have gained in-depth knowledge on how to conceptualize, plan and conduct a research project. It will thus show that students are prepared to write their Master Thesis.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics

Content:

The module deals with issues of governance, fairness and sustainability in the food system.

Key topics of the module may thereby include:

- Locks-ins and levers for facilitating a transitions toward more sustainable food systems;
- Food labels (origin-based labels, animal welfare labels);
- Food quality standards;
- Potential paths for a transition to more sustainable food systems
- Private and public governance in food sectors
- Fairness in business relationships

-European and national regulations and policies concerning the food sector

From a methodological point of view, the focus of this module is on

-Exploratory and Qualitative research methods

-Scientific writing skills

Intended Learning Outcomes:

After successful completion of this module, students will have in-depth knowledge on how to conceptualize, plan and conduct a research project concerning good governance, fairness and sustainability in agro-food systems. Moreover, students will be able to i) identify and structure a research topic, ii) build a conceptual framework for qualitative research; iii) applying qualitative research methods to a concrete research question; iv) develop a study instrument; v) conduct interviews for qualitative research; draft a scientific research report. The module thereby prepares students for the scientific work to be conducted in their master theses.

Teaching and Learning Methods:

The module is a seminar and provides students with in-depth knowledge of governance, fairness and sustainability grounded in economic theory. The seminar includes a set of lectures on governance, fairness and sustainability.

Guided by the instructor(s) through the entire process, students will work alone and/or in groups around a topic in governance, fairness and/or sustainability.

Activities are carried out in parallel in coordination with foreign universities and students will have the opportunity to collaborate and exchange with students from those universities. The course takes place online.

Together with “Advanced Seminar Economics & Policy/Life Sciences & Management – Food system governance, fairness and sustainability, Literature Review and Presentation Skills”, this module offers a comprehensive toolkit to prepare students for their master thesis as well as for a career in science.

Media:

PowerPoint presentations, economic textbooks, scientific articles

Reading List:

Barathova, K., Cacchiarelli, L., Di Fonzo, A., Lai, M., Lee, H., Menapace, L., ... & Vandervelde, S. (2020). Pass-through of unfair trading practices in EU food supply chains: methodology and empirical application.

Bowie, N. E. (1988). Fair markets. *Journal of Business Ethics*, 7(1-2), 89-98.

Denzin Lincoln 2017 *The SAGE Handbook of Qualitative Research*

Gentile, E., Loi, A., Gentile, M., Bruni, M., Berisio, S., Parisi, P., ... & Rieger, L. (2020). Evaluation of Marketing Standards contained in the CMO Regulation, the “Breakfast Directives” and CMO secondary legislation. Final report.

James, H. S. (Ed.). (2013). *The ethics and economics of agrifood competition* (p. 99). Dordrecht, Netherlands: Springer.

Kvale 1996 *Interviews: An Introduction to Qualitative Research Interviewing*

Miles Huberman Saldaña 2014 *Qualitative Data Analysis: A Methods Sourcebook*

MGT001345: Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods | Advanced Seminar Life Sciences, Management & Policy: Economics of Food Systems in Transition (Governance, Fairness and Sustainability): Scientific Writing and Exploratory Research Methods

Russo et al. (2021) Upfront Costs as Coordination Devices in the European Agri-Food Value Chain, forthcoming.

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WZ1700: Agribusiness Governance | Agribusiness Governance

Version of module description: Gültig ab winterterm 2018/19

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 5	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

A written examination of 90 minutes is deemed an appropriate mode of examination. The written tests the ability of students to:

- describe and explain: (i) the key features characterizing modern food and agricultural markets; (ii) the role of intermediaries and modern food retail; (iii) the governance forms and modes of organisation in agribusiness; and (iv) the role of coordination for the provision of quality.
- Analyse: (i) static and dynamic strategic behaviour of firms; (5) opportunistic behaviour, incentives, commitments and self-enforcement in contractual arrangements.

Students will be permitted to use non-programmable calculators during the examination. The examination carries a 50% pass mark.

Homework is assigned to students during the semester. The homework will not contribute to the final course mark. Homework can be delivered in writing or in the form of a short oral presentation and discussion of the subject matter.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Undergraduate class work in business management, strategic management, or organizational behaviour, governance and agricultural economics.

Content:

The course provides an overview about firm behaviour and markets in modern agri-business.

Topics discussed include:

- Competition and market power in modern agro-food markets
- The role of intermediaries and modern food retail
- Strategy interactions among firms

- Vertical relations and coordination in modern agro-food markets
- Motivation and the incentive problem
- Complete, incomplete and relational contracts: applications in food sector

Intended Learning Outcomes:

After successfully completing the module, students will be able:

- To describe the key features characterizing modern food and agricultural markets;
- To describe the governance forms and modes of organisation in agribusiness;
- To explain the role of intermediaries and modern food retail and the role of coordination for the provision of quality;
- To explain the role of competition, market power and coordination in modern agro-food markets;
- To apply analytical tools to analyse strategic firm behaviour;
- To analyse strategic firm behaviour;
- To explain coordination and the conditions for efficient coordination;
- To design contracts that solve incentive misalignment problems;
- To apply key concepts of contract design to real-life problems in agribusiness and to analyse outcomes of contractual arrangements;

Teaching and Learning Methods:

A variety of teaching methods will be adopted to optimize structure and rhythm:

- Lectures
- Interactive methods
- In-class experiments
- Discussion of relevant literature
- Practice exercises.

Media:

Teaching aids employed include: textbooks, hand-outs, whiteboard, PowerPoint.

Reading List:

Recommended textbook

- J. Church and R. Ware, Industrial Organization: A Strategic Approach, first edition, McGraw-Hill, 2000. (available for free online)
- P. Milgrom and J. Roberts, Economics, Organization & Management, Prentice Hall, 1992.

Following journal articles are presented in class. Additional readings (e.g., scientific journal articles) will be suggested during the lectures.

- Gereffi, G., Humphrey, J., & Sturgeon, T. (2005). The governance of global value chains. Review of international political economy, 12(1), 78-104.
- Levin, J. (2003). Relational incentive contracts. American Economic Review, 93(3), 835-857.
- Sexton, R. J. (2012). Market power, misconceptions, and modern agricultural markets. American Journal of Agricultural Economics, 95(2), 209-219.

- Wu, S. Y. (2014). Adapting contract theory to fit contract farming. American Journal of Agricultural Economics, 96(5), 1241-1256.

Other suggested references:

1. Jean Tirole: Industrial Organization.
2. Belleflamme and Peitz: Industrial Organization: Markets and Strategies.
3. Motta: Competition Policy: Theory and Practice

References 1 and 2 are the classical references for industrial organization models; and reference 3 focuses on antitrust and related economics models

Responsible for Module:

Menapace, Luisa; Prof. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-MM: Catalogue of Elective Modules: Management & Marketing | Wahlkatalog: Management & Marketing

Module Description

MGT001302: Customer Insights | Customer Insights

Version of module description: Gültig ab summerterm 2021

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination will be a 60-minute closed book written exam consisting of multiple-choice-questions designed to test if the students are able to

- retrieve the complexities of consumer behavior
- retrieve and analyze the influence of consumer behavior on marketing strategy
- retrieve and apply the learned theoretical concepts

Repeat Examination:

Next semester

(Recommended) Prerequisites:

principles of marketing

Content:

The module will cover the following topics:

- Consumer decision making process (from problem recognition to postpurchase behavior)
- External influences (including culture, demographics, social status, family, and marketing activities)
- Internal influences (including perception, learning, memory, motives, personality, emotions, and affect)
- Self-concept and lifestyle

Intended Learning Outcomes:

On successful completion of the course students will be able to:

- discuss the rationale for studying consumer behavior

- identify and explain internal and external factors which influence consumer behavior
- develop critical and reflexive understandings of the nature of consumption, markets and culture
- demonstrate how knowledge of consumer behavior can shape marketing strategy

Teaching and Learning Methods:

The module is held in the form of a lecture, in which students will be provided with theoretical material as well as practical examples deepening their understanding of consumer behavior and its role for marketing strategy. However, as learning is a process of joined discovery, students are encouraged to actively participate in class and to engage in joint discussions and critical thinking. In addition, the lectures will feature science insights (providing discussions of latest research in consumer behavior) and the joint discussion of small business cases.

Media:

Slides, textbooks, videos, mini cases, research articles

Reading List:

Mothersbaugh, D., Hawkins, D., and Kleiser, S. B. (2020). Consumer Behavior: Building Marketing Strategy, 14th Edition. McGraw Hill.

Solomon, M. R. (2020). Consumer Behavior: Buying, Having, and Being, Global Edition, 13th Edition. Pearson.

Responsible for Module:

Fuchs, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Customer Insights (MGT001302) (Vorlesung, 4 SWS)

Schnurr B

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001310: Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy | Advanced Seminar in Marketing, Strategy, Leadership & Management: International Marketing Strategy

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework focuses on the preparation of a full research-based marketing plan. Such an output is made up of two interrelated parts: the initial academic-research part and the latter practical business-like part. The research part requires the use of updated qualitative and quantitative methodologies. The business-like part demonstrates the understanding of international marketing strategy and advanced marketing as a whole. The group seminar paper is based on an extensive presentation (20 to 30 slides), in accordance with the guidelines provided during this advanced seminar. The group written assignment represents 100% of the seminar's evaluation. However, selected students receive an extra grade as a bonus for their proven "in-class attitude". Detailed information that well defines "in-class attitude" is provided during the opening session of the seminar.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Introducing Marketing Strategy in an international context, the role of marketing in a company, the meaning of marketing management, the required elements of marketing research, the transformation of marketing analysis into marketing strategy and objectives. If time allows, it's planned to tackle the deliverables of a marketing plan being an action plan and control standards.

Intended Learning Outcomes:

At the end of the seminar students will be able to understand the dynamics of marketing strategy in an international business | to realize the role of marketing strategy as a liaison between the company's vision and its tactics | to be able to address objectives based on marketing research | to address "strategic planning" in an international context for an existing company | to improve presentation skills.

Teaching and Learning Methods:

Frontal lectures, in-class discussions, group work, self-made case studies

Media:

Frontal lectures, online supervision

Reading List:

Donnelly, J. H. & Peter J. P. (2012). Preface to Marketing Management. 13th edition, McGraw-Hill.
Lehmann, D. R. & Winer, R. S. (2009). Analysis for Marketing Planning. 7th edition, McGraw-Hill.

Responsible for Module:**Courses (Type of course, Weekly hours per semester), Instructor:**

Advanced Seminar Marketing, Strategy, Leadership & Management: International Marketing Strategy (MGT001310) (Limited places) (Seminar, 4 SWS)

Abramovich D, Octavianus E

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001335: Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms | Advanced Seminar Marketing, Strategy, Leadership & Management: CSR and Sustainability of Family Firms

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each seminar participant will work individually on a specific topic in the field of CSR and sustainability of family firms.

Each student will write an academic essay (80% of the overall grade), based on existing literature on CSR and sustainability of family firms as well as on interview insights collected by the student. Each student will conduct a 1-hour interview with a family business owner of a medium sized family firm on sustainability and CSR topics. Students should demonstrate that:

- They are able to conduct semi-structured interviews to a high academic standard
- They can evaluate their interview insights in light of existing research on the topics of CSR and sustainability
- They can draw conclusions and identify opportunities for future research
- They are able to write a paper that follows a clear logic and is based on academic literature

Each student will present their work (20% of the overall grade) to an academic audience. Each student should demonstrate that they are able to answer questions to the empirical and theoretical part of their work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

This module will explore actions towards a sustainable economy and ways to improve the social responsibility of businesses. In particular, it will assess how family firms' entrepreneurial and social activities and their unique culture affect CSR and sustainability. Topics covered in the module are:

- Contemporary environmental and social issues for organizations
- The non-financial goals of family firms and their consequences
- Family firms and environmental performance
- Family firms and external stakeholders
- Family firms and internal stakeholders
- Family firms and reporting
- Family firms and philanthropy
- Family firms and social entrepreneurship

Intended Learning Outcomes:

After completing the seminar students should understand how family business owners tackle pressing social and environmental issues. After completing the module students will be able to:

- Understand and critically reflect on the role of family ownership for CSR and sustainability
- Understand family owners' non-financial incentives to engage in CSR and sustainability
- Reflect on possible barriers to promote CSR and sustainability through the family firm
- Compare existing knowledge of CSR and sustainability with their own first-hand experience interviewing medium sized family firms in the region
- Evaluate a specific family firm's actions to promote CSR and sustainability
- Explore how family businesses can exploit sustainable opportunities

Moreover, students will be able to

- Search, understand, synthesize, analyze and apply academic literature
- Present and discuss their findings and conclusions to an academic audience

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, in which the instructor provides the theoretical foundations of family and social enterprises
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-life input will be given through multi-media resources and case studies

- Next to in-class discussions student interaction is also ensured through online technology, such as online polls.
- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor
- In a final presentation, students present the results of their seminar essays

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle):

- Berrone, P., Cruz, C., Gomez-Mejia, L. R., & Larraza-Kintana, M. 2010. Socioemotional Wealth and Corporate Responses to Institutional Pressures: Do Family-Controlled Firms Pollute Less? *Administrative Science Quarterly*, 55(1): 82-113.
- Berrone, P., Cruz, C., & Gomez-Mejia, L. R. 2012. Socioemotional wealth in family firms: Theoretical dimensions, assessment approaches, and agenda for future research. *Family business review*, 25(3), 258-279.
- Campopiano, G., De Massis, A. 2014. Corporate social responsibility reporting: a content analysis in family and non-family firms, *Journal of Business Ethics*, 1-24
- Campopiano, G., De Massis, A. & Chirico F. 2014. Firm Philanthropy in Small- and Medium-Sized Family Firms: The Effects of Family Involvement in Ownership and Management. *Family Business Review*, 27: 244-257
- Cruz, C.; Larraza-Kintana, M. Garcés-Galdeano, L. Berrone, P. 2014. Are family firms really more socially responsible? *Entrepreneurship Theory and Practice* 38(6), 1295–1316
- Deephouse, D. L., & Jaskiewicz, P. 2013. Do family firms have better reputations than nonfamily firms? An integration of socioemotional wealth and social identity theories. *Journal of management Studies*, 50(3), 337-360.
- Dyer, W., & Whetten, D. 2006. Family Firms and Social Responsibility: Preliminary Evidence from the S&P 500. *Entrepreneurship Theory & Practice*, 30(6): 785-802.
- Gomez-Mejia, L. R., Cruz, C., Berrone, P., & De Castro, J. 2011. The Bind that Ties: Socioemotional Wealth Preservation in Family Firms. *Academy of Management Annals*, 5(1): 653-707.
- Kellermanns, F. W., Eddleston, K. A., and Zellweger, T. M. 2012. Extending the socioemotional wealth perspective: A look at the dark side. *Entrepreneurship Theory and Practice*, 36(6): 1175-1182.
- Le Breton-Miller, I., & Miller, D. 2016. Family firms and practices of sustainability: A contingency view. *Journal of Family Business Strategy*, 7(1), 26-33.
- Miller, D., & Le Breton-Miller, I. 2005. *Managing for the long run: Lessons in competitive advantage from great family businesses*: Harvard Business Press.
- Richards, M. 2022. When do Non-financial Goals Benefit Stakeholders? Theorizing on Care and Power in Family Firms. *Journal of Business Ethics*, 1-19.

- Richards, M., Zellweger, T., & Gond, J. P. 2017. Maintaining moral legitimacy through worlds and words: an explanation of firms' investment in sustainability certification. *Journal of Management Studies*, 54(5), 676-710.
- Spence, L. J. 2016. Small business social responsibility: Expanding core CSR theory. *Business & Society*, 55(1), 23-55.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001335): CSR and Sustainability in Family Firms (Limited places) (Seminar, 4 SWS)

Richards M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001339: Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management | Advanced Seminar Marketing, Strategy, Leadership & Management: HR Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Conceptual foundations of reputation management
- Topic 2. Reputation protection mechanisms
- Topic 3. Methods of reputation forming and maintaining
- Topic 4. Methods of crisis reputation management
- Topic 5. Methods of corporate reputation assessing

Intended Learning Outcomes:

- ability to increase the level of competitiveness of organizations as socio-economic systems taking into account the specifics of interpersonal competition in the trade environment

- identify actions that harm the information security of the trade organization, be able to apply methods to ensure it;
- to determine and implement a set of actions for the organization of e-commerce and goods and services promotion by means of Internet marketing.

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Eric B. Shiraev, Jennifer Keohane, Martijn Icks, Sergei A. Samoilenko. Character Assassination and Reputation Management: Theory and Applications. Routledge. 2021. 283.

John Doorley, Helio Fred Garcia. Reputation Management: The Key to Successful Public Relations and Corporate Communications. Routledge. 2006. 458.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001339): HR Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001340: Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management | Advanced Seminar Marketing, Strategy, Leadership & Management: Reputation Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on the performance in one written term paper with a maximum of 10 pages of text (60%) and an oral presentation about the topic of the term paper (40%) with max. 15 minute presentation + 15 minute discussion. The examination requirements will measure the student's ability to apply concepts, theories and methods. Moreover, the elaboration of a term paper and a presentation encourages the student to reproduce, analyze and evaluate theoretical knowledge about the student's respective topic.

The module is considered passed if an overall grade of 4.0 or better has been achieved

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Basic knowledge of business management

Content:

- Topic 1. Structure and functions of the human resources departments
- Topic 2. Competence approach in human resource management
- Topic 3. Planning of work with personnel in the organization
- Topic 4. Staff recruitment and staff selection processes
- Topic 5. Adaptation of staff in the organization
- Topic 6. Personnel evaluation and staff motivation
- Topic 7. Team cohesion and social development of staff
- Topic 8. Innovations in HR management

Intended Learning Outcomes:

- ability to organize the effective work of human resources according to the specifics of organization business objectives;
- ability to provide efficient activity of human resources services for solving human resource management tasks using different types of resources and labour instruments;
- ability to form an effective system of performance evaluation in different categories of work positions in the organization by using modern methods;
- ability to analyse the indicators of personnel movement in the organization and developing measures to stabilize the work of labour collective;

Teaching and Learning Methods:

The seminar will be based on in-class exercises and discussions, as well as practice-oriented case discussions, business simulations. In addition, students will examine one topic more detailed and write a seminar paper on it. The results are presented and discussed in a group presentation.

Media:

Powerpoint, Movie, Board/Flipchart, Zoom

Reading List:

Noe Raymond, Hollenbeck John, Gerhart Barry, Wright Patrick. Fundamentals of Human Resource Management. McGraw-Hill, 2019. 406.

Responsible for Module:

Mohnen, Alwine; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001340): Reputation Management (Seminar, 4 SWS)

Bieliaieva N

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001342: Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI | Advanced Seminar Marketing, Strategy, Leadership & Management: Gaining Competitive Advantage with AI

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20 minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Participants will develop a basic understanding of useful applications of AI in the area of strategic management. They learn how companies can strategically apply AI for gaining competitive advantage in different industries. Students will also improve their project management and teamwork skills, as they are required to elaborate a complex project topic on their own. They will create basic skills of academic writing and literature search, too. Furthermore, they strengthen their communication skills while presenting their results in front of the class.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterwards, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Presentation, discussion, academic literature, group work

Reading List:

- Russell, S. J. and Norvig, P. (2021): Artificial intelligence: A modern approach. Pearson Publishing
- Grant, R. M. (2019): Contemporary strategy analysis (10th ed.). John Wiley & Sons, Inc.
- Wodecki, A. (2019): Artificial Intelligence in value creation - Improving competitive advantage. Palgrave Macmillan

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001342): Gaining Competitive Advantage with AI (Seminar, 4 SWS)

Hutzschenreuter T, Lämmermann T, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001343: Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process | Advanced Seminar Marketing, Strategy, Leadership & Management: AI and the Strategizing Process

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Each student will be allocated to a group of 2-3 people. Each group will choose a project topic which will be provided in the course.

The examination consists of three parts:

- 1) A project plan about how the students intend to work together and how they elaborate on the topic (worth 20% of the grade)
- 2) A 20 pages group seminar paper (worth 40% of the grade)
- 3) A 20-minute group presentation using MS PowerPoint (worth 40% grade)

This procedure assists students to strengthen their academic writing, presentation, and project management skills.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

None, except an interest in AI and strategic management.

Content:

The seminar is planned to take place on site. First, there will be a mandatory two-day kick-off dealing with AI, the strategizing process, and general business strategies. Then, the students will be allocated to groups and start to work on their selected project topic. These topics generally deal with gaining a competitive advantage with the integration of different AI applications in several business contexts or industries.

Intended Learning Outcomes:

Die Teilnehmer werden die Potentiale und Grenzen von KI für den Strategieprozess verstehen und lernen, wie Strategen innovative KI-Anwendungen für die Strategieentwicklung nutzen können, um einen Wettbewerbsvorteil zu erzielen. Die Studierenden verbessern auch ihre Projektmanagement- und Teamwork-Fähigkeiten, da sie ein komplexes Projektthema selbständig erarbeiten müssen. Sie erwerben auch grundlegende Fähigkeiten im wissenschaftlichen Schreiben und in der Literaturrecherche. Außerdem stärken sie ihre Kommunikationsfähigkeiten, indem sie ihre Ergebnisse vor der Gruppe präsentieren.

Teaching and Learning Methods:

During the kick-off lecture, the students will get a basic introduction to understand AI and strategic management. Afterward, during the project group work, the team searches for adequate literature as well as develops appropriate concepts and case studies. The entire project is built on active interaction and discussion for improving personal, professional, and academic skills.

Media:

Präsentation, Diskussion, wissenschaftliche Literatur, Gruppenarbeit

Reading List:

- Russel, S. & Norvig, P., 2021. Artificial Intelligence. A Modern Approach. 4th edition. Hoboken: Pearson
- Johnson, G. et al., 2017. Exploring Strategy Text and Cases. 11th Edition. Edinburgh: Pearson Education
- Grant, R. M., 2019. Contemporary Strategy Analysis. 10th Edition. Hoboken: Wiley & Sons

Responsible for Module:

Hutzschenreuter, Thomas; Prof. Dr. rer. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Marketing, Strategy, Leadership & Management (MGT001343): AI and the Strategizing Process (Seminar, 4 SWS)

Hutzschenreuter T, Perkhofer F, Vuillemin M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001360: Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law | Advanced Seminar Marketing, Strategy, Leadership & Management: Digital Platforms, Data and the Law

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written assignment (e.g. on a current case or on a legal policy issue) in a group project work (approx. 15 pages, 60%), an oral presentation (approx. 15 minutes per participant, 30%) as well as participation in the oral discussion of the case presentations of other groups (10%). The papers can be written in German or English. Students are expected to deal with a distinct topic in an appropriate manner and to prepare it in a scientifically sound manner. The oral presentation serves to practice presentation techniques and forms the basis for the subsequent discussion. The students are expected to critically question the approach of other groups, to think their way into foreign topics and to comment on them.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

none

Content:

The digital economy is significantly shaped by a large number of digital platforms: search engines, online marketplaces, social networks, communication services, intermediary services in the sharing economy. Digital platform markets are shaped by digital technologies and exhibit distinct economic features in terms of market and competition mechanisms as compared to traditional markets. Especially due to the high concentration tendencies, new competition law issues and challenges arise for cartel authorities. High-profile antitrust proceedings brought by the European Commission and German Federal Cartel Office against dominant tech players like google, amazon, apple and facebook all over the world.

Furthermore, responsibility and liability (fake news, infringement of intellectual property, criminal content) are important questions that are the subject of legal policy debates and legislative activities. At the European level, for example, the Digital Markets Act and the Digital Services Act are being discussed.

The collection and exploitation of data forms a crucial basis for many business models in the digital economy. However, in the case of personal data in particular, the requirements of data protection law and in particular of the General Data Protection Regulation must be observed, for example with regard to issues of privacy protection in Big Data, profiling, web tracking or cloud computing. As part of the European data strategy, drafts for an EU Data Act and Data Governance Act are central legislative projects of the EU Commission to enable increased development of artificial intelligence and cloud computing in the future through data exchange models.

Fundamental questions also arise with regard to recent developments in the fields of “entrepreneurial strategies and competition” and “sustainability and law”.

Intended Learning Outcomes:

After participating in the seminar, students will be able to

- (1.) understand the basic features of the functioning and legal framework for digital platforms and data use,
- (2.) grasp the economic effects of entrepreneurial competition and innovation strategies on markets and economic actors as well as possible efficiencies,
- (3.) apply the learned knowledge in the assessment of current cases and legislative projects in the field of economic activity related to digital technologies and data,
- (4.) analyze the specific challenges in digital platform markets, recognize barriers to competition, identify the need for adaptation and present conclusions in a systematic manner.

Teaching and Learning Methods:

The module takes place as a block seminar and consists of the following units:

- In an introductory course, students are familiarized both with techniques of scientific work, literature research, the examination of a topic and the formalities of preparing a written assignment, and also with the main features of the legal assessment of facts on digital markets.
- The group work is done to draft the written assignment and to prepare the oral presentation.
- In another session, the groups are individually supervised with regard to the preparation of their work. Interim results are discussed and suggestions for the further procedure are given.
- The presentation of the project work with subsequent discussion takes place at a final event.

Media:

presentations, scientific literature

Reading List:

OECD (2022), OECD Handbook on Competition Policy in the Digital Age, <https://www.oecd.org/daf/competition-policy-in-the-digital-age/>

Ezrachi, Competition and Antitrust Law: A Very Short Introduction

Responsible for Module:

Mackenrodt, Mark-Oliver; Prof. Dr. iur. Dr. rer. pol. LL.M. (NYU)

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001360): Digital Platforms, Data and the Law (Limited places) (Seminar, 4 SWS)

Mackenrodt M, Pless V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001362: Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations | Advanced Seminar Marketing, Strategy, Leadership & Management: Contemporary and emerging issues for organizations

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Write a 3,500 word essay that demonstrates the range and depth of your thinking skills.

The Management Consultant's Task. Identify a contemporary issue facing one or more organisations. Draw on the skills developed in the lectures to arrive at a deep understanding of the problem and to identify a strategy for tackling it.

- What is the presenting problem?
- What issues need to be taken into account in order to understand the problem?
- Analyse the issues/problem using two or more of the approaches discussed in the lectures;
- What is the real problem?
- Decide what should be done to tackle it;

Write an essay showing your analyses and outlining a strategy to tackle the problem (80% of the grade).

You will present your work (20% of the overall grade) to an academic audience. You should demonstrate that you are able to answer questions on your work.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Fluency in spoken and written English

Content:

Organisations are persistently faced with changing internal and external contextual issues.

Changes can thereby be both rapid and profound and often involve interactions between various processes and forces including, but not limited to, the societal, political, economic, and

technological contexts in which organisations operate. This course is designed to edify the application of critical thinking skills in evaluating selected contemporary and emerging issues so that the students can use informed judgment in formation of appropriate business responses.

Intended Learning Outcomes:

This unit will help you avoid making mistakes and ensure you make the best decisions possible in the circumstances. It will do this through developing your critical thinking and analytical skills. Imagine working as a manager in a few years time, or perhaps running your own business. You have a task to do. Rather than jumping immediately to do it, you will be able to analyse the situation from a variety of perspectives, develop understanding of why the current situation has arisen, explore what is actually happening in this situation, and work out the best way forward. That is, you will be able to generate deep insights into what you are facing as a manager and be able to act using forethought and understanding. To achieve this, we will focus on four areas that can help improve our thinking and analytical skills:

- a. Critical thinking skills. We will be focusing on what blinkers we put over our eyes that prevent us thinking things through. This also helps generate self-understanding;
- b. We develop an understanding of other people, through different perspectives of how people function;
- c. We reflect on how to act ethically when dealing with a difficult situation;
- d. Integrative thinking skills. We discuss the method, pros and cons of integrative thinking.

There will be an emphasis on three learning processes throughout the unit. The first is on enhancing awareness and understanding of emerging and contemporary issues for organisations. The second one is understanding ourselves as individuals, and especially identifying what influences our own thought processes. The final learning process is on group discussions. This is because our powers of analysis are multiplied when we work with others. But we also have to be able to listen to and learn from others.

Teaching and Learning Methods:

- The content of the course is transmitted via lectures, supported by power-point presentations, where the instructor provides the theoretical foundations of family and social enterprises.
- A strong focus of the course will be on existing academic literature, which will be discussed in class
- Group work and breakout sessions will be an important part of this module, in which students jointly and critically reflect on the theories and insights presented in the module
- The content of the module is discussed in class by openly exchanging ideas and thoughts, creating a lively learning atmosphere
- Every session contains exercises, in which students apply their learning
- Guest speakers will provide practical insights into the theoretical perspectives discussed in the module
- Other important real-live input will be given through multi-media resources and case studies
- Next to in-class discussion student interaction is also ensured through online technology, such as online polls.

- For their essays students will investigate topics within the subject of this course. Students will receive feedback from the instructor.
- In a final presentation, students present the results of their project thesis

Media:

Powerpoint, Zoom-Sessions, Breakout-Sessions, Online polls and simulations

Reading List:

Basic literature (for detailed reading list, see Moodle): Chatfield, Tom. (2017) Critical thinking. Your guide to effective argument, successful analysis and independent study. London:

Brockman, John (2013) Thinking: the new science of decision-making, problem-solving, and prediction in life and markets. Harper-Collins, New York.

Stocchetti, M. and Kukkonen, K. (2010) Critical media analysis: an introduction for media professionals. Peter Lang publishers.

Butt, Trevor (2003) Understanding people. Basingstoke: MacMillan.

Goffman, I. (1990) The presentation of self in everyday life. London: Penguin.

Boltanski, L., & Thévenot, L. (2006). On justification: Economies of worth. Princeton University Press.

Thornton, P. H., Ocasio, W., & Lounsbury, M. (2012). The institutional logics perspective. Oxford University Press.

Responsible for Module:

Richards, Melanie; Prof. Dr. oec.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Innovation & Entrepreneurship / Marketing, Strategy, Leadership & Management (MGT001362): Contemporary and Emerging Issues for Organizations (Limited places) (Seminar, 4 SWS)

Richards M, Safieh M, Zösmair S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001367: Introduction to R for Data Science | Introduction to R for Data Science

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The coursework requirements encompass reading and preparing the weekly reading assignments and solving the exercises. In addition, each student will give a presentation (30-45 minutes; individually or in teams of two), that is also the basis for the grade.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

None. This is an introductory course. It is suitable for beginners without any notable knowledge of programming or data analysis.

Content:

Generating insight from raw data is an essential skill across various scientific disciplines and applied fields. Among the core competencies of a data scientist are structuring projects and workflows, importing, preparing and transforming data sets, common programming methods (such as iteration, functions, conditionals), visualizing and modeling data, and communicating the results in a comprehensible and insightful manner. The module equips students with a solid foundation of such common methods in the field of data science. These methods are demonstrated and practiced using the open source programming language R, associated packages (especially the "tidyverse"), as well as the graphical user interface RStudio.

Intended Learning Outcomes:

At the end of the module students will know and understand commonly applied methods in the field of data science. They are capable of applying these methods to novel data sets and problems, and know how to independently structure and implement data-analytic projects. They are familiar with

the open source programming language R, the graphical user interface RStudio, as well as with common packages and their applications.

Teaching and Learning Methods:

Based on the suggested literature students will give short presentations, introducing the class to methods of programming, data wrangling and data analysis. The students are asked to integrate interactive elements and concrete demonstrations in these presentations. In exercises (solved in small groups or individually) the class practices and consolidates the implementation of the introduced methods by applying them to concrete data sets.

Media:

Reading List:

Wickham, H., & Grolemund, G. (2016). R for data science: import, tidy, transform, visualize, and model data. O'Reilly Media, Inc.

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Introduction to R for Data Science - Exercise (MGT001367) (Limited places) (Übung, 2 SWS)
Zilker V

Introduction to R for Data Science (MGT001367) (Limited places) (Seminar, 2 SWS)
Zilker V

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001368: Models in the study of human behavior | Models in the study of human behavior

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Course work and reading assignments (seminar): Each week will be introduced by 1-2 papers that are thought-provoking and non-trivial, yet accessible and relatively short. Students will prepare the readings so that they are able to briefly summarize and discuss the key ideas. Occasionally (3 times), readings are accompanied by a take-home question that students should answer in brief text form (ca. 1 page). All three take-home assignments are graded.

Presentation and discussion (exercise): At the mock conferences, students give a 15 minutes scientific presentation of a high quality publication, followed by a 15 minutes audience discussion. The talk and discussion are graded.

Grading scheme:

30 % reading assignments (3 x 10%)

50 % mock conference talk (incl. 1 consultation and 1 feedback session)

20 % mock conference discussion

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Content:

Formal models (in mathematical or programming language) figure prominently in the natural science (e.g., physics), but less so in the behavioral sciences (e.g., behavioral economics, psychology). The lack of models – particularly of those that attempt to explain the cognitive processes underlying human behavior – led to the emergence of distracting labels and narratives

(e.g., “biases”, “thinking fast and slow”). These distractors are remarkably popular in behavioral sciences as well as in business and society, yet they have done little to advance our understanding of why people behave the way they do. This course shows how modeling is invaluable for gaining genuine insights into human behavior and how it can drive empirical research and real-world applications (e.g., consulting, policy-making). Some state-of-the-art examples are presented by the students in the mock conferences.

Some guiding questions and discussion points are:

- What the behavioral sciences want and where they have gone astray?
- Why the behavioral sciences cannot help but to model?
- What are scientific models of human behavior? What can the behavioral sciences learn from the natural sciences and their models? What not?
- Which role do cognition (e.g., information-processing of the mind/brain) and the environment (e.g., information structures) play in the explanation of human behavior?
- Case studies in decision making under risk and uncertainty (descriptive, predictive, process/cognitive models)
- Relations among and integration of models within and across model classes
- Modeling and the construction, development, and testing of theories about human behavior and cognition
- Real-world applications of models of human behavior and cognition

Intended Learning Outcomes:

Upon completion of the module, students possess profound knowledge about the utility and limitations of formal modeling approaches to the study of human behavior. Specifically, students are familiar with the goals and problems of the behavioral sciences and understand how they can be addressed through formal modeling. They know different model classes – including some state-of-the-art models in decision making – and which research question and inferences they are appropriate for. Based on this knowledge, students are able to interpret and evaluate models in the relevant literature and to make reasonable modeling choices for future research or applied projects. In addition, students improved their ability to effectively communicate the main ideas and results of a published paper or a broader research project in concise scientific talks.

Teaching and Learning Methods:

Seminar sessions comprise of ca. 45 minutes lecture-style talks aiming to complement the readings and convey relevant knowledge about the topic. Each talk is accompanied by group and small-group discussions which can be both prompted by students and the lecturer.

Exercise sessions take the form of mock conferences, i.e., each student will provide a scientific talk (incl. discussion) based on a high quality publication relevant to the topic. As a prelude, the first three sessions are for training, i.e., important aspects of scientific talks are practiced in mini-exercises.

Media:

Reading List:

For an idea of the readings and the topics addressed in this course, you may see:

Example for a seminar paper:

Guest, O., & Martin, A. E. (2021). How computational modeling can force theory building in psychological science. *Perspectives on Psychological Science*, 16(4), 789–802. <https://doi.org/10.1177/1745691620970585>

Example for a mock conference paper:

Zhao, W. J., Coady, A., & Bhatia, S. (2022). Computational mechanisms for context-based behavioral interventions: A large-scale analysis. *Proceedings of the National Academy of Sciences*, 119(15), e2114914119. <https://doi.org/10.1073/pnas.2114914119>

Responsible for Module:

Pachur, Thorsten; Prof. Dr. phil.

Courses (Type of course, Weekly hours per semester), Instructor:

Models of human behavior: Mock conferences (MGT001368) (Limited places) (Übung, 2 SWS)
Hof L

Models in the study of human behavior (MGT001368) (Limited places) (Seminar, 2 SWS)
Hof L

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001376: Digital Marketing & Text Analytics | Digital Marketing & Text Analytics

Version of module description: Gültig ab winterterm 2022/23

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The examination consists of a written report consisting of 10 PPT content slides (90%) and in-class participation (10%). The written report will be in the format of a management-style presentation, focusing on the main insights and supported by appropriate visualizations and tables. Thereby, the examination tests the students' ability to translate the results from applying different text analytics methods into managerially relevant insights in a clear, concise, and compelling manner.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Basic experience with R and/or Python is recommended (e.g., loading and exploring datasets, generating variables, creating visualizations, running regression analyses).

Content:

The module will cover the following topics:

- Trends in Digital Marketing & Text Analytics
- Text Analytics Methods (Lexicons, Machine Learning, Deep Learning)
- Sentiment Analysis
- Challenges of Natural Language Processing
- Ethical Considerations of Text Analytics

Intended Learning Outcomes:

Upon successful completion of the module, students will be able to:

- understand how text analytics can inform data-driven decision making
- apply diverse text analytics methods using R and/or Python to digital marketing problems
- evaluate which text analytics methods are appropriate contingent on the application context

- develop an end-to-end solution from unstructured data to structured insights

Teaching and Learning Methods:

The module will be held in the form of a seminar. The first block of the seminar is a lecture-style introductory session to applied text analytics in marketing. The seminar will put emphasis on in-class discussions, interactive materials, practical relevance, research-based, interdisciplinary teaching, and code examples (in R and Python). The seminar will offer an engaging learning environment, complemented by remote and in-class coaching opportunities. To apply the knowledge learned and gain first-hand experience in implementing different text analytics methods, the students will work on an individual case study that they submit by the end of the seminar.

Media:

Slides, research articles, textbooks, interactive websites, programming code (in R and Python)

Reading List:

Berger, J., Humphreys, A., Ludwig, S., Moe, W. W., Netzer, O., & Schweidel, D. A. (2020). Uniting the tribes: Using text for marketing insight. *Journal of Marketing*, 84(1), 1-25.
Hartmann, J., Heitmann, M., Siebert, C., & Schamp, C. (2022). More than a Feeling: Accuracy and Application of Sentiment Analysis. *International Journal of Research in Marketing*. Forthcoming.
Hartmann, J. & Netzer, O. (2022). Natural Language Processing in Marketing. *Review of Marketing Research*. Special Issue: Artificial Intelligence and Marketing. Forthcoming.
Additional references will be provided in the course.

Responsible for Module:

Hartmann, Jochen; Prof. Dr.: jochen.hartmann@tum.de

Courses (Type of course, Weekly hours per semester), Instructor:

Digital Marketing & Text Analytics (MGT001376) (Seminar, 2 SWS)

Hartmann J

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI000997: Marketing Entrepreneurship Lab | Marketing Entrepreneurship Lab

Version of module description: Gültig ab summerterm 2013

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 150	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grading is based on a presentation and a reflection paper.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Content:

Learn from Max Wittrock, marketing expert and co-founder of jokolade and mymuesli, practical marketing and business knowledge and apply your marketing skills to real world Start-ups. At the Marketing Entrepreneurship Lab students get the opportunity to improve their marketing knowledge and apply it to a real world challenge. Support a Start-up of your choice with a course-related project in the areas of strategic marketing, market research, product launch, etc (also possible as a team). The following topics are covered among others in the course:

- How do you create a marketing plan and decide on a strategy?
- How do you measure marketing effectiveness?
- The basics of Public Relations, Storytelling, and Social Media Marketing
- How to plan a Start-up market entry?
- How to balance budget and goals?
- The correlation of startup business models and marketing

Intended Learning Outcomes:

Have better understanding of marketing challenges and tools. Enable students to apply their theoretical knowledge about marketing and gain new capabilities in a professional and more practical direction by relating to real life startup marketing challenges.

Equip student with practical skills beyond the traditional marketing curriculum and thus close bridge students with startup founders to better equip them for working in a startup.

Teaching and Learning Methods:

lectures
group works
project-based learning
real Start-up cases

Media:

hybrid format, blocked seminar, presentation, discussion, clinic

Reading List:

will be presented at the start of the seminar

Responsible for Module:

Patzelt, Holger; Prof. Dr. rer. pol.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001179: Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption | Advanced Seminar Marketing, Strategy, Leadership & Management: Sustainable Consumption

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on a written seminar paper (~15 pages, 50 % of the grade), whereas the results and conclusions of the seminar paper need to be presented (20 min, 50 % of the grade) in front of the class. The seminar paper as well as the presentation in front of the class demonstrate that students are able to reproduce and summarize their acquired knowledge about the respective research topic. Furthermore, the seminar paper and the related presentation show that the students are able to critically analyze the key aspects regarding their research question. By presenting their findings in front of the class, students prove that they are able to present the key aspects in a concise manner and that they are able to answer further questions on their presented findings.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Knowledge in microeconomics/consumer economics and/or consumer behavior theories.
Knowledge in empirical research methods.

Content:

Key topics of the seminar may include:

- Current issues in sustainable consumption
- Current issues in consumers and digitalization
- Current issues in consumer research

Intended Learning Outcomes:

After successful participation in the module students will have in-depth knowledge on the tackled focus of the module. Students will be able to (1) write a scientific research paper, (2) procure relevant literature and (3) structure a topic. Additionally, students will be able to (4) present their research findings in front of seminar participants, (5) answer their questions and (6) moderate a following discussion.

Teaching and Learning Methods:

The module is a seminar, in which the students will be assigned state-of-the-art research papers from the recent literature. They are expected to prepare high-quality presentations and write-ups, reflecting their analyses, understanding and insights from reading the papers and related literature. The lecturer will provide guidance and advice all along, from the choice of the initial topic, to tips on reading original literature, on scientific writing, and on giving successful presentations.

Media:

Slides, books, scientific papers

Reading List:

Ethridge, D. (2004). Research Methodology in Applied Economics, 2nd Edition. Ames: Blackwell Publishing.

Reisch, L. (2015). Handbook of research on sustainable consumption. Cheltenham: Elgar.

Relevant literature will be selected and communicated specifically.

Responsible for Module:

Roosen, Jutta; Prof. Dr. Ph.D.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001222: Commercial Criminal Law and Compliance | Wirtschaftsstrafrecht und Compliance

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: German	Duration: one semester	Frequency: winter/summer semester
Credits:* 3	Total Hours: 90	Self-study Hours: 60	Contact Hours: 30

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Die Prüfung dient der Feststellung, ob bzw. inwieweit die formulierten Lernergebnisse erreicht wurden. Dies wird im Rahmen einer einstündigen (60 Minuten) schriftlichen Klausur unter Zuhilfenahme der Gesetzestexte ermittelt. Die Studierenden müssen im Rahmen abstrakter Fragen demonstrieren, dass sie die Grundsätze des Wirtschaftsstrafrechts kennen und erklären können.

Im Rahmen einer Fallbearbeitung müssen die erworbenen Kenntnisse zum Wirtschaftsstrafrecht auf unbekannte Lebenssachverhalte angewandt werden. Auf diese Weise wird ermittelt, ob die Studierenden konkrete Lebenssachverhalte unter rechtlichen Gesichtspunkten analysieren und hinsichtlich rechtlicher Folgen bewerten können.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Allgemeine Kenntnisse der Rechtsanwendung, z.B. aus den Modulen WI0000027

"Wirtschaftsprivatrecht 1" und WI0000030 "Wirtschaftsprivatrecht 2" oder vergleichbaren Veranstaltungen

Content:

Das Modul soll Studierenden einen Überblick über das deutsche Wirtschaftsstrafrecht und dessen Bedeutung für die Compliance Anforderungen an Unternehmen verschaffen.

Inhaltlich werden besprochen:

- Allgemeines Strafrecht: Aufbau von Straftatbeständen: Objektiver und subjektiver Tatbestand, Rechtswidrigkeit, Schuld; Versuch; Täterschaft und Teilnahme; Rechtsfolgen der Tat: Geldbußen für Unternehmen und Geld- und Freiheitsstrafen für die verantwortlichen Personen
- Betrug, Untreue, Unterschlagung

- Insolvenz- und Bilanzstrafrecht
- Korruptionsdelikte
- Delikte gegen den Wettbewerb
- Steuerstrafrecht
- Untersuchung von Sachverhalten des Wirtschaftslebens in Hinblick auf ihre strafrechtliche Relevanz
- Aktuelle politische Fragen zur Entwicklung des Wirtschaftsstrafrechts
- Compliance
- Wirtschaftsstrafrecht als Teil der Compliance Anforderungen an Unternehmen
- Besuch einer Justizvollzugsanstalt oder einer Gerichtsverhandlung

Intended Learning Outcomes:

Am Ende der Veranstaltung werden die Studierenden in der Lage sein,

- (1.) wichtige Grundsätze des Strafrechts zu verstehen,
- (2.) den strafrechtlichen Rahmen wirtschaftlicher Betätigung zu erfassen,
- (3.) rechtliche Folgen zu identifizieren und daraus Gestaltungsmöglichkeiten abzuleiten,
- (4.) in schriftlicher Form in einem ausformulierten Gutachten konkrete Lebenssachverhalte rechtlich zu beurteilen.

Teaching and Learning Methods:

In der Vorlesung werden die Lerninhalte vom Vortragenden präsentiert und mit den Studierenden diskutiert.

Anhand von Fällen aus dem Bereich des Wirtschaftsstrafrechts werden die vermittelten Inhalte in Einzel- oder Gruppenarbeit auf konkrete Lebenssachverhalte angewandt. Dies dient der Wiederholung und Vertiefung des Stoffs, der Einübung strukturierter Darstellung rechtlicher Probleme sowie der Verknüpfung verschiedener Problemkreise.

Media:

Präsentation, Fälle mit Lösungen

Reading List:

Inoue/Hassenpflug/Hauptmann, Strafrecht – leicht gemacht

Kraatz, Wirtschaftsstrafrecht

Wittig, Wirtschaftsstrafrecht

Beck/Valerius, Fälle zum Wirtschaftsstrafrecht

Responsible for Module:

Ann, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Wirtschaftsstrafrecht und Compliance (WI001222) (Vorlesung, 2 SWS)

Eisenreich G (Färber A, Smith S)

For further information in this module, please click campus.tum.de or [here](#).

WahlKat-OSCM: Catalogue of Elective Modules: Operations & Supply Chain Management | Wahlkatalog: Operations & Supply Chain Management

Module Description

MGT001306: Planning and Scheduling in the Automotive Industry | Planning and Scheduling in the Automotive Industry

Version of module description: Gültig ab winterterm 2021/22

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The assessment takes place in form of a written exam (120 min) at the end of the semester. In the exam students demonstrate that they are able to explain, discuss and critically evaluate specific concepts of operations and supply chain management in the automotive industry. Furthermore, they proof that they can apply the discussed quantitative approaches and assess these approaches in terms of effectiveness and efficiency.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Operations Research and Higher Mathematics

Content:

With practical examples from the automotive industry, the course expands the participants' ability to apply quantitative methods for operational problems. Planning systems in the automotive industry are demonstrated using real examples and problem sizes. The relationships between planning problems and the associated coordination concepts (e.g. hierarchical planning, rolling planning, event-driven) are presented. The implementation of mass customization, strategies for variety reduction, layout and assembly line, sequencing, production program planning, strategic allocation of products to plants and production lines are shown. The course shows the connection between strategic and operational tasks using the latest mathematical modeling for

digital production planning. You will learn the introduced methods are applied in modern modeling software (CPLEX, R and Python KI libraries).

Practical cases

Ramp-up planning for new product introduction in a global production network, MRP for high variety premium production, Exploring the power of option bundling, Aggregate planning and the impact of pricing and capacity planning, Capacity fixing for body-shop planning

Methodologies

Mixed integer programming for strategic network optimization; Bayesian forecasting, AI-based data fusion and deep learning with neural networks for MRP; Constraint programming for car sequencing.

Intended Learning Outcomes:

- Gain an overview and insights on different manufacturing environments for automotive production and supply chain management
- Understand modelling strategies to match customer demand and automotive order-to-delivery processes in a flexible production network
- Describe and Link product variety to order-fulfillment strategies and understand the impact of product variety on operations
- Define Mass customization strategies and their function in different production scenarios
- Apply Bayesian forecasting techniques, AI and deep learning models to real-world cases and apply forecast error measurement systems
- Understand optimization techniques for manufacturing operations planning and balance production loads with linear programming
- Use stochastic models for uncertain data and planning situations
- Be able to calculate complex product launch and ramp-up scenarios for automotive production and understand the Management of the Operations Interfaces
- Define and apply Material Requirements planning for automotive components and understand the sourcing cost structure and supplier cascade in this industry
- Understand the concept of Assembly Lines and be able to apply balancing and sequencing OR approaches.

Teaching and Learning Methods:

The module consists of lectures with integrated exercises.

In the lectures the contents of the module are delivered through presentations and talks. In the integrated exercises students apply their knowledge to solve case assignments. The results are then discussed in class. The students improve the acquired knowledge by studying the suggested literature.

Media:

Reading List:

- Staebelin, T., & Aoki, K. (2015). Planning and scheduling in the automotive industry: A comparison of industrial practice at German and Japanese makers. *International Journal of Production Economics*, 162, 258-272.
- Becker, A., Stolletz, R., & Stäblein, T. (2017). Strategic ramp-up planning in automotive production networks. *International Journal of Production Research*, 55(1), 59-78.
- Wochner, S., Grunow, M., Staebelin, T., & Stolletz, R. (2016). Planning for ramp-ups and new product introductions in the automotive industry: Extending sales and operations planning. *International Journal of Production Economics*, 182, 372-383.
- Bersch, C. V., Akkerman, R., & Kolisch, R. (2021). Strategic Planning of New Product Introductions: Integrated Planning of Products and Modules in the Automotive Industry. *Omega*, 102515.
- Song, J. S., & Xue, Z. (2021). Demand shaping through bundling and product configuration: A dynamic multiproduct inventory-pricing model. *Operations Research*, 69(2), 525-544.
- Meyr, Herbert. "Supply chain planning in the German automotive industry." In *Supply Chain Planning*, pp. 343-365. Springer, Berlin, Heidelberg, 2009.
- Wu, J., Ding, Y., & Shi, L. (2021). Mathematical modeling and heuristic approaches for a multi-stage car sequencing problem. *Computers & Industrial Engineering*, 152.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Planning and Scheduling in the Automotive Industry (MGT001306) (Limited places) (Vorlesung, 4 SWS)

Grunow M [L], Schömig-Beißner M, Stäblein T

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001350: Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management | Advanced Seminar Operations & Supply Chain Management: Production & Supply Chain Management

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The students write a research paper (max. 25 pages) relating to a specific topic within the focus of the module, in which they demonstrate that they can perform a small research project from a discussion of the relevant literature, analysis of problem and solution approaches to the application in examples or cases and the identification of directions for future research. A final presentation (30 minutes with ensuing Q&A) proves that students are able to present their work to a scientific audience in a precise, comprehensible and demonstrative way. Further information will be announced at the beginning of the semester.

Research paper and presentation will be graded as one contribution/examination, individual weighting is not applicable.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

It is expected that participants have an interest in practical problems of production planning, scheduling and logistics, and the quantitative modelling of business problems. Participants should be familiar with Operations Research (OR) techniques.

The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite.

It is strongly advised that the participants have previously taken part in the module "Modelling, Optimization and Simulation in Operations Management" or similar modules at other universities.

Content:

Within this seminar, groups of students study a variety of problems with real-world applications.

A supervisor with relevant research background guides each group through every step of their progress, from understanding the state-of-the-art literature to the final implementation of their extensions. Using selected scientific publications, the students will understand problems relevant to different industries and investigate various modeling and solution techniques to solve these problems.

Within this process, students develop a wide spectrum of skills, which ultimately prepares them for carrying out a thesis with high academic value.

Intended Learning Outcomes:

At the end of the module the students will be able to:

- Review state-of-the-art in operations and supply chain management approaches related to the module focus.
- Apply literature findings and/or methodologies to examples or case studies.
- Critically evaluate the scientific contributions of the analyzed literature.
- Analyze problems and solution approaches for operations and supply chain management methods and tools in the context of the module focus.
- Develop ideas for future research in relation to the seminar focus.
- Adequately communicate and discuss scientific contributions and research findings within the focus of the module

Teaching and Learning Methods:

The module consists of a seminar. The contents is delivered through presentations by the students. The students improve the acquired knowledge by studying the suggested literature. The students will be supervised by the lecturer when they work on their topic.

Media:

Presentation slides

Technical papers

Reading List:

van Weele, Arjan J., Purchasing and Supply Chain Management, 2014

Research papers

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Seminar Operations & Supply Chain Management (MGT001350): Production & Supply Chain Management (Seminar, 4 SWS)

Grunow M [L], Grunow M, Pahr A, Schömig-Beißner M, Fatemianaraki S

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001370: Designing Manufacturing Systems | Designing Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: winter semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The students demonstrate that they can create appropriate designs for different production systems using the approaches introduced in the lecture. Furthermore, students show that they are able to explain the fundamentals of the different design approaches and evaluate them. At the end of the lecture students will have a good understanding of the design of production systems and layouts, like job shops, flow lines, single flow rows, production centers, and flexible assembly layouts.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to designing of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these

decisions by applying various quantitative methods in application areas such as assembly systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Job shops
- Traditional assembly lines
- Flexible assembly lines
- Single flow row
- Center production

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in designing production systems.
- Distinguish the most important production layout types (job shop, flow lines and production centers). Analyze the layout types advantages and disadvantages, decide for practical layout problems, which type to choose.
- Apply rough and exact planning approaches for the most important layout types, including the application of heuristics and the formulation and adaption of mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the design problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Designing Manufacturing Systems(MGT001370) (Limited places) (Vorlesung, 4 SWS)

Grunow M, Okumusoglu B, Schömig-Beißner M

For further information in this module, please click campus.tum.de or [here](#).

Module Description

MGT001371: Scheduling Manufacturing Systems | Scheduling Manufacturing Systems

Version of module description: Gültig ab summerterm 2022

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The grade of the module is based on a written exam, of 90 minutes. Also, students can hand-in assignments to earn a grade bonus of one level.

The focus is on scheduling short term operations on the different manufacturing layout types.

The students have to show that for different production systems they are able to apply suitable scheduling approaches taught in the lecture. Furthermore, the students demonstrate that they are able to explain the fundamentals of the different scheduling approaches and evaluate them.

Allowed aids for the exam will be announced at the beginning of the semester.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

PLEASE NOTE:

This module cannot be attended if WI100967 Designing and Scheduling Manufacturing Systems was attended previously.

Knowledge of quantitative approaches to production and supply chain management. The modules "Management Science" and "Production and Logistics" or similar modules at other universities are a prerequisite. Also, basic programming experience in Python is strongly recommended.

Content:

Decisions related to scheduling of a production system play an important role in all manufacturing industries. Decisions like configuration of a layout and planning of material flow are all essential for maximizing the profit of a company. In this course, the students learn how to support these decisions by applying various quantitative methods in application areas such as assembly

systems, process industries, automotive industry and AGVs in flexible assembly layouts and production centers.

Content:

- Layout types
- Introduction to scheduling
- Job shops
- Flexible assembly systems
- Economic lot scheduling, block planning
- Scheduling AGV's in centers (online vs. offline scheduling)

Intended Learning Outcomes:

After the module the students will be able to:

- Give an overview of methods used in scheduling production systems.
- Give an overview of the scheduling objectives and requirements in manufacturing.
- Evaluate and apply different planning procedures (shifting bottleneck, scheduling of flexible assembly systems, economic lot scheduling, block planning and online vs. offline scheduling) to develop production schedules for different types of systems such as assembly lines, food processing systems and AGVs in flexible assembly layouts and production centers.
- Apply heuristics and formulate and solve mathematical models.

Teaching and Learning Methods:

The module uses a blended learning approach with online on-demand lectures for the students to study on their own pace. Weekly in-class lectures are intended to re-cap the lecture material from the recorded videos, clarify questions and discuss extensions. The optional assignments involve the modelling of the scheduling problems discussed in class and the implementation of these mathematical models.

Media:

Lecture slides, lecture video recordings and case studies, in-class exercises, homework assignments and their solutions.

Reading List:

Will be provided with course syllabus at the beginning of the semester.

Responsible for Module:

Grunow, Martin; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001088: Advanced Modeling, Optimization, and Simulation in Operations Management | Advanced Modeling, Optimization, and Simulation in Operations Management [AMOS]

Version of module description: Gültig ab summerterm 2016

Module Level: Master	Language: English	Duration: one semester	Frequency: winter/summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The offered module is composed of the sections optimization and simulation. In both sections, basic knowledge and skills for designing and evaluating service and production processes are taught. The solution of analyzed problems is gained either through the application of optimization methods or through simulation. Due to the different problem-solving approaches (and the use of different software packages), both sections are thought separately. To facilitate the learning success, the learning outcomes are examined directly at the end of each section. At the end of the optimization section, there is a written exam on modeling linear optimization problems. In addition to theoretical knowledge, the students' skills in modeling with OPL and IBM ILOG CPLEX are tested. At the end of the simulation section, there is also a written exam, in which the learning outcomes in discrete-event simulation, using the software AnyLogic are tested. Both exams evaluate the individual performance of the acquired theoretical and practical skills, requiring own calculations and argumentative answers. Exams are worth 60 points each and noncumulative. To pass the course, students need to pass both exams individually. The final grade of the module is the truncated average of the exam grades. Both exams take 60 minutes each. In the exams, no aids are allowed. In addition, students can achieve a 0.3/0.4-grade bonus (according to APSO/FPSO midterm) in each section through the successful participation in the respective homework assignments.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Management Science, Basic course in Statistics, Basic Course in Mathematics, Production and Logistics

Content:

The acquired skills are used in the field of operations management to understand, redesign, control and optimize the production of goods and services. The students learn quantitative methods for the analysis of decision problems in operations management, and therefore, the basis for all subsequent lectures at the Department of Operations & Supply Chain Management. The presented methods can be subdivided into two distinct study sections: optimization and simulation.

Optimization section:

- Introduction to linear programming, CPLEX Studio IDE, and IBM ILOG OPL
- LP formulations, e.g. production planning problems
- Model building with OPL, e.g. generic modeling, model testing with instances, scripting for pre- and post-processing
- Interpreting and using the solution of a LP model
- Spreadsheet input/output with OPL

Simulation section:

- Introduction to simulation, AnyLogic
- System; event; model; steps in a simulation study
- Data collection, statistical analyse and input modeling
- Fundamental simulation concepts in AnyLogic
- Simulation of simple systems together with verification, calibration, and validation
- Statistical simulation data output analysis having regard to different scenarios

Intended Learning Outcomes:

At the end of the module, students will be able to create mixed integer linear programming formulations, and discrete event simulation models of simple problems in production and operations management.

Furthermore, students will be able to solve MILP formulations in OPL and IBM ILOG Script, and implement discrete event simulation models in AnyLogic. The students also learn, how to evaluate and compare the calculated problem solutions.

Teaching and Learning Methods:

The weekly sessions consist of a lecture with an integrated exercise class. During the lecture, the content is presented and discussed. The students are invited to improve the acquired knowledge by studying the suggested literature. In the exercise, the students apply the acquired knowledge by solving and implementing given problems. The homework assignments allow students to individually improve their skills, by answering theoretical questions and implementing problems, using the respective software. After each homework assignment, the students are free to discuss their solutions and open questions in a Q&A session.

Media:

PowerPoint, Exercise sheets, Whiteboard

Reading List:

Optimization

- Williams, H. P. (1999): Model Building in Mathematical Programming. 4th edition.

Supplementary reading materials about optimization and linear programming

- Domschke, W. and Drexl, A. (2005): Einführung in Operations Research. 6th edition, Springer.
- Domschke, W., Scholl, A. and Voss, S. (1997): Produktionsplanung. 2nd edition, Springer.
- Hillier, F. S. and Lieberman, G. J. (2004): Introduction to Operations Research. 8th edition, McGraw-Hill.
- Klein, R. and Scholl, A. (2004): Planung und Entscheidung. Vahlen.
- Winston, W. L. (2004): Operations Research. 5th edition, Thomson.

Simulation:

- Kelton, W. D., Sadowski, R. P. and Sturrock, D. T. (2010): Simulation with ARENA. 5th edition, Boston: McGraw-Hill.

Supplementary reading materials about simulation and statistics

- Banks J., Carson J. S., Nelson, B. L. and Nicol. D. M. (2009): Discrete-Event System Simulation. 5th edition, Upper-Saddle-River: Prentice Hall.
- Law, A.M. (2007): Simulation modeling and analysis. 4th edition, McGraw-Hill, New York
- Bleymüller, J., Gehlert, G., Gülicher, H. (2008): Statistik für Wirtschaftswissenschaftler. 15th edition, München: Verlag Vahlen.

Responsible for Module:

Kolisch, Rainer; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

Advanced Modeling and Optimization in Operations Management (WI001088) (Limited places)
(Seminar, 2 SWS)
Jost C, Pahr A

Advanced Simulation in Operations Management (WI001088) (Limited places) (Seminar, 2 SWS)
Jost C, Pahr A

For further information in this module, please click campus.tum.de or [here](#).

Module Description

WI001135: Stochastic Optimization | Stochastische Optimierung

Version of module description: Gültig ab summerterm 2015

Module Level: Master	Language: English	Duration: one semester	Frequency: summer semester
Credits:* 6	Total Hours: 180	Self-study Hours: 120	Contact Hours: 60

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Grading is based on of a final exam (60%), written presentation of the results obtained for the homework (40%), and bonus points are awarded for participation in discussions in the lecture and the lab. With this voluntary mid-term assignment students can improve their module grade. The homework during the semester serves to assess the ability to apply stochastic optimization to real world problems. By this method, the students continually reflect about the theory presented in class and learn to translate theoretical knowledge into practical solutions. The in-depth knowledge of the theory of stochastic optimization and the critical reflection of its limitations are assessed in a final written exam focussing on the theoretical knowledge. Moreover, the students can prove their ability to relate these theoretical results to real world problems. The presentation and discussion of the homework in the lab sessions measure students' ability to structure and present their results, connect them with state-of-the-art methods and theories, and present them in a scientific way.

Repeat Examination:

End of Semester

(Recommended) Prerequisites:

Knowledge of basic linear optimization and basic probability theory would be an advantage. The required theory is reviewed in the class.

Content:

In this module students learn about the theory and the methods of stochastic optimization. The theory is complemented by a range of real-world examples with a focus on applications in energy trading and finance. Along with the examples an introduction to software tools is given that enables students to solve stochastic optimization problems. The required mathematical tools will be introduced along the way.

The module contents span the theory of stochastic optimization (two-stage and multi-stage), numerical solution methods, the treatment of risk via risk measures in stochastic optimization, as well as sampling based approaches.

In particular, topics of the course include but are not limited to

- What is stochastic optimization
- Two-stage linear stochastic optimization with recourse
- Computational methods
- Monte-Carlo methods
- Multi-stage models
- Risk measures in stochastic optimization

Intended Learning Outcomes:

After the successful completion of this module, students are able (1) to understand the basic theory of stochastic optimization, (2) to critically reflect the limitations of the theory, (3) to implement solution approaches for stochastic optimization using MATLAB in combination with numerical solvers, (4) to model real-world problems under uncertainty as stochastic optimization problems that can be treated with the methods introduced in the course, (5) to communicate the results to a scientific audience.

Teaching and Learning Methods:

The module combines several learning methods.

To facilitate a better understanding of the subject the course is divided into lectures and a lab (exercise). In the lectures theory is presented which is subsequently applied by students in homework assignments using MATLAB. The solutions are handed in and students can volunteer to present their solutions in the lab. In private reading, students complement the knowledge from the lecture with additional methods relevant for solving the cases. Students reflect on the theory and their applicability in class and during class discussion. By working on real world stochastic optimization problems, handling actual data, and designing numerical solution approaches as well as engaging in discussions of their homework solutions, participants get in-depth knowledge about the basics of stochastic optimization.

Media:

Lecture notes, presentations, scientific literature

Reading List:

Birge, J. and Louveaux, F. Introduction to Stochastic Programming. Springer Series in Operations Research and Financial Engineering, 2011 (second edition).

Shapiro, A. and Dentcheva, D. and Ruszczyński, A. Lectures on Stochastic Programming: Modeling and Theory. MOS-SIAM Series on Optimization. 2014 (second edition).

Responsible for Module:

Wozabal, David; Prof. Dr. rer. soc.

Courses (Type of course, Weekly hours per semester), Instructor:

Stochastic Optimization, Lecture, 2 SWS

Stochastic Optimization, Exercise, 2 SWS

Prof. Dr. David Wozabal

For further information in this module, please click campus.tum.de or [here](#).

Double Degree Program HEC Paris | Double Degree Program HEC Paris

Module Description

WI700006: Modules from HEC Paris | Modules from HEC Paris

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: Language taught	Duration:	Frequency: winter/summer semester
Credits:* 60	Total Hours:	Self-study Hours:	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

Within this module courses of the double degree program with Grand École des Hautes Études Commerciales (HEC) can be recognized. If you are interested in the program, you can find more information here: <https://www.wi.tum.de/student-life/joint-international-programs/>.

Repeat Examination:

(Recommended) Prerequisites:

Content:

Intended Learning Outcomes:

Teaching and Learning Methods:

Media:

Reading List:

Responsible for Module:

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

Master's Thesis | Master's Thesis

Module Description

WI900249: Master's Thesis (Master in Management and Technology) | Master's Thesis (Master in Management and Technology)

Version of module description: Gültig ab summerterm 2019

Module Level: Master	Language: German/English	Duration:	Frequency: winter/summer semester
Credits:* 30	Total Hours: 900	Self-study Hours: 900	Contact Hours:

Number of credits may vary according to degree program. Please see Transcript of Records.

Description of Examination Method:

The Master's Thesis is the final paper on a specific topic in business administration or economics. The thesis usually requires six months of work. Students describe and analyze the state of research on a specific topic. Based on the scientific knowledge and methodical skills acquired during their studies, students autonomously find an answer to their research question, or provide a solution to a specific problem. The Master's Thesis is supervised by a professor of the TUM School of Management or a professor who teaches on the program Master Management & Technology.

Repeat Examination:

Next semester

(Recommended) Prerequisites:

Students can start their Thesis after the successful completion of at least 48 credits, of which at least 18 credits are from the technology specialization.

Content:

The Master's Thesis focuses on a research topic in business administration or economics, often with a special focus on engineering and natural sciences. The thesis is supervised by a professor of the TUM School of Management or a professor who teaches on the program Master Management & Technology, often in collaboration with a company or a research institution. The Thesis must be completed within six months.

Intended Learning Outcomes:

At the end of the module Master's Thesis, students are able to independently and systematically complete a scientific project. Therefore, students deploy their scientific knowledge and methodical

skills to the specific subject. They describe the state-of-the-art knowledge in the specific field, conduct the research, evaluate the findings, and classify them within the scientific and or practical discussion. So, students are able to independently address new and complex research questions and also develop their own solutions and recommendations.

Teaching and Learning Methods:

The thesis should familiarize students with scientific work and should give them deep insights into a specific topic. Therefore, students apply their knowledge and methodical skills, acquired during the studies, and create a scientific manuscript within the set time frame.

Media:

literature, presentations

Reading List:

specific literature based on the topic

Responsible for Module:

Fuchs, Christoph; Prof. Dr.

Courses (Type of course, Weekly hours per semester), Instructor:

For further information in this module, please click campus.tum.de or [here](#).

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[IN2211] Auction Theory and Market Design Auktionstheorie und Marktdesign	673 - 674

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[WI001087] Banking Law and Credit Collaterals Bank- und Kreditsicherungsrecht	198 - 199
[EI0611] Basics of Electrical Energy Storage Grundlagen Elektrischer Energiespeicher	567 - 568
[CH1091] Basic Principles of Physical Chemistry 1 Grundlagen der Physikalischen Chemie 1	528 - 530
[EI70810] Battery Storage Batteriespeicher	584 - 586
[CH4117] Biochemistry Biochemie	533 - 535
[CH4117] Biochemistry Biochemie	540 - 542

[CH0106] Biology for Chemists Biologie für Chemiker	536 - 537
[MW1903] Bioprocess Engineering Bioverfahrenstechnik	492 - 493
[MW1903] Bioprocess Engineering Bioverfahrenstechnik	694 - 695
[IN2359] Blockchain-based Systems Engineering Blockchain-based Systems Engineering	650 - 651
[IN2359] Blockchain-based Systems Engineering Blockchain-based Systems Engineering	758 - 759
[EI73141] Brain, Mind and Cognition (Seminar) Brain, Mind and Cognition (Seminar) [BMCSem]	732 - 733
[POL70044] Business Ethics Unternehmensethik	801 - 802
[IN2105] Business Process Technologies and Management Geschäftsprozesstechnologien und -management	647 - 649
[IN2105] Business Process Technologies and Management Geschäftsprozesstechnologien und -management	755 - 757

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[WahlKat-EE] Catalogue of Elective Modules: Economics & Econometrics Wahlkatalog: Economics & Econometrics	214
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[WahlKat-EE] Catalogue of Elective Modules: Economics & Econometrics Wahlkatalog: Economics & Econometrics	806
[WahlKat-FA] Catalogue of Elective Modules: Finance and Accounting Wahlkatalog: Finance & Accounting	191
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[WahlKat-IE] Catalogue of Elective Modules: Innovation & Entrepreneurship Wahlkatalog: Innovation & Entrepreneurship	49
[WahlKat-IE] Catalogue of Elective Modules: Innovation & Entrepreneurship Wahlkatalog: Innovation & Entrepreneurship	370
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[WahlKat-LSMP] Catalogue of Elective Modules: Life Sciences Management & Policy Wahlkatalog: Life Sciences Management & Policy	895
[WahlKat-MM] Catalogue of Elective Modules: Management & Marketing Wahlkatalog: Management & Marketing	128
[WahlKat-MM] Catalogue of Elective Modules: Management & Marketing Wahlkatalog: Management & Marketing	426
[WahlKat-MM] Catalogue of Elective Modules: Management & Marketing Wahlkatalog: Management & Marketing	908
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Catalogue of Elective Modules: Mechanical Engineering (advanced) Wahlkatalog: Maschinenwesen (advanced)	696
[WahlKat-EM] Catalogue of Elective Modules: Modules Energy Markets Wahlkatalog: Energy Markets	246
[WahlKat-EM] Catalogue of Elective Modules: Modules Energy Markets Wahlkatalog: Energy Markets	357
[WahlKat-EM] Catalogue of Elective Modules: Modules Energy Markets Wahlkatalog: Energy Markets	832
[WahlKat-OSCM] Catalogue of Elective Modules: Operations & Supply Chain Management Wahlkatalog: Operations & Supply Chain Management	170
[WahlKat-OSCM] Catalogue of Elective Modules: Operations & Supply Chain Management Wahlkatalog: Operations & Supply Chain Management	460
[WahlKat-OSCM] Catalogue of Elective Modules: Operations & Supply Chain Management Wahlkatalog: Operations & Supply Chain Management	944
[IN2073] Cloud Computing Cloud Computing	715 - 716
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	101 - 103
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	162 - 164
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	200 - 202
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	367 - 369
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	413 - 415
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	457 - 459
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	844 - 846

[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	892 - 894
[WI001222] Commercial Criminal Law and Compliance Wirtschaftsstrafrecht und Compliance	941 - 943
[EI0625] Communication Networks Kommunikationsnetze	556 - 557
[CH3153] Construction Chemistry 1 Bauchemie 1	546 - 548
[AR30372] Core Topic: Publics & Participation Core Topic: Publics & Participation	784 - 785
[MGT001302] Customer Insights Customer Insights	908 - 909

D

[IN2339] Data Analysis and Visualization in R Data Analysis and Visualization in R	709 - 711
[EI70330] Data Networking Data Networking [DNET]	581 - 583
[MGT001370] Designing Manufacturing Systems Designing Manufacturing Systems	173 - 174
[MGT001370] Designing Manufacturing Systems Designing Manufacturing Systems	463 - 464
[MGT001370] Designing Manufacturing Systems Designing Manufacturing Systems	950 - 951
[WI001126] Designrecht Designrecht	882 - 883
[MW2076] Design of Electric Vehicles Auslegung von Elektrofahrzeugen	622 - 624
[EI7331] Design of Integrated Circuits Entwicklung von Integrierten Schaltungen	563 - 564
[MGT001376] Digital Marketing & Text Analytics Digital Marketing & Text Analytics	153 - 154
[MGT001376] Digital Marketing & Text Analytics Digital Marketing & Text Analytics	451 - 452
[MGT001376] Digital Marketing & Text Analytics Digital Marketing & Text Analytics	935 - 936
[BGU70004] Discrete Choice Methods for Transportation Systems Analysis Diskrete Wahlmethoden für Verkehrssystemanalyse	664 - 666
[BGU70004] Discrete Choice Methods for Transportation Systems Analysis Diskrete Wahlmethoden für Verkehrssystemanalyse	772 - 774
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[EI7513] Ecomanagement and Life Cycle Analysis Umweltmanagement - Ökoauditierung	608 - 609
Electives Wahlbereich	533
Electives from Information Technology and Electronics (advanced) Wahlfächer aus Informationstechnik und Elektronik (advanced)	732
Electives from Chemistry (advanced) Wahlfächer aus Chemie (advanced)	722
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Electives from Electrical Engineering and Information Technology Wahlfächer aus Elektro-/ Informationstechnik	727
Electives from Industrial Engineering Wahlfächer aus Industrial Engineering	763
Electives from Power Engineering (advanced) Wahlfächer aus Energietechnik (advanced)	734
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[Fa-WahlKat] Elective Modules Finance and Accounting Wahlfächer Finance and Accounting	191
Elective Modules Innovation and Entrepreneurship Wahlfächer Innovation and Entrepreneurship	49
Elective Modules in Management Wahlfächer in Management	333
Elective Modules Management & Marketing Wahlfächer Management & Marketing	128
[EM-WahlKat] Elective Modules Modules Energy Markets Wahlfächer Energy Markets	246
[LSMP-WahlKat] Elective Modules Modules Life Sciences Management & Policy Wahlfächer Life Sciences Management & Policy	261
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[EI0610] Electrical Drives - Fundamentals and Applications Elektrische Antriebe - Grundlagen und Anwendungen	565 - 566
[EI1289] Electrical Engineering Elektrotechnik	551 - 553
[EI0612] Electrical Small Power Machines Elektrische Kleinmaschinen	569 - 570
[EI7328] Electromagnetic Compatibility in the Field of Power Engineering Elektromagnetische Verträglichkeit in der Energietechnik	591 - 592

[WI000258] Empirical Research in Economics and Management Empirical Research in Economics and Management	232 - 234
[WI000258] Empirical Research in Economics and Management Empirical Research in Economics and Management	351 - 353
[WI000258] Empirical Research in Economics and Management Empirical Research in Economics and Management	824 - 826
[MW0628] Energy and Economy Energie und Wirtschaft	699 - 700
[EI7329] Energy Application Technology Energieanwendungstechnik	593 - 594
[EI7329] Energy Application Technology Energieanwendungstechnik	734 - 735
[MW2277] Energy Carriers for mobile Applications Energieträger für mobile Anwendungen	503 - 504
[MW2277] Energy Carriers for mobile Applications Energieträger für mobile Anwendungen	703 - 704
[WI001145] Energy Economics Energy Economics	235 - 236
[WI001145] Energy Economics Energy Economics	827 - 828
[WI001145] Energy Economics Energy Economics	835 - 836
[WI000946] Energy Markets I Energy Markets I	249 - 251
[EI7330] Energy Supply in Liberalised Markets Energieversorgung im liberalisierten Markt	595 - 597
[POL62200] Energy Transformation Energy Transformation	229 - 231
[POL62200] Energy Transformation Energy Transformation	348 - 350
[POL62200] Energy Transformation Energy Transformation	821 - 823
[MW1108] Engineering Mechanics for Technology Management Technische Mechanik für TUM-BWL	488 - 489
[WI001166] Entrepreneurial Prototyping Entrepreneurial Prototyping	92 - 94
Ethics (max. 2 exam in 2 different modules can be counted) Ethik (max. 2 Leistungen aus 2 verschiedenen Modulen können eingebracht werden)	801
[BGU52021] European Mobility Venture - euMOVE. Mobility Benchmark across Europe European Mobility Venture - euMOVE. Mobilitätsbenchmark in Europa [euMOVE]	786 - 788

F

[MW0036] Factory Planning Fabrikplanung	497 - 498
[MGT001364] Family Businesses Family Businesses	82 - 83
[MGT001364] Family Businesses Family Businesses	397 - 398
[MGT001364] Family Businesses Family Businesses	874 - 875
[WI000948] Food Economics Food Economics	271 - 272
[MA4800] Foundations of Data Analysis Foundations of Data Analysis	678 - 680
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	522 - 524

[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	652 - 654
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	717 - 719
[IN2406] Fundamentals of Artificial Intelligence Fundamentals of Artificial Intelligence	760 - 762
[IN0008] Fundamentals of Databases Grundlagen: Datenbanken	510 - 511
[EI0620] Fundamentals of Electrical Machines Grundlagen elektrischer Maschinen	571 - 572
[EI0709] Fundamentals of Energy Economy Grundlagen der Energiewirtschaft [GDE]	575 - 576

G

[POL64100] Game Theory for Political Scientists Game Theory for Political Scientists [GT]	792 - 794
[CH6202] General and Inorganic Chemistry Allgemeine und Anorganische Chemie	531 - 532

H

[MGT001349] How Digital Platforms Compete – Building and Sustaining Competitive Advantage How Digital Platforms Compete – Building and Sustaining Competitive Advantage	65 - 67
[MGT001349] How Digital Platforms Compete – Building and Sustaining Competitive Advantage How Digital Platforms Compete – Building and Sustaining Competitive Advantage	380 - 382
[MGT001349] How Digital Platforms Compete – Building and Sustaining Competitive Advantage How Digital Platforms Compete – Building and Sustaining Competitive Advantage	857 - 859
[ED150011] Hydrogen Mobility Wasserstoffmobilität [H2Mobil]	494 - 496
[ED150011] Hydrogen Mobility Wasserstoffmobilität [H2Mobil]	696 - 698

I

[MGT001346] Impact School Impact School	59 - 61
[MGT001346] Impact School Impact School	374 - 376
[MGT001346] Impact School Impact School	851 - 853

[EI7135] Industrial Energy Economy Industrielle Energiewirtschaft	589 - 590
[IN8029] Informatics Bachelor Practical Courses for Management Informatik Bachelor-Praktika für Management	636 - 638
[IN8029] Informatics Bachelor Practical Courses for Management Informatik Bachelor-Praktika für Management	745 - 747
[MGT001347] Innovation Facilitator Innovation Facilitator	62 - 64
[MGT001347] Innovation Facilitator Innovation Facilitator	377 - 379
[MGT001347] Innovation Facilitator Innovation Facilitator	854 - 856
[CH4107] Inorganic Solid State and Organometallic Chemistry Anorganische Festkörperchemie und Organometallchemie	725 - 726
[EI7467] Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country Interdisciplinary Project Internship Concept Development of a Renewable Energy System in a Developing Country [ProRESDC]	598 - 600
[EI05551] Internet Communication Internetkommunikation [INT]	554 - 555
[EI05551] Internet Communication Internetkommunikation [INT]	727 - 729
[IN8005] Introduction into Computer Science (for non informatics studies) Einführung in die Informatik für andere Fachrichtungen	675 - 677
[IN8005] Introduction into Computer Science (for non informatics studies) Einführung in die Informatik für andere Fachrichtungen	781 - 783
[IN0010] Introduction to Computer Networking and Distributed Systems Grundlagen: Rechnernetze und Verteilte Systeme	517 - 519
[IN0001] Introduction to Informatics Einführung in die Informatik	508 - 509
[CH1090] Introduction to Organic Chemistry Einführung in die Organische Chemie	525 - 527
[CIT5230000] Introduction to Programming Introduction to Programming	631 - 633
[CIT5230000] Introduction to Programming Introduction to Programming	739 - 741
[MGT001367] Introduction to R for Data Science Introduction to R for Data Science	148 - 149
[MGT001367] Introduction to R for Data Science Introduction to R for Data Science	446 - 447
[MGT001367] Introduction to R for Data Science Introduction to R for Data Science	930 - 931
[WI000979] Inventory Management Inventory Management	177 - 179
[IN0042] IT Security IT-Sicherheit	512 - 513
[IN0042] IT Security IT-Sicherheit	707 - 708

L

[EI1287] Laboratory Course Power Transmission and High Voltage Technology Praktikum Energieübertragungs- und Hochspannungstechnik für Lehramt und TUM-BWL	577 - 578
[WI000116] Lead User Project Lead User Projekt	49 - 51
[WI001255] Lecture Series Renewable Energy Systems in the Global South Ringvorlesung Erneuerbare Energiesysteme im Globalen Süden	625 - 627
[ED160007] Lithium-Ion Battery Production Lithium-Ionen-Batterieproduktion [VLBP]	479 - 481
[ED160007] Lithium-Ion Battery Production Lithium-Ionen-Batterieproduktion [VLBP]	685 - 687
[WI001140] Luxury Marketing Luxury Marketing	157 - 159

M

[MW1694] Machine Elements - Basics, Manufacturing, Application Maschinenelemente - Grundlagen, Fertigung, Anwendung [ME-BMA]	490 - 491
[MGT001356] Managing Challenges in the BioTech Industry Managing Challenges in the BioTech Industry	194 - 195
[MGT001356] Managing Challenges in the BioTech Industry Managing Challenges in the BioTech Industry	363 - 364
[MGT001356] Managing Challenges in the BioTech Industry Managing Challenges in the BioTech Industry	840 - 841
[WI000997] Marketing Entrepreneurship Lab Marketing Entrepreneurship Lab	155 - 156
[WI000997] Marketing Entrepreneurship Lab Marketing Entrepreneurship Lab	453 - 454
[WI000997] Marketing Entrepreneurship Lab Marketing Entrepreneurship Lab	937 - 938
Master's Thesis Master's Thesis	962
[WI900249] Master's Thesis (Master in Management and Technology) Master's Thesis (Master in Management and Technology)	962 - 963
[BV350007] Materials in Mechanical Engineering Werkstoffe im Maschinenwesen [Materials in mechanical engineering]	474 - 475
[EI7486] Mechanism of Power and Gas Markets in Europe Energiewirtschaftliche Mechanismen der europäischen Strom- und Gasmärkte	604 - 605
[EI0631] Media Technology Medientechnik	560 - 562
[EI0697] Mobile Communications Mobile Communications	639 - 640
[EI70870] Modeling of Energy Systems Modellierung von Energiesystemen	587 - 588
[MGT001368] Models in the study of human behavior Models in the study of human behavior	150 - 152

[MGT001368] Models in the study of human behavior Models in the study of human behavior	226 - 228
[MGT001368] Models in the study of human behavior Models in the study of human behavior	345 - 347
[MGT001368] Models in the study of human behavior Models in the study of human behavior	448 - 450
[MGT001368] Models in the study of human behavior Models in the study of human behavior	818 - 820
[MGT001368] Models in the study of human behavior Models in the study of human behavior	932 - 934
[WI700006] Modules from HEC Paris Modules from HEC Paris	960 - 961
[CH0226] Molecular Medicine Molekulare Medizin	543 - 545
[CH0226] Molecular Medicine Molekulare Medizin	722 - 724

N

[EI0636] Nanoelectronics Nanoelectronics [NEL]	748 - 750
[IN2101] Network Security Netzsicherheit	645 - 646
[IN2101] Network Security Netzsicherheit	753 - 754
No management specialization chosen No management specialization chosen	273

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[MW0066] Piston Engines 1 Kolbenmotoren 1 [Piston Engines I]	485 - 487
[MW0066] Piston Engines 1 Kolbenmotoren 1 [Piston Engines I]	691 - 693
[MGT001306] Planning and Scheduling in the Automotive Industry Planning and Scheduling in the Automotive Industry	944 - 946
[EI0628] Power Electronics - Fundamentals and Applications Leistungselektronik - Grundlagen und Standardanwendungen	573 - 574
[WI001141] Principled Entrepreneurial Decisions Principled Entrepreneurial Decisions [PED]	90 - 91

[WI001141] Principled Entrepreneurial Decisions Principled Entrepreneurial Decisions [PED]	405 - 406
[WI001141] Principled Entrepreneurial Decisions Principled Entrepreneurial Decisions [PED]	884 - 885
[EI10002] Principles of Electrotechnology Principles of Electrotechnology [PiET]	549 - 550
[EI10002] Principles of Electrotechnology Principles of Electrotechnology [PiET]	634 - 635
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	214 - 215
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	261 - 262
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	333 - 334
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	416 - 417
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	806 - 807
[MGT001337] Process tracing: Methods and applications Process tracing: Methods and applications	895 - 896
[MW0101] Product Ergonomics Produktergonomie	499 - 500
[EI74831] Project Lab Renewable and Sustainable Energy Systems Project Lab Renewable and Sustainable Energy Systems [PropENS]	601 - 603
Project Studies Projektstudium	803
[WI900685] Project Studies (Master in Management and Technology) Project Studies (Master in Management and Technology)	803 - 805
[EI4585] Project: Economic Aspects of Nanotechnology Projektpraktikum: Wirtschaftliche Aspekte der Nanotechnologie	579 - 580
[MGT001341] Prototyping Entrepreneurial Ideas in New Technology Prototyping Entrepreneurial Ideas in New Technology	57 - 58
[MGT001341] Prototyping Entrepreneurial Ideas in New Technology Prototyping Entrepreneurial Ideas in New Technology	372 - 373
[MGT001341] Prototyping Entrepreneurial Ideas in New Technology Prototyping Entrepreneurial Ideas in New Technology	849 - 850
[EI04024] Python for Engineering Data Analysis - From Machine Learning to Visualization Python for Engineering Data Analysis - From Machine Learning to Visualization [PyEDA]	742 - 744

R

[MW1475] Renewable Energy Technology 1 Regenerative Energiesysteme 1 [RET I]	616 - 618
[MW1476] Renewable Energy Technology 2 Regenerative Energiesysteme 2 [RET II]	619 - 621
Required Modules Pflichtbereich	525
[IN2067] Robotics Robotik	643 - 644

S

[MGT001371] Scheduling Manufacturing Systems Scheduling Manufacturing Systems	175 - 176
[MGT001371] Scheduling Manufacturing Systems Scheduling Manufacturing Systems	465 - 466
[MGT001371] Scheduling Manufacturing Systems Scheduling Manufacturing Systems	952 - 953
[BGU68011] Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]	661 - 663
[BGU68011] Service Concepts and Operation Models for New Mobility Solutions for Mixed-Use Residential Developments Konzepte und Operationsmodelle für neue Mobilitätslösungen in gemischtgenutzten Siedlungsentwicklungen [Service Concepts and Operation Models]	769 - 771
[SOT10028] Social Entrepreneurship Education at Vocational Schools Social Entrepreneurship Education an und mit beruflichen Schulen	52 - 53
[SOT10028] Social Entrepreneurship Education at Vocational Schools Social Entrepreneurship Education an und mit beruflichen Schulen	370 - 371
[SOT10028] Social Entrepreneurship Education at Vocational Schools Social Entrepreneurship Education an und mit beruflichen Schulen	847 - 848
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Specialization in Management: Economics and Econometrics Management-Schwerpunkt: Economics and Econometrics	203
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Specialization in Management: Life Sciences Management and Policy Management-Schwerpunkt: Life Sciences Management and Policy	252
Specialization in Management: Management and Marketing Management- Schwerpunkt: Management and Marketing	104
Specialization in Management: Operations and Supply Chain Management Management-Schwerpunkt: Operations and Supply Chain Management	165
Specialization in Technology Technik-Schwerpunkt	473
Specialization in Technology: Chemistry (major) Technik-Schwerpunkt: Chemie Vertiefungsmodule (major)	540
Specialization in Technology: Chemistry (minor) Technik-Schwerpunkt: Chemie Basismodule (minor)	525
Specialization in Technology: Computer Engineering (major) Technik- Schwerpunkt: Computer Engineering Vertiefungsmodule (major)	639
Specialization in Technology: Computer Engineering (minor) Technik- Schwerpunkt: Computer Engineering Basismodule (minor)	628
Specialization in Technology: Electrical Engineering and Information Technology (minor) Technik-Schwerpunkt: Elektro-/ Informationstechnik Basismodule (minor)	549
Specialization in Technology: Industrial Engineering (minor) Technik- Schwerpunkt: Industrial Engineering Basissmodule (minor)	655
Specialization in Technology: Informatics (major) Technik-Schwerpunkt: Informatik Vertiefungsmodule (major)	514
Specialization in Technology: Informatics (minor) Technik-Schwerpunkt: Informatik Basismodule (minor)	505
Specialization in Technology: Information Technology and Electronics (major) Technik-Schwerpunkt: Informationstechnik und Elektronik Vertiefungsmodule (major)	560
Specialization in Technology: Mechanical Engineering (major) Technik- Schwerpunkt: Maschinenwesen Vertiefungsmodule (major)	494
Specialization in Technology: Mechanical Engineering (minor) Technik- Schwerpunkt: Maschinenwesen Basismodule (minor)	474
Specialization in Technology: Power Engineering (major) Technik- Schwerpunkt: Energietechnik Vertiefungsmodule (major)	565
[BGU70006] Statistical Learning and Data Analytics for Transportation Systems Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]	667 - 669
[BGU70006] Statistical Learning and Data Analytics for Transportation Systems Statistisches Lernen und Datenanalyse für Verkehrssysteme [Statistical Learning and Data Analytics for Transportation Systems]	775 - 777
[WI001135] Stochastic Optimization Stochastische Optimierung	183 - 185
[WI001135] Stochastic Optimization Stochastische Optimierung	470 - 472
[WI001135] Stochastic Optimization Stochastische Optimierung	957 - 959

[CIT4230000] Strategic IT Management Strategic IT Management	514 - 516
[CIT4230000] Strategic IT Management Strategic IT Management	712 - 714
[MW1909] Sustainable Energy Systems Nachhaltige Energiesysteme	501 - 502
[MW1909] Sustainable Energy Systems Nachhaltige Energiesysteme	701 - 702
[ED160017] Sustainable Manufacturing Nachhaltige Produktion [SuM]	482 - 484
[ED160017] Sustainable Manufacturing Nachhaltige Produktion [SuM]	688 - 690
[ED150010] Sustainable Mobile Drivetrains Nachhaltige Mobile Antriebssysteme	476 - 478
[ED150010] Sustainable Mobile Drivetrains Nachhaltige Mobile Antriebssysteme	682 - 684
[EI80004] Sustainable Mobility Sustainable Mobility [SuMo]	613 - 615

T

[WI001148] Technology, Society and International Security Technology, Society and International Security [Technology, Society and International Security]	795 - 797
[EI7624] Techno-Economic Analysis of Telecommunication Networks Techno-Economic Analysis of Telecommunication Networks	610 - 612
[MGT001338] The replication revolution The replication revolution	216 - 217
[MGT001338] The replication revolution The replication revolution	263 - 264
[MGT001338] The replication revolution The replication revolution	335 - 336
[MGT001338] The replication revolution The replication revolution	418 - 419
[MGT001338] The replication revolution The replication revolution	808 - 809
[MGT001338] The replication revolution The replication revolution	897 - 898
[BGU56058] Travel Behavior and Environmental Impacts Verkehrsverhalten und Umweltauswirkungen [TBEI]	655 - 657
[BGU56058] Travel Behavior and Environmental Impacts Verkehrsverhalten und Umweltauswirkungen [TBEI]	763 - 765

U

[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	98 - 100
[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	237 - 239
[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	354 - 356
[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	410 - 412

[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	829 - 831
[WI001211] Understanding Regional Innovation Cultures Understanding Regional Innovation Cultures [InnoCultures]	889 - 891
[BGU70008] Urban Transportation Systems: Operations Research and Emerging Mobility Technologies Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]	670 - 672
[BGU70008] Urban Transportation Systems: Operations Research and Emerging Mobility Technologies Urbane Verkehrssysteme: Betriebsforschung und neue Mobilitätstechnologien [Urban Transportation Systems]	778 - 780

V

[IN2040] Virtual Machines Virtuelle Maschinen	520 - 521
[IN2040] Virtual Machines Virtuelle Maschinen	641 - 642
[IN2040] Virtual Machines Virtuelle Maschinen	751 - 752

W

[WI001194] Who is responsible for food and health? Social and cultural perspective on food, health, and technology Who is responsible for food and health? Social and cultural perspective on food, health, and technology	95 - 97
[WI001194] Who is responsible for food and health? Social and cultural perspective on food, health, and technology Who is responsible for food and health? Social and cultural perspective on food, health, and technology	407 - 409
[WI001194] Who is responsible for food and health? Social and cultural perspective on food, health, and technology Who is responsible for food and health? Social and cultural perspective on food, health, and technology	886 - 888

Y

[MGT001351] Yes we can! - Empowerment as composition Yes we can! - Befähigung als Komposition	68 - 70
[MGT001351] Yes we can! - Empowerment as composition Yes we can! - Befähigung als Komposition	383 - 385
[MGT001351] Yes we can! - Empowerment as composition Yes we can! - Befähigung als Komposition	860 - 862

