



Description of the degree program

PO 2

Date: 01.10.2026

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Compulsory Discipline Economic Sciences

Title	Management Accounting		
Number	2214000050	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Controlling und Unternehmensrechnung
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Overview of capital market-oriented accounting in accordance with IFRS • The technique of posting business transactions • General recognition and measurement rules • Presentation of the financial position • Presentation of the earnings position • Presentation of the financial position • Basic concepts of cost and revenue accounting • Cost and revenue type accounting • Cost centre accounting • Cost and revenue element accounting • Cost and activity accounting systems based on partial costs			
Objective qualification			
After completing the module, students are able to:			
• describe the fundamental rules of accounting under IFRS and their implementation in bookkeeping • explain the concept of traditional cost accounting • apply key methods of accounting under IFRS • apply key methods of traditional cost accounting • critically reflect on information from IFRS-based accounting and on decision-making foundations derived from cost accounting • independently acquire relevant knowledge and resolve comprehension problems by asking questionsun-ting.			
Literature			
• Zimmermann, J./Werner, J.R./Hitz, J.-M. (2025): Buchführung und Bilanzierung nach IFRS und HGB, 5. Aufl., Pearson			

- Deimel, K./Erdmann, G./Isemann, R./Müller, S. (2017): Kostenrechnung – Das Lehrbuch für Bachelor, Master und Praktiker, Pearson, Kapitel 1–6



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Management Accounting	2,0	Lecture	german
Management Accounting - Exercise	2,0	Exercise	german
Literature			
• Zimmermann, J./Werner, J. R./Hitz, J.-M. (2020): Accounting and Financial Reporting under IFRS and the German Commercial Code (HGB), 4th ed., Pearson • Deimel, K./Erdmann, G./Isemann, R./Müller, S. (2017): Cost Accounting: The Textbook for Bachelor's and Master's Students and Practitioners, Pearson, Chapters 1–6			

Title	Fundamentals of Business Administration – Production & Logistics and Finance		
Number	2299000250	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Automobilwirtschaft und Industrielle Produktion - Lehrstuhl für Produktion und Logistik Institut für Finanzwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam, 120 minutes, or 1 take-home exam		
Course achievement			
Contents			
Introduction to Production and Logistics: • Global production in the context of sustainable development • Modelling of production processes and systems • Evaluation of production systems using dominance relations • Economic evaluation of production systems • Sustainability assessment (economic, environmental, social) of production systems and supply chains • Embedding production systems in value chains • Fundamentals of decision theory • Planning of production, procurement and distribution • Supply chain planning Introduction to finance: • Static and dynamic profitability decisions under certainty • Fisher separation and the net present value criterion • Determining project cash flows • Application and evaluation of static methods • Parameter rules • Fundamentals of corporate finance • Financing instruments and their classification • The transformation function of financing measures • Market value maximisation and cost of capital minimisation • Modigliani/Miller (1958) and the irrelevance of financing decisions • Simultaneous investment and financing decisions using comprehensive financial planning			
Objective qualification			

Introduction to Production & Logistics**Students...**

- ...can explain the challenges of global production and sustainable development
- ...can describe production processes and systems using mathematical models
- ...have a basic understanding of economic assessment concepts and methods
- ...understand the importance of considering production systems within the context of supply chains
- ...are familiar with the relevant approaches to life-cycle-based sustainability assessment
- ...can apply life-cycle-based assessment methods to analyse simple production systems and supply chains
- ...are able to integrate the individual assessment methods into a comprehensive assessment approach
- ...are familiar with the key concepts of decision theory and can apply simple multi-criteria decision-making models

Introduction to Finance:**Students...**

- ...understand the significance of net present value in the context of a business decision-making situation.
- ...can make investment decisions that maximise net present value based on given, certain payment structures.
- ...are able to apply both 'static' and 'dynamic' benefit-cost analyses and are able to evaluate these critically.
- ...are familiar with the key parameter rules and can contextualise and critically assess these within the framework of net present value maximisation.
- ...are familiar with the most important financial instruments and can classify them according to the basic forms of financing.
- ...understand the transformative function of corporate financing measures and are familiar with the concept of market value maximisation and cost of capital minimisation.
- ...understand the irrelevance of financing in a perfect market environment, as well as the 'leverage effect', and are aware of their implications for a firm's cost of capital.
- ...are able to evaluate investment and financing programmes on the basis of a comprehensive financial plan, even in an imperfect market environment.

Literature**Related courses****Rules for the choice of courses**

Lecture/exercise are required.
Tutorials and exam preparation are optional.

Compulsory attendance**Name of the course****SWS****Eventtype****Language**

Introduction to Finance

2,0

Lecture/Exercise

german

Literature

- Breuer, W. (2013): Finance, 3rd edition, Wiesbaden.
- Breuer, W. (2012): Investment I, 4th edition, Wiesbaden.
- Hirth, H. (2017): Fundamentals of Finance and Investment, 4th edition, Munich.
- Kruschwitz, L.; Lorenz, D. (2019): Investment Analysis, 15th edition, Berlin.

Introduction to Production and Logistics	2,0	Lecture/Exercise	german
Literature			
• Dyckhoff/Spengler: Production Management (Springer, 2010, 3rd edition) • Hahn, R.: Sustainability Management (2022)			
Exam Preparation for Introduction to Production and Logistics	1,0	Exercise	german
Literature			
• Dyckhoff/Spengler: Production Management (Springer, 2010, 3rd edition) • Hahn, R.: Sustainability Management (2022)			

Title	Basics of Business Studies - Management and Marketing		
Number	2299540	Module version	V3
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Fundamentals of corporate management; • Fundamentals of procurement management; • Fundamentals of operational decision-making; • Basics of marketing; • Marketing research; • Objectives and basic strategies of marketing; • Marketing implementation and control			
Objective qualification			
Students have a basic understanding of general business administration and marketing. They will be able to differentiate between and describe the various business functions, in particular the three main functions of planning, decision-making and control. Students will also have acquired the ability to view business reality from a marketing perspective.			
Literature			
Introduction in Marketing: • Fritz, W. /von der Oelsnitz, D./Seegebarth, B.: Marketing. Elemente marktorientierter Unternehmensführung, 5. Aufl., Stuttgart 2019. • Meffert, H./Burmann, C./Kirchgeorg, M.: Marketing : Grundlagen marktorientierter Unternehmensführung, Konzepte - Instrumente - Praxisbeispiele, 12. Aufl., Wiesbaden 2014. • Kotler, P./Keller, K./Opresnik, M. O.: Marketing-Management, 15. Aufl., München 2017. • Homburg, C.: Grundlagen des Marketingmanagements: Einführung in Strategie, Instrumente, Umsetzung und Unternehmensführung, 5. Aufl., Wiesbaden 2017. • Folienskript			
Introduction in Corporate Governance: • von der Oelsnitz, D. (2009): Management. Geschichte, Aufgaben, Beruf, München. • Staehle, W.H. (1999): Management, 8. Aufl., München. • Schreyögg, G./Koch, J. (2020): Management: Grundlagen der Unternehmensführung, 8. Aufl., Wiesbaden			



Related courses			
Rules for the choice of courses			
Lectures compulsory. Exercises and tutorials are voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction to Management	2,0	Lecture	german
Literature			
• von der Oelsnitz, D. (2009): Management. Geschichte, Aufgaben, Beruf, München • Staehle, W.H. (1999): Management, 8. Aufl., München • Schreyögg, G./Koch, J. (2020): Management: Grundlagen der Unternehmensführung, 8. Aufl., Wiesbaden			
Introduction to Marketing	2,0	Lecture	german
Literature			
• Fritz, W. /von der Oelsnitz, D./Seegebarth, B.: Marketing. Elemente marktorientierter Unternehmensführung, 5. Aufl., Stuttgart 2019 • Meffert, H./Burmann, C./Kirchgeorg, M.: Marketing : Grundlagen marktorientierter Unternehmensführung, Konzepte - Instrumente - Praxisbeispiele, 12. Aufl., Wiesbaden 2014 • Kotler, P./Keller, K./Opresnik, M. O.: Marketing-Management, 15. Aufl., München 2017 • Homburg, C.: Grundlagen des Marketingmanagements: Einführung in Strategie, Instrumente, Umsetzung und Unternehmensführung, 5. Aufl., Wiesbaden 2017 • Slide Transcript			
Review of the lecture "Introduction to Marketing"	2,0	Colloquium	german
Tutorials on Introduction to Management	2,0	Tutorial	german
Literature			
• Macharzina, K./Wolf, J. (2023): Unternehmensführung, 12. Aufl., Wiesbaden. • Staehle, W.H. (1999): Management, 8. Aufl., München. • Schreyögg, G./Koch, J. (2020): Management: Grundlagen der Unternehmensführung, 8th ed., Wiesbaden.			
Consultation colloquium "Lecture: Introduction to Management"	1,0	Colloquium	german

Title	Basics of Law		
Number	2216320	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Sarah Rachut
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (180 min) or 1 take-at-home exam		
Course achievement			
Contents			
Fundamentals of law 1: Introduction to law, legal methodology of case and dispute resolution, constitutional law, in particular state organisation and fundamental rights, administrative law, in particular official action through administrative acts, legal remedies, basic principles of European law. Fundamentals of law 2: Fundamentals of civil law, in particular legal capacity, declarations of intent, conclusion of contracts, representation and avoidance, law of obligations - general part - and fundamentals of criminal law			
Objective qualification			
Students understand the basic principles of law, in particular constitutional law, administrative law and European law (Fundamentals of Law 1). Furthermore, they deal with the contents of the Civil Code - General Section and the Law of Obligations - General Section - and gain an initial insight into criminal law (Fundamentals of Law 2). They solve simple legal cases independently.			
Literature			
Jeweils in aktueller Auflage, derzeit: • Haug, Öffentliches Recht im Überblick, 3. Auflage 2021, • Leipold, BGB I Einführung und Allgemeiner Teil, 1. Auflage, 2022, Mohr Siebeck Verlag, • Brox/Walker, Allgemeines Schuldrecht, 50. Auflage, 2026, Verlag C.H. Beck • Literatursammlung ausgewählter Aufsätze (über Stud.IP)			



Related courses			
Rules for the choice of courses			
The lecture "Fundamentals of Law 1" should be attended before the lecture "Fundamentals of Law 2". The exercises are voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Fundamentals of Law 1	2,0	Lecture	german
Literature			
All in their latest editions; currently:			
• Haug, Öffentliches Recht im Überblick, 3rd edition 2021, • Leipold, BGB I Einführung und Allgemeiner Teil, 11th edition, 2022, Mohr Siebeck Verlag, • Brox/Walker, Allgemeines Schuldrecht, 50th edition, 2026, Verlag C.H. Beck • Collection of Selected Essays (via Stud.IP)			
Fundamentals of Law 2	2,0	Lecture	
Literature			
All in their latest editions; currently:			
• Haug, Öffentliches Recht im Überblick, 3rd edition 2021, • Leipold, BGB I Einführung und Allgemeiner Teil, 11th edition, 2022, Mohr Siebeck Verlag, • Brox/Walker, Allgemeines Schuldrecht, 50th edition, 2026, Verlag C.H. Beck • Collection of Selected Essays (via Stud.IP)			
Fundamentals of Law (Exercise)	2,0	Exercise	german

Title	Basics of Economics		
Number	2212000030	Module version	V2
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Markus Ludwig
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam 120 (min) or 1 take-at-home exam		
Course achievement	only for Bachelor Social Sciences instead of the exam: 1 written exam 120 (min) or 1 take-at-home exam		
Module grade composition	The module mark is calculated equally from the marks for the two written exams or take-home exams.		
Contents			
• Supply and demand • Competition and market efficiency • Macroeconomic variables (gross domestic product, inflation, unemployment) • Business cycle and growth			
Objective qualification			
Students have a basic understanding of how markets work. They know the empirical-statistical background of macroeconomic variables such as GDP, inflation, unemployment and balance of payments and can describe and evaluate economic policy in Germany against the background of economic theories.			
Literature			
• Blanchard, Oliver, Illing, Gerhard: Makroökonomie, Pearson Studium, aktuelle Auflage • Mankiw, N. Gregory, Taylor, Mark P.: Grundzüge der Volkswirtschaftslehre, Schäffer-Poeschel, aktuelle Auflage • Pindyck, Robert S., Rubinfeld, Daniel L.: Mikroökonomie, Pearson Studium, aktuelle Auflage			



Related courses			
Rules for the choice of courses			
Exercises and tutorials are voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Microeconomics	2,0	Lecture/Exercise	german
Literature			
• Mankiw, N. Gregory, Taylor, Mark P.: Principles of Economics, Schäffer-Poeschel, latest edition • Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, latest edition			
Macroeconomics	2,0	Lecture/Exercise	german
Literature			
• Blanchard, Oliver, Illing, Gerhard: Macroeconomics, Pearson Studium, latest edition.			
Maths Revision Guide	1,0	Tutorial	german
Microeconomics for Repeaters	1,0	Exercise	german
Literature			
• Mankiw, N. Gregory, Taylor, Mark P.: Principles of Economics, Schäffer-Poeschel, latest edition • Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, latest edition			
Macroeconomics for Repeaters	1,0	Tutorial	german
Literature			
• Blanchard, Oliver, Illing, Gerhard: Macroeconomics, Pearson Studium, latest edition.			

Compulsory Discipline Technology-oriented Management

Title	Business Innovation Project		
Number	2299000230	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 8,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	240		
Class attendance (h)	56	Self studying (h)	184
Compulsory requirements			
Expected performance/ Type of examination	1 project work or 1 presentation or 1 portfolio		
Course achievement			
Contents			
Current issues from the practice of Technology-oriented Management. Design of innovative concepts, e.g. in products, services, processes or structures.			
Objective qualification			
Students have dealt in depth with an issue from the practice of Technology-oriented Management. They are able to recognize challenges in practice, concretize them, develop solutions in a team based on the knowledge they have gained so far and finally present them (for practice).			
Literature			
will be provided in the respective project			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Business Innovation Project - Marketing and Customer Analytics		Project	german

Business Innovation Project - Finance	4,0	Lecture/Exercise	german
Literature			
will be announced during the session			
Business Innovation Project – Service Information Systems		Project	german
Business Innovation Project - Production & Logistics		Project	german

Title	Introduction to Technology-oriented Management		
Number	2299000000	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	3 / 5,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement	1 portfolio or 1 presentation or 1 term paper or 1 oral presentation		
Contents			
During the introductory session, the institutes within the Department of Economics present their respective academic approaches to issues relating to technology and management. The various disciplinary and methodological approaches in business administration, economics, law and business informatics will be presented. At the end of the semester, students will draw up their own study plan and, at their discretion, explore one of the lectures they have attended in greater depth through a presentation.			
Objective qualification			
Students learn about different business disciplines and their respective views on Technology-oriented Management. The students reflect on their own subject-related interests via a study plan and gain initial experience in scientific work.			
Literature			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction into Technology-oriented Management	3,0	Lecture/Exercise	german

Title	Introduction to Business Information Systems		
Number	2222000080	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssy- steme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examina- tion	1 exam (90 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Overview of business informatics • Hardware, software and networking • Enterprise models: data, function and process modelling • Application development and project management • Integrated application systems in industry and services • Inter-company information systems: e-commerce, electronic markets • IT and corporate strategy: e-business management, customer relationship management, supply chain management, digital products • Management of information processing (information management, process management, knowledge management)			
Objective qualification			
The "Introduction to Business Information Systems" module provides students with an overview of business information systems: as an interdisciplinary subject between business administration, computer science and technology and as an independent subject that considers the relationships between people, (business) tasks and technology. Participants are familiar with the operational and inter-company areas of application of business informatics and know how business management tasks are supported with integrated application systems. They know and master the essential approaches to the design and introduction of application systems and their significance in the management of the company's information system. In addition, they have an idea of new developments in business informatics, e.g. in inter-company relationships of the company with customers and partners or in electronic markets.			
Literature			
• Mertens et al.: Grundzüge der Wirtschaftsinformatik, 9. Auflage, Berlin et al. 2005. • Lehner, F., Wildner, S., Scholz, M.: Wirtschaftsinformatik. Eine Einführung, München, Wien 2008. • Laudon, K. et al.: Wirtschaftsinformatik: Eine Einführung, München 2006 • Stahlknecht, P., Hasenkamp, U.: Einführung in die Wirtschaftsinformatik, 11. Auflage, Berlin et al. 2005 • Vorlesungsunterlagen zum Download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction to Business Information Systems	3,0	Lecture/Exercise	german
Literature			
• Mertens et al.: Fundamentals of Business Informatics, 9th edition, Berlin et al. 2005 • Lehner, F., Wildner, S., Scholz, M.: Business Informatics: An Introduction, Munich, Vienna 2008 • Laudon, K. et al.: Business Informatics: An Introduction, Munich 2006 • Stahlknecht, P., Hasenkamp, U.: Introduction to Business Informatics, 11th edition, Berlin et al. 2005 • Lecture notes available for download			

Title	Internship		
Number	2299900	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Department Wirtschafts-wissenschaften
Hours per Week / ECTS	1 / 10,0	Module owner	N.N. Dozent-Wirtschaftswissen
Workload (h)	300		
Class attendance (h)	285	Self studying (h)	15
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement	1 internship report (must be prepared in accordance with the internship guidelines for the Technology-oriented Management degree program)		
Contents			
The internship should be closely related to the current course of study and the future professional field. The internship must be approved in advance by a subject-related institute of the Department of Economics; an internship report must be submitted to the institute at the end of the internship.			
Objective qualification			
The work placement provides students with practical work experience before they complete their studies and helps them choose a future employer. The main objectives are to put the business management skills acquired during the course into practice, to familiarise oneself with complex operational procedures and organisational structures, and to gain an insight into a future career field.			
Literature			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Compulsory Discipline Mathematics and Methods

Title	Industrial AI and Its Applications		
Number	2227000010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschafts-informatik/Abt. Data-Driven Enterprise
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Frederik Möller
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 Portfolio		
Course achievement	Graded completion of four course assignments (challenges), to be submitted individually or in groups in person. The deadlines will be announced in class. Submission of a video presentation (the length will be announced in class) and answering any follow-up questions. Each assignment counts for 20% of the final grade (20/20/20/20/20)		
Contents			
In the module “Industrial AI and Its Applications,” students gain in-depth knowledge of the systematic use and integration of generative AI into business processes through a combination of theoretical foundations and real-world case studies. In particular, students develop a deep understanding of how to specifically control large language models (LLMs) through advanced prompting techniques (e.g., few-shot learning, cloze and prefix prompts) as well as through context engineering. The focus is on the paradigm shift toward “Agentic AI” and autonomous workflows—that is, AI systems that no longer merely react to inputs but independently plan, decide on, and execute complex, multi-step tasks in business processes (e.g., in supply chain management or software development) with the help of external tools. This gives rise to a variety of questions, e.g.: How can proprietary company data be securely integrated into AI applications (e.g., via RAG), and how can organizations effectively protect themselves against specific AI risks such as indirect prompt injections, jailbreaks, and insidious AI hallucinations? In the accompanying exercise, students learn how to apply various AI interaction techniques using real-world industry use cases (e.g., structured prompt design for classifying customer service inquiries or the conceptual design of AI agents for data analysis)			
Objective qualification			
Upon completion of the module, students will be able to identify, model, and describe industrial AI use cases and agent-based workflows. In particular, students will be able to apply the fundamental elements and rules of structured prompting, context engineering, and AI security (e.g., the use of guardrails against prompt injections) in practice.			
Literature			

- Banh, L., & Strobel, G. (2023). Generative artificial intelligence. Electronic Markets.
- Denning, P. J. (2025). Generative AI. Ubiquity (ACM publication).
- Denning, P. J. (2025). In Large Language Models We Trust? Communications of the ACM.
- Feuerriegel, S., Hartmann, J., Janiesch, C., & Zschech, P. (2024). Generative AI. Business & Information Systems Engineering, 66(1), 111–126.
- Janiesch, C., Zschech, P., & Heinrich, K. (2021). Machine learning and deep learning. Electronic Markets, 31(3), 685–695.
- LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436–444.
- Liu, P., Yuan, W., Fu, J., Jiang, Z., Hayashi, H., & Neubig, G. (2023). Pre-train, Prompt, and Predict: A Systematic Survey of Prompting Methods in Natural Language Processing. ACM Computing Surveys, 55(9), Article 195.
- Russinovich, M., Salem, A., Zanella-Béguelin, S., & Zunger, Y. (2025). The Price of Intelligence. Communications of the ACM.
- Simon, H. A. (1995). Artificial intelligence: an empirical science. Artificial Intelligence, 77(1), 95–127.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
AI in Business: Fundamentals and Applications	4,0	Lecture/Exercise	german
Literature			
• Banh, L., & Strobel, G. (2023). Generative artificial intelligence. Electronic Markets. • Denning, P. J. (2025). Generative AI. Ubiquity (ACM publication). • Denning, P. J. (2025). In Large Language Models We Trust? Communications of the ACM. • Feuerriegel, S., Hartmann, J., Janiesch, C., & Zschech, P. (2024). Generative AI. Business & Information Systems Engineering, 66(1), 111–126. • Janiesch, C., Zschech, P., & Heinrich, K. (2021). Machine learning and deep learning. Electronic Markets, 31(3), 685–695. • LeCun, Y., Bengio, Y., & Hinton, G. (2015). Deep learning. Nature, 521(7553), 436–444. • Liu, P., Yuan, W., Fu, J., Jiang, Z., Hayashi, H., & Neubig, G. (2023). Pre-train, Prompt, and Predict: A Systematic Survey of Prompting Methods in Natural Language Processing. ACM Computing Surveys, 55(9), Article 195. • Russinovich, M., Salem, A., Zanella-Béguelin, S., & Zunger, Y. (2025). The Price of Intelligence. Communications of the ACM. • Simon, H. A. (1995). Artificial intelligence: an empirical science. Artificial Intelligence, 77(1), 95–127.			

Title	Mathematics for Economics		
Number	1294000000	Module version	V2
Shorttext		Language	english german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Partielle Differentialgleichungen
Hours per Week / ECTS	6 / 9,0	Module owner	Studiendekan der Mathematik
Workload (h)	270		
Class attendance (h)	128	Self studying (h)	142
Compulsory requirements			
Expected performance/ Type of examination	Engineering Mathematics A 1 Exam (180 min)		
Course achievement	Mathematics and Economics Assessment: Take-home exam or written exam (30 min)		
Contents			
Mathematics and Economics Presentation of topics from school mathematics in connection with introductions to topics in economics, e.g. Compound interest, geometric sequences, and power laws Loans, savings plans, logarithms, and root laws Matching problems, mappings, bijectivity Optimal decisions, linear functions, intersections of lines Monopolies, price formation, quadratic functions, the PQ formula Production planning, allocation of production resources, systems of linear equations Portfolio theory (introduction), probabilities, rational expressions, and matrices, supplemented as needed by logistics, location planning, and other topics Mathematics for engineering students A (Calculus 1) 1 sequences and limit: definitions and concepts, e.g. monotony and bounds, convergence criteria of comparison and of monotony, typical limits, Euler's number e, accumulation point, limit superior, Bachmann-Landau notation, supremum, Cauchy sequence, basic properties of real numbers 2 series: convergence and absolute convergence, geometric, harmonic and exponential series, comparison test, ratio test, root test, alternating series test with proofs 3 functions: concepts, standard functions including hyperbolic and area functions, relation to trigonometric functions, inverse function, rational functions and partial fraction decomposition, graphical representation 4 limits of functions and continuity: definition, properties of continuous functions, classification of discontinuities, intermediate value theorem, extreme value theorem with proof 5 differentiation: difference and differential quotient, C^n-spaces and norms, product and chain rule, derivatives of standard functions, derivatives of inverse functions, mean value theorem, de l'Hospital's rule with proof, extreme values, curvature Taylor polynomials and series 6 integration: definit and indefinit integral (Riemann), fundamental theorem of calculus with proof, integration by parts, integration by substitution, integrals of standard functions, integrals of rational functions and power series, improper integrals, Gamma-unction Mathematics for engineering students A (Linear Algebra)			

1 algebraic structures: number domains, group, field, modulo, complex numbers, cartesian and polar form, Euler's identity, roots of complex numbers, polynomial division, linear factor decomposition, fundamental theorem of algebra without proof

2 vectors and vector spaces: linear independence, sub-space, basis, dimension, norm, scalar product, projection, ortho-normal basis, Cauchy Schwarz inequality

3 linear maps and matrices: definition of general linear maps, kernel, image, rank, inverse matrix, transposition, determinant, matrix norm

4 Gaussian algorithm: trapezoid form, underdetermined systems and parameter-dependent solutions, inverse matrix

5 eigenvalues and eigenvectors: diagonalizable matrices, eigenvalues and -vectors of symmetric matrices, Jordan form, similarity

6 vectors in geometry: lines and planes, Hesse normal form, vector product, triple product, transformation of coordinates

Objective qualification

Mathematics and Economics

Students have a solid grounding in mathematics at secondary school level and are able to make connections with topics in economics.

Engineering Mathematics A

The students combine the learnt mathematical methods of univariate calculus and linear algebra in the description and investigation of applied problems in the engineering sciences. They choose appropriate calculation techniques and appropriate methods of proof for the discussion of the mathematical fundamentals in the applied and engineering sciences, and they apply these techniques and methods. The students explain the formation of mathematical concepts and they derive the motivation of these concepts from applications and from the mathematical specification and delimitation of terms and definitions. The students reproduce and explain basic proofs and ideas of proofs in univariate calculus and linear algebra. They are able to identify and to test relations between the learnt concepts. The students are able to analyse mathematical problems occurring in applications and engineering lectures, to extract and to solve treatable sub-problems and to identify continuative difficulties. Finally, students use constructively modern tools for the treatment of computational problems.

Literature

Mathematics and Economics

Langemann, Reisch: Mathematics Made Easy, Mathematical Modelling, SpringerSpektrum
Langemann, Sommer: Mathematics Made Easy, Basic Knowledge for First-Year Students in All Disciplines, SpringerSpektrum

Engineering Mathematics A

Textbooks and lecture notes on advanced mathematics, e.g. Burg, Haf, Wille, Meister: Advanced Mathematics for Engineers, Volumes I & II, SpringerVieweg
Ansorge, Oberle, Rothe, Sonar: Mathematics in Engineering and the Natural Sciences, Volume I, Wiley
Langemann, Sommer: Mathematics Made Easy, Twelve Challenges in the First Semester, SpringerSpektrum



Related courses			
Rules for the choice of courses			
You can attend lectures in German or English. Participation in the small exercises is voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Mathematics for Engineers A (Analysis 1)	1,0	Exercise	german
Mathematics for Engineers A (Analysis 1)	1,0	Exercise, small group	german
	3,0	Lecture/Exercise	german
	1,0	Exercise, small group	german
	3,0	Lecture/Exercise	english
	1,0	Exercise	english
	1,0	Exercise, small group	english
	3,0	Lecture/Exercise	english
	1,0	Exercise	english
	1,0	Exercise, small group	english
Mathematics for Engineers A (Linear Algebra)	1,0	Exercise	german
Mathematics for Engineers A (Linear Algebra)	2,0	Lecture/Exercise	german
Mathematics for Engineers	6,0	Lecture/Exercise	english german
Mathematics and Economics	1,0	Lecture	german

Title	Quantitative Methods in Economic Sciences		
Number	2299000080	Module version	V2
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	6 / 9,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	270		
Class attendance (h)	84	Self studying (h)	186
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Operations Reserach • Linear programming • Integer optimization • Graph-based optimization • Heuristics and meta-heuristics			
Statistik • Descriptive statistics • Estimation and test theory • Confidence intervals • Independence and goodness of fit tests			
Empirische Wirtschaftsforschung • Fundamentals of empirical economic research • Statistical analysis of economic data • Estimation and interpretation of econometric models • Statistical inference and hypothesis tests			
Objective qualification			
After completing this module, students have a basic overview of quantitative methods in economics and are able to apply them. They will be able to identify and model common quantitative decision-making and analysis problems and solve them by applying an appropriate method			
Literature			
See course listings for sample literature			



Related courses			
Rules for the choice of courses			
Participation in the exercises is voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Operations Research	2,0	Lecture/Exercise	german
Literature			
• Domschke, W.; Drexl, A.; Klein, R.; Scholl, A.: Einführung in Operations Research. 9. Auflage. Springer, 2015. • Mattfeld, M.; Vahrenkamp, R.: Logistiknetzwerke. 2. Auflage. Springer, 2014			
Operations Research - A small exercise	1,0	Lecture/Exercise	german
	2,0	Lecture	german
Literature			
• Fahrmeir, L. et al.: Statistik: Der Weg zur Datenanalyse. Springer, 2007. • Mosler, K.; Schmid, F.: Beschreibende Statistik und Wirtschaftsstatistik. Springer, 2006			
	1,0	Exercise, small group	german
Fundamentals of Empirical Economics	2,0	Lecture/Exercise	german
Literature			
• Wooldridge, Jeffrey. Introductory Econometrics: A Modern Approach, 7e, Boston: Cengage Learning, 2019 • Stock, James, and Mark Watson. Introduction to econometrics, 3e, Boston: Pearson/Addison Wesley, 2014			

Title	Economic methodology A (Major)		
Number	2299840	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Department Wirtschafts-wissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Studiendekan der Wirt-schaftswissenschaften
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1st examination: 1 written examination (60 min) or 1 term paper or 1 portfolio or 1 oral examination or 1 presentation or 1 take-at-home exam 2nd examination: 1 term paper or 1 portfolio or 1 oral examination or 1 presentation or 1 written examination (60 min) or 1 take-at-home exam		
Course achievement			
Contents			
Multivariate data analysis: The beginner's course in multivariate data analysis provides students with a basic understanding of working with quantitative data (conception, collection & evaluation), which is used as a basis for economic decisions. Among other things, the course covers the methods of factor, reliability, correlation and regression analyses using the open source software R. In exercises, students acquire application skills in analysing their own data sets. The Master's course Multivariate Data Analysis 2 is offered as a continuation. Qualitative methods 1 and 2: Qualitative research methods complement quantitative analysis by, for example, working with smaller sub-ject groups, more exploratory, more interpretative or also accompanied by the design of artefacts. In this course, students are familiarised with an overview of qualitative methods and their special features and are able to discuss, reflect on and decide on their use. In a total of 6 individual methods for collecting, pro-cessing and analysing findings, students acquire theoretical knowledge as well as basic skills in their use and apply them in small research scenarios. The six methods covered in particular include structured litera-ture analyses, expert interviews, experiments and approaches from grounded theory, action research, case study research and design thinking. Software-based applications of operations research: Knowledge of relevant standard software in the field of data analytics and operations research Application of the software to selected questions on the optimisation of production and logistics systems Knowledge transfer through Teaching the basics of modelling and application Software presentation as well as supervised and independent use of the software Topics: Fundamentals of OR-supported planning and decision-making using mathematical optimisation Fundamentals of data analysis using the CRISP-DM process model			

Data acquisition, analysis and evaluation using the KNIME software
 Mathematical formulation of optimisation models (standard OR models)
 Implementation, solution finding and evaluation using AIMMS
 Independent use of the software as part of a case study
 Comparative analysis of alternative optimisation models

Machine Learning Applications in Business Decision-Making

Methods of accounting consulting

Objective qualification

After completing this module, students have an overview of methods in economics and are able to apply them. They will be able to identify and model common quantitative and qualitative decision-making and analysis problems and solve them by applying an appropriate method.

Literature

Qualitative Verfahren:

- Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016

Softwarebasierte Anwendungen des OR:

- Domschke, W.; Drexl, A. (2015): Einführung in Operations Research, 9. Auflage, Springer
- Roelofs, M.; Bisshop, J. (2020): AIMMS The User's Guide, Paragon Decision Technology (Hrsg.); URL: https://download.aimms.com/aimms/download/manual/AIMMS3_UG.pdf
- Cleve, J.; Lämmel, U. (2016): Data Mining; 2. Auflage, DeGruyter
- KNIME Analytics Platform; URL: <https://www.knime.com/sites/default/files/KNIME%20Analytics%20Platform%20Course%20for%20Beginners.pdf>

Multivariate Datenanalyse:

- Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2018). Multivariate Analysemethoden – Eine anwendungsorientierte Einführung, 15. Auflage: Springer.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). Multivariate data analysis, 8. Auflage: Cengage.

Machine Learning Applications in Business Decision-Making

- Afsharian, M. (2024). Data science essentials in business administration: A multidisciplinary perspective. Decision Analytics Journal, 11, 100442.
- Evans, J.R. (2017): Business Analytics. 2nd edition. Pearson, London.
- Evans, J.R., Olson, D.L. (2002): Introduction to Simulation and Risk Analysis. 2nd edition. Pearson, New Jersey.
- Hodeghatta, U.R., Nayak, U. (2016): Business Analytics Using R - A Practical Approach. Apress.
- Jank, W. (2011): Business Analytics for Managers (Use R!). Springer, New York.
- Provost, F., Fawcett, T. (2013): Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly and Associates
- Runkler, T.A. (2016): Data Analytics – Models and Algorithms for Intelligent Data Analysis. 2nd edition. Springer, Wiesbaden.
- Kubat, M. (2015): An Introduction to Machine Learning. Springer, New York.

Methoden der Accounting-Beratung

- Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung



Related courses			
Rules for the choice of courses			
2 events of your choice. Students are expected to attend the following courses if they intend to write a thesis and/or seminar in the following subjects. Multivariate Data Analysis: Institute for Marketing & Innovation Qualitative methods: Information Management, Corporate Management & Organisation Software-based applications of OR: Decision Support, Production & Logistics Machine Learning Applications in Business Decision-Making: Finance, Economics Accounting consulting methods: corporate accounting			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Machine Learning and Econometrics	2,0	Lecture/Exercise	german
Literature			
- James, G.; Witten, D.; Hastie, T; Tibshirani, R.: An Introduction to Statistical Learning with Applications in R (stets die neueste Auflage) - Wooldridge, J. M.: Introductory Econometrics: A Modern Approach (stets die neueste Auflage)			
Multivariate Data Analysis	2,0	Lecture/Exercise	german
Literature			
- Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2018). Multivariate Analysemethoden – Eine anwendungsorientierte Einführung, 15. Auflage: Springer - Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). Multivariate data analysis, 8. Auflage: Cengage			
Qualitativ Methods 1	2,0	Lecture/Exercise	german
Literature			
Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016			
Software-based Applications of Operations Research	2,0	Lecture/Exercise	german
Literature			
- Domschke, W.; Drexl, A. (2015): Einführung in Operations Research, 9. Auflage, Springer - Cleve, J.; Lämmel, U. (2016): Data Mining; 2. Auflage, DeGruyter			
	2,0	Lecture	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Methods of Data Science for Business	1,0	Lecture	english
	1,0	Colloquium	english

Machine Learning Applications in Business Decision-Making	2,0	Lecture/Exercise	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Machine Learning Applications in Business Decision-Making	1,0	Colloquium	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Qualitativ Methods 2	2,0	Lecture/Exercise	german
Literature			
Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016			

Compulsory Elective Discipline Economic Sciences

Title	Specialisation - Data Science		
Number	2218000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Methoden der Wirtschaftsinformatik		
Expected performance/ Type of examination	2 assessment components for the selected courses: 1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as 1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			

Contents**Business Analytics**

- Introduction to Business Analytics
- Data Mining
- Cross-Industry Standard Process
- Exploratory Data Analysis
- Descriptive Modelling
- Predictive Modelling
- Pattern Search and Analysis
- Time Series Analysis

Machine and Statistical Learning in Finance

- Fundamental Methods and Techniques of Machine and Statistical Learning (e.g. linear regression, variable selection methods and tree-based methods)
- Application of these methods to forecasting and estimation problems in finance
- Implementation of these methods within the context of software-based case studies

Objective qualification**Business Analytics**

Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at

least on a trial basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.

Machine and statistical learning in finance

Students will master fundamental methods of machine and statistical learning and will be able to use these to address forecasting and estimation problems in finance.

Literature

Business Analytics

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
 Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance

Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (current edition), Springer.
 James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (current edition), Springer.
 Supplementary reading material will be made available via Stud.IP during the course.



Related courses

Rules for the choice of courses

You must enrol in two lectures.

Compulsory module

Business Analytics
 Machine and Statistical Learning in Finance

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Business Analytics	2,0	Lecture	german
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Literature

- Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
- Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance	2,0	Lecture	german
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Literature

- Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer.
- James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer.
- Supplementary reading material will be made available via Stud.IP during the course.

Title	Specialisation - Decision Support		
Number	2218000010	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Methoden der Wirtschaftsinformatik		
Expected performance/ Type of examination	2 assessment components for the selected courses:1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
Business Analytics • Introduction to Business Analytics • Data Mining • Cross-Industry Standard Process • Exploratory Data Analysis • Descriptive Modelling • Predictive Modelling • Pattern Search and Analysis • Time Series Analysis			
Business Application Systems • Enterprise Resource Planning (ERP) Systems • Data Structures for Information Integration • ERP Functions in Production Planning • Online Analytical Processing (OLAP) • Data Warehouse Modelling • Extract, Transform and Load (ETL) Processes • Metadata and Subsystems in the Data Warehouse			
Objective qualification			
Business Analytics Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at least on a trial basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.			

Business Application Systems

Students gain a fundamental understanding of two complementary paradigms of business information processing. They become familiar with transaction-oriented information processing in ERP systems and are introduced to its significance for the integration of operational and cross-organisational tasks. Students understand the role of information integration for coordination, cooperation and communication tasks within the organisation. Furthermore, students become familiar with analysis-oriented information processing and are introduced to its significance in management support. They will gain a comprehensive understanding of the structure, design and application of analytical databases.

Literature**Business Analytics**

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
 Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Business Application Systems

Kurbel, K.: Enterprise Resource Planning and Supply Chain Management in Industry. DeGruyter Oldenbourg Verlag, Munich 2016

**Related courses****Rules for the choice of courses**

You must enrol in two lectures.

Compulsory module

Business Analytics

Business Application Systems

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Business application systems	2,0	Lecture	german
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Literature

- Kurbel, K.: Enterprise Resource Planning and Supply Chain Management in Industry. De Gruyter Oldenbourg Verlag, Munich 2016

Business Analytics	2,0	Lecture	german
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Literature

- Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
- Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance	2,0	Lecture	german
Literature			
• Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer. • James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer. • Supplementary reading material will be made available via Stud.IP during the course.			

Title	Specialisation - Finance		
Number	2215000000	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Finanzwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Marc Gürtler
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	2 assessment components for the selected courses: 1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as 1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
Machine and Statistical Learning in Finance			
- Fundamental methods and techniques of machine and statistical learning (e.g. linear regression, variable selection methods and tree-based methods) - Application of these methods to forecasting and estimation problems in finance - Implementation of these methods through software-based case studies			
Track – Finance Investment and Financing			
Track – Data Science Business Analytics			
- Introduction to Business Analytics - Data Mining - Cross-Industry Standard Process - Exploratory Data Analysis - Descriptive Modelling - Predictive Modelling - Pattern Search and Analysis - Time Series Analysis			
Objective qualification			
Machine Learning and Statistical Learning in Finance (compulsory)			
Students will master the fundamental methods of machine learning and statistical learning and will be able to use them to address forecasting and estimation problems in finance.			
- depending on the chosen track (1 compulsory module) -			
Track - Finance			

Investment and Financing

Students are familiar with the fundamental procedures for evaluating investment decisions under uncertainty. These include correction procedures, sensitivity and risk analyses, and the expected value-variance principle. Furthermore, students can evaluate investment projects using the Capital Asset Pricing Model (CAPM). They are also able to take sequential courses of action and real options into account when assessing investment projects. In the context of raising capital, students consider taxes and insolvency costs in their financing decisions. They are aware of the perverse incentives associated with debt and equity financing and can take countermeasures. In the context of debt financing, they are aware of the significance and incentive effect of collateral. Finally, students can optimally structure mezzanine financing forms with regard to their channelling function.

Track - Data Science
Business Analytics

Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at least on an illustrative basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.

Literature

You must take two lectures.

Compulsory module
Machine and Statistical Learning in Finance
One elective module – compulsory
Investment and Finance
Business Analytics
Seminar optional.**Machine Learning and Statistical Learning in Finance**

Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer.

James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (current edition), Springer.

Supplementary reading material will be made available via Stud.IP during the course.

Track – Finance
Investment and Financing

Breuer, Wolfgang (2012): Investment I, 4th edition, Wiesbaden. Breuer, Wolfgang (2001): Investment II, Wiesbaden.

Breuer, Wolfgang/Gürtler, Marc/Schuhmacher, Joachim (1999): The Valuation of Corporate Real Options, in: Business Research and Practice, Vol. 51, pp. 213–232.

Busse von Colbe, Walther/Witte, Frank (2018): Investment Theory and Investment Analysis, 5th edition, Berlin. Kruschwitz, Lutz/Lorenz, Daniela (2019): Investment Analysis, 15th edition, Berlin.

Track - Data Science
Business Analytics

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001

Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020



Related courses			
Rules for the choice of courses			
You must take two lectures. Compulsory module Machine and Statistical Learning in Finance One elective module – compulsory Investment and Finance Business Analytics Seminar optional.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Investment and Financing	2,0	Lecture	german
Literature			
• Breuer, Wolfgang (current edition): Investment I, 4th edition, Wiesbaden. Breuer, Wolfgang (2001): Investment II, Wiesbaden. • Breuer, Wolfgang/Gürtler, Marc/Schuhmacher, Joachim (current edition): The Valuation of Corporate Real Options, in: Business Research and Practice, Vol. 51, pp. 213–232. • Busse von Colbe, Walther/Witte, Frank (current edition): Investment Theory and Investment Analysis, 5th edition, Berlin. • Kruschwitz, Lutz/Lorenz, Daniela (current edition): Investment Analysis, 15th edition, Berlin.			
Machine and Statistical Learning in Finance	2,0	Lecture	german
Literature			
• Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer. • James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer. • Supplementary reading material will be made available via Stud.IP during the course.			
Bachelor's Specialisation Finance (Colloquium)	2,0	Colloquium	german

Title	Specialisation – Innovation Management		
Number	2225000050	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The Bachelor's course 'Introduction to Entrepreneurship' guides students through the entire start-up process, from the initial idea to the successful establishment of a start-up. The basic ways of thinking and acting that are particularly relevant for technology-orientated start-up projects are taught. Special emphasis is placed on the development, evaluation and utilisation of technological opportunities. Students learn to develop innovative ideas and evaluate them critically. They are enabled to design viable business models and create a comprehensive business plan. In addition, students acquire the ability to calculate and assess the value and profitability of companies or individual projects.			
Objective qualification			
Students are familiar with the financial, business and legal aspects of setting up a company. They are able to independently assess the economic and technological potential of new companies. They are capable of founding a company.			
Literature			
will be announced at the beginning of the course.			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction to Innovation Management	4,0	Lecture/Exercise	german

Title	Specialisation - Cost Management		
Number	2214000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Controlling und Unternehmensrechnung
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	The module “Bachelor's Specialization in Economics (Cost Management Track)” builds on the module “Management Accounting.” to make decisions.		
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (20 mins) or 1 written assignment (term paper) or 1 take-home exam or written exam + (Students can earn up to 12 additional marks through presentations, which are added to their written exam mark)		
Course achievement			
Contents			
• Cost and Revenue Accounting as a Decision-Making Tool • Selected Cost and Revenue Accounting Systems • Fundamentals of Cost Management • Key Tools of Cost Management			
Objective qualification			
Students gain an in-depth understanding of the issues and methods involved in industrial accounting, particularly cost and revenue accounting as well as strategic cost management. On this basis, they are able to analyze related problems and make appropriate decisions.			
Literature			
• Ewert, R./Wagenhofer, A. (2014): Interne Unternehmensrechnung, Berlin et al., 8. Aufl. • Friedl, B. (2019): Praxishandbuch Kostenmanagement, München, 2. Aufl. (bzw. ggf. aktuellere Aufl.)			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Cost Accounting Systems	2,0	Lecture	german
Literature			
Ewert, R./Wagenhofer, (2014): Internal Business Accounting, 8th ed., Berlin et al.			
Strategic Cost Management	2,0	Lecture	german
Literature			
Baden, A. (1997): Strategic Cost Accounting, Wiesbaden			
Strategic Cost Management (Colloquium)	1,0	Colloquium	german
	1,0	Lecture	german
	1,0	Lecture	german
Audit Insights	2,0	Lecture	german
Cost Accounting Systems (Colloquium)	1,0	Colloquium	german
Fundamentals of Auditing	2,0	Lecture	german
Literature			
Baden, A. (1997): Strategic Cost Accounting, Wiesbaden			

Title	Specialisation - Marketing		
Number	2221000020	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Christof Backhaus
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 minutes) or 1 essay or 1 presentation or 1 portfolio or 1 oral exam or 1 take-home exam		
Course achievement			
Contents			
B2B Marketing: • Grundbegriffe und Besonderheiten des B2B Marketing • Das Marketing-Management eines Investitionsgüterherstellers • Geschäftstypenspezifische Sonderprobleme des B2B Marketing			
Digital Marketing: • Grundbegriffe und Konzepte des Digital Marketing • Wesentliche Geschäftsmodelle im Digital Marketing • Ansätze und Instrumente des Online-Kommunikations-Mix (z. B. SEO, SEA, Content Marketing) und deren Bedeutung für die digitale Kundenerfahrung. • Entwicklung integrierter Digital Marketing-Konzepte zur zielgruppenspezifischen Ausgestaltung des Digital Marketing und entsprechender Kampagnen • Kritische Analyse und Bewertung der Wirksamkeit von digitalen Marketingkampagnen			
Objective qualification			
In this module, students acquire the ability to apply and expand their basic marketing knowledge to the special problems of B2B marketing , internet marketing and market-oriented electronic commerce. After completing the module, they will be able to analyse the marketing situation of a capital goods manufacturer and develop a marketing concept. In addition, students will be able to recognise the special features of marketing in e-commerce and outline a concept for internet marketing.			
Literature			
• Backhaus, K./ Voeth, M. (2010): Industriegütermarketing, 10. Aufl., München. • Backhaus, K./ Voeth, M. (2015): Handbuch Business-to-Business-Marketing, 2. Aufl., Wiesbaden. • Seebacher, U. (2023): Praxishandbuch B2B-Marketing, 2. Aufl., Wiesbaden. • Purle, E. et al. (2023): B2B-Marketing und Vertrieb, 2. Aufl., Wiesbaden.			

- Chaffey, D./ Ellis-Chadwick, F. (2022): Digital Marketing, 8. Aufl., Harlow.
- Kingsnorth, S. (2022): Digital Marketing Strategy: An Integrated Approach to Online Marketing, 3. Aufl., London.
- Olbrich, R./ Schultz, C./ Holsing, C. (2025): Electronic Commerce und Online-Marketing, 3. Aufl., Berlin.
- Krowinska, A. et al. (2023): Digital Content Marketing, 1. Aufl., London.
- Folienskripte



Related courses			
Rules for the choice of courses			
Lectures compulsory. Exercises voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
B2B Marketing	2,0	Lecture	german
Digital Marketing	2,0	Lecture	german
Exercise Digital Marketing and B2B Marketing	2,0	Exercise	german

Title	Specialisation - Production and Logistics		
Number	2220060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Automobilwirtschaft und Industrielle Produktion - Lehrstuhl für Produktion und Logistik
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Advanced Planning Systems • Forecasting methods • Production programme planning • Materials management • Production control • Process planning • Procurement logistics • distribution logistics • Spare parts logistics • Transport systems and traffic • Reverse logistics			
Objective qualification			
Students have a basic understanding of production management and logistics issues. With the help of the quantitative and qualitative methods they have learned, they are able to model and solve industrial problems. Students also have a basic understanding of the most important tools such as simulation, optimisation and operational planning systems (APS, ERP).			
Literature			
• Günther/Tempelmeier (2009): Produktion und Logistik • Dyckhoff/Spengler (2010): Produktionswirtschaft • Pfohl (2010): Logistiksysteme • Thonemann (2010): Operations Management • eigene Foliensätze/Übungsaufgaben			



Related courses			
Rules for the choice of courses			
Lecture compulsory. Tutorials and colloquium voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Operations Management	4,0	Lecture	german
Literature			
- Günther, H.-O.; Tempelmeier, H. (2020): Supply Chain Analytics, 13th revised edition, Books on Demand, Norderstedt - Dyckhoff, H.; Spengler, T.S. (2010): Produktionswirtschaft, 3rd revised edition, Springer, Berlin - Pfohl, H.-C. (2025): Logistiksysteme, 10th edition., Springer, Berlin u. a. - Thonemann, U. (2018): Operations Management, 3rd revised edition, Pearson, Hallbergmoos Further textbooks and current academic publications will be announced during the course. Supplementary materials (in particular academic articles, case studies and lecture notes) will be made available as PDF documents via the learning platform.			
Bachelor-Colloquium - Production and Logistics	2,0	Colloquium	german
Exercise Operations Management	2,0	Exercise	german
Literature			
- Günther, H.-O.; Tempelmeier, H. (2020): Supply Chain Analytics, 13th revised edition, Books on Demand, Norderstedt - Dyckhoff, H.; Spengler, T.S. (2010): Production Management, 3rd revised edition, Springer, Berlin - Pfohl, H.-C. (2025): Logistics Systems, 10th ed., Springer, Berlin et al. - Thonemann, U. (2018): Operations Management, 3rd updated ed., Pearson, Hallbergmoos Further textbooks and current academic publications will be announced during the course. Supplementary materials (in particular academic articles, case studies and lecture notes) will be made available as PDF documents via the learning platform.			

Title	Specialisation - Law		
Number	2216340	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	The course builds on the lectures 'Fundamentals of Law 1' and 'Fundamentals of Law 2'.		
Expected performance/ Type of examination	1 written exam (120 min) or 1 oral exam (30 min) or 1 take-at-home exam		
Course achievement			
Contents			
Specialization in Law VL: This course provides students with in-depth knowledge of civil law, in particular the special part of the law of obligations, basic principles of labor law and tort law.			
Exercise in Advanced Law: The course provides students with practical application strategies for solving legal cases from the law of obligations - special part, tort law, i.e. tortious acts (§§ 823 ff. BGB) and basic principles of labor law.			
Objective qualification			
Students are able to understand and assess specific issues of civil law - law of obligations, individual employment law and tort law - and to apply them to practical cases and come to a conclusion independently.			
Literature			
• Löhnig, Martin; Fischinger, Philipp S.: Einführung in das Zivilrecht, aktuelle Auflage, C. F. Müller • Musielak, Hans-Joachim; Hau, Wolfgang: Grundkurs BGB, aktuelle Auflage, C. H. BECK • Medicus, Dieter; Petersen, Jens: Grundwissen zum Bürgerlichen Recht, aktuelle Auflage, Vahlen • Junker, Abbo: Grundkurs Arbeitsrecht, aktuelle Auflage, C. H. BECK • Krause, Rüdiger: Arbeitsrecht, aktuelle Auflage, Nomos			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Spezialisierung Law	4,0	Lecture/Exercise	
Literature			
Löhnig, Martin; Fischinger, Philipp S.: Introduction to Civil Law, latest edition, C. F. Müller Musielak, Hans-Joachim; Hau, Wolfgang: Introductory Course on the German Civil Code (BGB), latest edition, C. H. BECK Medicus, Dieter; Petersen, Jens: Basic Knowledge of Civil Law, latest edition, Vahlen Junker, Abbo: Introductory Course in Employment Law, latest edition, C. H. BECK Krause, Rüdiger: Employment Law, latest edition, Nomos			

Title	Specialisation - Service Information Systems		
Number	2222000060	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam+ (60 min) (3 CP) or 1 take-at-home exam (3 CP)		
Course achievement	1 project work (3 CP) The coursework must be completed before the examination.		
Module grade composition	Upon request, the coursework can be included in the module grade. The coursework then accounts for 50% of the module grade. The request must be submitted before the coursework is completed and also applies to repeat examinations.		
Contents			
Fundamentals and Design of Digital Markets and E-Commerce from a Business Informatics Perspective (Digital Markets as Socio-Technical Information Systems Based on Human-Task-Technology).			
The course covers in particular:			
Concepts and models for describing and analyzing digital market mechanisms, transaction and interaction processes, and cross-channel customer interaction			
Fundamentals of digital service design and value creation in usage and interaction			
Business model and revenue logic of digital offerings, as well as key economic perspectives on digital value creation (e.g., information, network, and attention aspects)			
Principles of user-centered interaction design, as well as critical reflection on the influence of design on decisions and trust, taking relevant framework conditions into account			
Application in an application-oriented project to analyze a real-world context and to design a digital service approach			
Objective qualification			
Students understand digital markets as cross-organizational, socio-technical information systems and can explain and analyze key mechanisms of digital market organization (e.g., transaction phases, cross-channel interaction, business and revenue models). They are able to apply established models and concepts to systematically design, justify, and critically evaluate digital service solutions. Working in a team, they can systematically address a limited practical problem within a project context, while also reflecting on ethical and regulatory requirements for the design of digital interactions.			
Literature			
• Bodendorf, F., Robra-Bissantz, S.: E-Business-Management, Berlin 2009 • Laudon, K. et al.: Wirtschaftsinformatik: Eine Einführung, München 2006			

- Kollmann, T.: E-Business: Grundlagen elektronischer Geschäftsprozesse in der Net Economy, Wiesbaden 2008



Related courses			
Rules for the choice of courses			
One lecture and one project, to be completed in the same semester; colloquium voluntary			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Digital Markets	2,0	Lecture	german
Literature			
Lecture notes are available for download; further reading will be announced during the course.			
Design Digital Markets	2,0	Project	german
Literature			
The required literature will be announced at the first session, depending on the topic.			
Bachelor's Specialisation in Service Information Systems (Colloquium)	2,0	Colloquium	german

Title	Specialisation - Services Marketing		
Number	2201000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 mins) or 1 portfolio or 1 take-home exam		
Course achievement			
Contents			
• Consumer Behavior in Services • Customer Expectations of Services • Perception of Services • Customer Relationship Management • Service Design • Service Standards and Tangible Elements • The Role of Staff in the Service Process • The Role of the Customer in the Service Process • Service Distribution • Service Communication • Service Pricing			
Objective qualification			
In this module, students acquire a basic understanding of issues relating to the management of service companies and the marketing of services. Students learn a broad spectrum of methods for analysing business management issues in various service fields.			
Literature			
• Wirtz, J., & Lovelock, C. (2021). Services marketing: People, technology, strategy. World Scientific. •			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Colloquium	german
Services Marketing	4,0	Lecture/Exercise	german

Title	Specialisation - Economics		
Number	2212250	Module version	V4
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Markus Ludwig
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Knowledge from the module Fundamentals of Economics		
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Market and state failure • Equity and justice • Growth and development • Trade			
Objective qualification			
The module deepens and expands the content of the module Fundamentals of Economics. Students are able to use complex economic models to analyze the actions of private and state actors and assess economic effects.			
Literature			
• Todaro, Michael P., Smith, Stephen C.: Economic Development, Pearson, aktuelle Auflage. • Weil, David: Economic Growth, Routledge, aktuelle Auflage. • Pindyck, Robert S., Rubinfeld, Daniel L.: Mikroökonomie, Pearson Studium, aktuelle Auflage.			



Related courses			
Rules for the choice of courses			
Lectures compulsory, tutorials voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Development Economics	2,0	Lecture/Exercise	german
Literature			
• Todaro, Michael P., Smith, Stephen C.: Economic Development, Pearson, latest edition • Weil, David: Economic Growth, Routledge, latest edition			
Economics of the State	2,0	Lecture/Exercise	german
Literature			
• Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, current edition			
	2,0	Colloquium	german

Title	Specialisation – Business Management & Organisation		
Number	2223120	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Management
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dietrich von der Oelsnitz
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Basic knowledge of management studies, in particular the main functions of planning, decision-making and control.		
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
Personnel management • Tasks and the function of supervisors and • Presentation of the behavioral science principles of personnel management, in particular motivation theory • Basic approaches to personnel management • Practice-dominated management models such as the Harzburg model or "management by" concepts Strategic corporate management • Selected approaches to strategic analysis (e.g. experience curve concept, portfolio models and life cycle concepts) • Basic strategies of corporate management • The concept of hypercompetition			
Objective qualification			
After completing this module, students will be able to understand methods of strategic analysis and the basic strategies of sales-oriented corporate management. Furthermore, students will be introduced to the broad spectrum of possible management styles and models, including their behavioral theory background. After successfully completing the module, students will be able to recognize which leadership behavior is promising in which context.			
Literature			
Human resources management: • Oelsnitz, D. von der (2011): Einführung in die systemische Personalführung, Heidelberg. • Neuberger, O. (2002): Führen und führen lassen, 6. Auflage, Stuttgart. • Wunderer, R. (2003): Führung und Zusammenarbeit, 9. Auflage, München/Neuwied. Strategic corporate management: • Hungenberg, H. (2008): Strategisches Management in Unternehmen, 8. Auflage, Wiesbaden.			

- Welge, M. K. / Al-Laham, A. (2008): Strategisches Management, 8. Auflage, Wiesbaden.



Related courses			
Rules for the choice of courses			
Colloquia voluntary			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Leadership	2,0	Lecture	german
Literature			
• Oelsnitz, D. von der (2011): An Introduction to Systemic Human Resource Management, Heidelberg. • Neuberger, O. (2002): Leading and Being Led, 6th edition, Stuttgart. • Wunderer, R. (2003): Leadership and Collaboration, 9th edition, Munich/Neuwied.			
Strategic Business Management	2,0	Lecture	german
Literature			
• Hungenberg, H. (2008): Strategic Management in Organisations, 8th edition, Wiesbaden. • Welge, M. K. / Al-Laham, A. (2008): Strategic Management, 8th edition, Wiesbaden.			
Consulting Colloquium on Leadership	2,0	Colloquium	german
Consulting Colloquium "Strategic Business Management"	1,0	Colloquium	german

Compulsory Elective Discipline Technology-oriented Management
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Title	Specialisation - Digital Enterprises		
Number	2218130	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschafts-informatik/Abt. Data-Driven Enterprise
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Frederik Möller
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 Assessment: 1 term paper including 1 presentation or 1 written exam (120 mins), or 1 oral exam or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
In the "Data Ecosystems and Data Sovereignty" module, students acquire in-depth knowledge of the design and analysis of data ecosystems based on practical case studies and theoretical principles. In particular, they develop a deep understanding of digital technologies and data. The focus is on the special nature of data - it can be reproduced, used and shared at almost no cost. This gives rise to a variety of questions, such as: under what conditions do companies share data with other companies? In the exercise accompanying the lecture, students learn how to apply various research and modelling methods (e.g. e3-value).			
Objective qualification			
After completing the module, students will be able to recognise, model and describe data ecosystems. In particular, students will be able to apply basic elements and rules of data sovereignty.			
Literature			
• Azkan, Can; Möller, Frederik; Ebel, Martin; Iqbal, Taskeen; Otto, Boris; Pöppelbuss, Jens (2022): Hunting the Treasure: Modeling Data Ecosystem Participant Value. In: Proceedings of the 43rd International Conference on Information Systems. Copenhagen: Denmark. • Eitel, Andreas; Jung, Christian; Brandstädter, Robin; Hosseini, Seyed Hossein; Bader, Sebastian; Kühnle, Christian et al. (2021): Usage Control in the International Data Spaces. Hg. v. International Data Space Association (Position Paper Version 3.0). • Jarke, Matthias; Otto, Boris; Ram, Sudha (2019): Data Sovereignty and Data Space Ecosystems. In: Business and Information Systems Engineering 61 (5), S. 549–550. DOI: 10.1007/s12599-019-00614-2. • Jussen, Ilka; Schweihoff, Julia; Dahm, Valentin; Möller, Frederik; Otto, Boris (2023): Data Sharing Fundamentals: Definition and Characteristics. In: Proceedings of the 56th Hawaii International Conference on System Sciences. Hawaii: USA. • Park, Jaehong; Sandhu, Ravi (2004): The UCONABC Usage Control Model. In: ACM Trans. Inf. Syst. Secur. 7 (1), S. 128–174. DOI: 10.1145/984334.984339.			

- Zrenner, Johannes; Möller, Frederik Oliver; Jung, Christian; Eitel, Andreas; Otto, Boris (2019): Usage control architecture options for data sovereignty in business ecosystems. In: Journal of Enterprise Information Management 32 (3), S. 477–495. DOI: 10.1108/JEIM-03-2018-0058.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Data ecosystems and data sovereignty	4,0	Lecture/Exercise	german
Literature			
• Azkan, Can; Möller, Frederik; Ebel, Martin; Iqbal, Taskeen; Otto, Boris; Pöppelbuss, Jens (2022): Hunting the Treasure: Modeling Data Ecosystem Participant Value. In: Proceedings of the 43rd International Conference on Information Systems. Copenhagen: Denmark. • Eitel, Andreas; Jung, Christian; Brandstädter, Robin; Hosseini, Seyed Hossein; Bader, Sebastian; Kühnle, Christian et al. (2021): Usage Control in the International Data Spaces. Hg. v. International Data Space Association (Position Paper Version 3.0). • Jarke, Matthias; Otto, Boris; Ram, Sudha (2019): Data Sovereignty and Data Space Ecosystems. In: Business and Information Systems Engineering 61 (5), S. 549–550. DOI: 10.1007/s12599-019-00614-2. • Jussen, Ilka; Schweihoff, Julia; Dahm, Valentin; Möller, Frederik; Otto, Boris (2023): Data Sharing Fundamentals: Definition and Characteristics. In: Proceedings of the 56th Hawaii International Conference on System Sciences. Hawaii: USA. • Park, Jaehong; Sandhu, Ravi (2004): The UCONABC Usage Control Model. In: ACM Trans. Inf. Syst. Secur. 7 (1), S. 128–174. DOI: 10.1145/984334.984339. • Zrenner, Johannes; Möller, Frederik Oliver; Jung, Christian; Eitel, Andreas; Otto, Boris (2019): Usage control architecture options for data sovereignty in business ecosystems. In: Journal of Enterprise Information Management 32 (3), S. 477–495. DOI: 10.1108/JEIM-03-2018-0058.			

Title	Specialisation - Young Companies		
Number	2225000020	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The Bachelor's course 'Introduction to Entrepreneurship' guides students through the entire start-up process, from the initial idea to the successful establishment of a start-up. The basic ways of thinking and acting that are particularly relevant for technology-orientated start-up projects are taught. Special emphasis is placed on the development, evaluation and utilisation of technological opportunities. Students learn to develop innovative ideas and evaluate them critically. They are enabled to design viable business models and create a comprehensive business plan. In addition, students acquire the ability to calculate and assess the value and profitability of companies or individual projects.			
Objective qualification			
Students are familiar with the financial, business and legal aspects of setting up a company. They are able to independently assess the economic and technological potential of new companies. They are capable of founding a company.			
Literature			
will be announced at the beginning of the course.			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction Entrepreneurship	4,0	Lecture/Exercise	german

Title	Specialisation - Sustainable Enterprises		
Number	2224000060	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Basic knowledge of business administration and an interest in ethical issues in a corporate context are recommended.		
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The module teaches the key principles of business ethics and covers central concepts such as ethics, morality, responsibility and justice. It provides an overview of key ethical theories and their relevance to business activities. It addresses the responsibility of companies towards various stakeholders as well as the opportunities and limitations of corporate social responsibility and sustainability strategies. In addition, current ethical challenges – for example, in the context of digitalisation, global supply chains and technology-driven management – are critically analysed using practical examples and dilemmas.			
Objective qualification			
Upon completion of the module, students will have a sound understanding of key ethical theories and concepts. They will be able to contextualise entrepreneurial activity within society, identify ethical conflicts and reflect on them critically. Particular emphasis is placed on developing reflective skills – a key competence for responsible decision-making in business and society. Students learn to understand responsibility and sustainability not as add-ons, but as integral components of business practice.			
Literature			
• Lütge, C., & Uhl, M. (2018). Wirtschaftsethik. Lehrbuch/Studienliteratur. 1. Auflage. München: Vahlen. XII, 268 S. ISBN 978-3-8006-5323-9. • Göbel, E. (2024). Unternehmensethik: Grundlagen und praktische Umsetzung. 7., überarb. Aufl. Stuttgart: UTB. 369 S. ISBN 978-3-8252-8830-3. (Lehrbuch/Studienliteratur, Softcover) • Suchanek, A. (2021). Unternehmensethik: In Vertrauen investieren. 4. Auflage. Tübingen: Mohr Siebeck / UTB. 284 S. ISBN 978-3-8252-5419-3. • Küpper, H.-U. (2020). Einführung in die Wirtschaftsethik. 2. Auflage. München: Schäffer-Poeschel. 316 S. ISBN 978-3-7910-4873-6. •			
Specific references to literature on the respective topics will be presented and made available during the course of the lecture.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Ethics in Enterprises: Fundamentals of responsible Management	2,0	Lecture/Exercise	german
Living Sustainability: Applied Ethics in Business	2,0	Lecture/Exercise	german

Compulsory Elective Discipline Mathematics and Methods

Title	Economic methodology B (Major)		
Number	2299840	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Department Wirtschaftswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1st examination: 1 written examination (60 min) or 1 term paper or 1 portfolio or 1 oral examination or 1 presentation or 1 take-at-home exam 2nd examination: 1 term paper or 1 portfolio or 1 oral examination or 1 presentation or 1 written examination (60 min) or 1 take-at-home exam		
Course achievement			

Contents**Multivariate data analysis:**

The beginner's course in multivariate data analysis provides students with a basic understanding of working with quantitative data (conception, collection & evaluation), which is used as a basis for economic decisions.

Among other things, the course covers the methods of factor, reliability, correlation and regression analyses using the open source software R. In exercises, students acquire application skills in analysing their own data sets. The Master's course Multivariate Data Analysis 2 is offered as a continuation.

Qualitative methods 1 and 2:

Qualitative research methods complement quantitative analysis by, for example, working with smaller subject groups, more exploratory, more interpretative or also accompanied by the design of artefacts. In this course, students are familiarised with an overview of qualitative methods and their special features and are able to discuss, reflect on and decide on their use. In a total of 6 individual methods for collecting, processing and analysing findings, students acquire theoretical knowledge as well as basic skills in their use and apply them in small research scenarios. The six methods covered in particular include structured literature analyses, expert interviews, experiments and approaches from grounded theory, action research, case study research and design thinking.

Software-based applications of operations research:

Knowledge of relevant standard software in the field of data analytics and operations research
Application of the software to selected questions on the optimisation of production and logistics systems
Knowledge transfer through
Teaching the basics of modelling and application
Software presentation as well as supervised and independent use of the software

Topics:

Fundamentals of OR-supported planning and decision-making using mathematical optimisation
 Fundamentals of data analysis using the CRISP-DM process model
 Data acquisition, analysis and evaluation using the KNIME software
 Mathematical formulation of optimisation models (standard OR models)
 Implementation, solution finding and evaluation using AIMMS
 Independent use of the software as part of a case study
 Comparative analysis of alternative optimisation models

Machine Learning Applications in Business Decision-Making

Methods of accounting consulting

Objective qualification

After completing this module, students have an overview of methods in economics and are able to apply them. They will be able to identify and model common quantitative and qualitative decision-making and analysis problems and solve them by applying an appropriate method.

Literature

Qualitative Verfahren:

- Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016

Softwarebasierte Anwendungen des OR:

- Domschke, W.; Drexl, A. (2015): Einführung in Operations Research, 9. Auflage, Springer
- Roelofs, M.; Bisshop, J. (2020): AIMMS The User's Guide, Paragon Decision Technology (Hrsg.); URL: https://download.aimms.com/aimms/download/manual/AIMMS3_UG.pdf
- Cleve, J.; Lämmel, U. (2016): Data Mining; 2. Auflage, DeGruyter
- KNIME Analytics Platform; URL: <https://www.knime.com/sites/default/file/KNIME%20Analytics%20Platform%20Course%20for%20Beginners.pdf>

Multivariate Datenanalyse:

- Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2018). Multivariate Analysemethoden – Eine anwendungsorientierte Einführung, 15. Auflage: Springer.
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). Multivariate data analysis, 8. Auflage: Cengage.

Machine Learning Applications in Business Decision-Making

- Afsharian, M. (2024). Data science essentials in business administration: A multidisciplinary perspective. Decision Analytics Journal, 11, 100442.
- Evans, J.R. (2017): Business Analytics. 2nd edition. Pearson, London.
- Evans, J.R., Olson, D.L. (2002): Introduction to Simulation and Risk Analysis. 2nd edition. Pearson, New Jersey.
- Hodeghatta, U.R., Nayak, U. (2016): Business Analytics Using R - A Practical Approach. Apress.
- Jank, W. (2011): Business Analytics for Managers (Use R!). Springer, New York.
- Provost, F., Fawcett, T. (2013): Data Science for Business: What You Need to Know About Data Mining and Data-Analytic Thinking. O'Reilly and Associates
- Runkler, T.A. (2016): Data Analytics – Models and Algorithms for Intelligent Data Analysis. 2nd edition. Springer, Wiesbaden.
- Kubat, M. (2015): An Introduction to Machine Learning. Springer, New York.

Methoden der Accounting-Beratung

- Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung



Related courses			
Rules for the choice of courses			
2 events of your choice.			
Students are expected to attend the following courses if they intend to write a thesis and/or seminar in the following subjects.			
Multivariate Data Analysis: Institute for Marketing & Innovation			
Qualitative methods: Information Management, Corporate Management & Organisation			
Software-based applications of OR: Decision Support, Production & Logistics			
Machine Learning Applications in Business Decision-Making: Finance, Economics			
Accounting consulting methods: corporate accounting			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Machine Learning and Econometrics	2,0	Lecture/Exercise	german
Literature			
- James, G.; Witten, D.; Hastie, T; Tibshirani, R.: An Introduction to Statistical Learning with Applications in R (stets die neueste Auflage) - Wooldridge, J. M.: Introductory Econometrics: A Modern Approach (stets die neueste Auflage)			
Multivariate Data Analysis	2,0	Lecture/Exercise	german
Literature			
- Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2018). Multivariate Analysemethoden – Eine anwendungsorientierte Einführung, 15. Auflage: Springer - Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2018). Multivariate data analysis, 8. Auflage: Cengage			
Qualitativ Methods 1	2,0	Lecture/Exercise	german
Literature			
Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016			
	2,0	Lecture	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Software-based Applications of Operations Research	2,0	Lecture/Exercise	german
Literature			
- Domschke, W.; Drexl, A. (2015): Einführung in Operations Research, 9. Auflage, Springer - Cleve, J.; Lämmel, U. (2016): Data Mining; 2. Auflage, DeGruyter			
Methods of Data Science for Business	1,0	Lecture	english
	1,0	Colloquium	english

Machine Learning Applications in Business Decision-Making	2,0	Lecture/Exercise	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Machine Learning Applications in Business Decision-Making	1,0	Colloquium	german
Literature			
Meyer / Theile (2025, 34. Auflage) Bilanzierung nach Handels- und Steuerrecht unter Einschluss der Konzernrechnungslegung und der internationalen Rechnungslegung			
Qualitativ Methods 2	2,0	Lecture/Exercise	german
Literature			
Mayring, Philipp: Einführung in die Qualitative Sozialforschung, 2016			

Title	Discrete Mathematics		
Number	1201320	Module version	V4
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Analysis und Algebra
Hours per Week / ECTS	3 / 5,0	Module owner	Studiendekan der Mathematik
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination in the form of a written exam (90 minutes) or an oral exam (approx. 25 minutes) or a project or take-home exam		
Course achievement	1 Coursework in the form of weekly homework assignments is possible.		
Contents			
- Combinatorial proof principles - Counting methods - Permutations, combinations, variations, inclusion-exclusion - Asymptotic analysis - Graphs - Trees - Important graph properties - Modular arithmetic - Applications in cryptography			
Objective qualification			
- After completing this module, students will have gained an insight into a number of methods, concepts and algorithms used in discrete mathematics. - They will be able to solve selected application problems using combinatorial, graph theory or arithmetic methods and efficient algorithms.			
Literature			
- M. Aigner: Diskrete Mathematik, 5. Aufl. Vieweg, Wiesbaden, 2004. - T. Ihringer: Diskrete Mathematik, 2. Aufl. Teubner, Stuttgart, 1999. - A. Steger: Diskrete Strukturen, Band 1. Springer, Berlin, 2001.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Discrete Mathematics	3,0	Lecture/Exercise	german

Title	Algebra for Computer Scientists		
Number	1201130	Module version	V3
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Partielle Differentialgleichungen
Hours per Week / ECTS	3 / 5,0	Module owner	Studiendekan der Mathematik
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination in the form of a written exam (90 minutes) or an oral exam (approx. 25 minutes) or a project or take-home exam		
Course achievement	1 Coursework in the form of weekly homework assignments is possible.		
Contents			
- Sets, relations and mappings - Groups and Boolean algebras - Integers and polynomials - Semigroups and monoids - Permutations - Groups - Characters of finite Abelian groups and the finite Fourier transform - Operations of groups on sets - Rings - Categories and functors - Monoids and rings - Algebraic systems			
Objective qualification			
Students are familiar with basic algebraic structures and their significance for computer science.			
Literature			
- G. Birkhoff, T.C. Bartee: Modern applied algebra, McGraw-Hill Inc.,US. - S. Buris, H.P. Sankappanavar: A Course in Universal Algebra, Springer-Verlag. - O. Forster: Algorithmische Zahlentheorie, Vieweg-Verlag. - S. Lang: Algebra, Springer-Verlag. - J.D. Lipson: Elements of algebra and algebraic computing, Addison-Wesley.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Lecture/Exercise	german

Title	Introduction Numerical Analysis for Computer Scientists		
Number	1201140	Module version	V3
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Numerische Mathematik
Hours per Week / ECTS	3 / 5,0	Module owner	Studiendekan der Mathematik
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination in the form of a written exam (90 minutes) or an oral exam (approx. 25 minutes) or a project or take-home exam		
Course achievement	1 Coursework in the form of weekly homework assignments is possible.		
Contents			
- Gauß algorithm (LR decomposition) - Stability of an algorithm, condition of a problem - Linear equilibrium problem (QR decomposition) - Non-linear equations (bisection, Newton's method) - Interpolation and approximation (classical polynomial interpolation, splines) - Definite integrals (quadrature formula, Newton-Cotes formulas, Romberg quadrature, extrapolation)			
Objective qualification			
- Students are familiar with simple methods for approximating functions and integrals - Students are familiar with methods for solving (non-)linear equations - Students are familiar with software relevant to numerical analysis - Students are familiar with methods for solving (non-)linear equations and for approximating functions and integrals - Students understand the importance and fundamentals of error analysis - Students have the ability to apply basic principles of implementing numerical algorithms			
Literature			
- Deuffhard, Hohmann, Numerische Mathematik I, de Gruyter - Moler, Numerical Computing with MATLAB, SIAM, auch online - H.R. Schwarz, N. Köckler, Numerische Mathematik, Teubner			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise, small group	german

Title	Stochastics for Computer Scientists		
Number	1201420	Module version	V3
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Mathematische Stochastik
Hours per Week / ECTS	3 / 5,0	Module owner	Studiendekan der Mathematik
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination in the form of a written exam (90 minutes) or an oral exam (approx. 25 minutes) or a project or take-home exam		
Course achievement	1 Coursework in the form of weekly homework assignments is possible.		
Contents			
- Relative frequencies, probability measures - Laplace experiment, discrete distributions - Calculation rules for probability measures - Elementary conditional probabilities - Stochastic independence - Random variables on discrete probability spaces - Probability measures with densities, calculation rules for expected values, variances and covariances - Weak law of large numbers - Weak convergence, distribution convergence and central limit theorems			
Objective qualification			
- Students understand the modelling of random events and the axiomatic structure of probability theory - Students have the ability to formulate concrete situations using random variables - Students can calculate probabilities of events in Laplace spaces - Students understand the relationship between W-measures and distribution functions - Students can calculate expected values, variances and covariances of random distributions - Students are confident in dealing with discrete and continuous random distributions - Students understand the weak law of large numbers and its significance - Students understand the central limit theorems			
Literature			
- U. Krengel, Einführung in die Wahrscheinlichkeitstheorie und Statistik, Vieweg-Verlag - F. Jondra + A. Wiesler, Wahrscheinlichkeitsrechnung und stochastische Prozesse, Teubner			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise, small group	german

Elective Discipline Economic Sciences

Title	Specialisation - Data Science		
Number	2218000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Methoden der Wirtschaftsinformatik		
Expected performance/ Type of examination	2 assessment components for the selected courses: 1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as 1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			

Contents**Business Analytics**

- Introduction to Business Analytics
- Data Mining
- Cross-Industry Standard Process
- Exploratory Data Analysis
- Descriptive Modelling
- Predictive Modelling
- Pattern Search and Analysis
- Time Series Analysis

Machine and Statistical Learning in Finance

- Fundamental Methods and Techniques of Machine and Statistical Learning (e.g. linear regression, variable selection methods and tree-based methods)
- Application of these methods to forecasting and estimation problems in finance
- Implementation of these methods within the context of software-based case studies

Objective qualification**Business Analytics**

Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at

least on a trial basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.

Machine and statistical learning in finance

Students will master fundamental methods of machine and statistical learning and will be able to use these to address forecasting and estimation problems in finance.

Literature

Business Analytics

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
 Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance

Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (current edition), Springer.
 James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (current edition), Springer.
 Supplementary reading material will be made available via Stud.IP during the course.



Related courses

Rules for the choice of courses

You must enrol in two lectures.

Compulsory module

Business Analytics
 Machine and Statistical Learning in Finance

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Business Analytics	2,0	Lecture	german
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Literature

- Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
- Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance	2,0	Lecture	german
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Literature

- Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer.
- James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer.
- Supplementary reading material will be made available via Stud.IP during the course.

Title	Specialisation - Decision Support		
Number	2218000010	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Methoden der Wirtschaftsinformatik		
Expected performance/ Type of examination	2 assessment components for the selected courses:1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
Business Analytics • Introduction to Business Analytics • Data Mining • Cross-Industry Standard Process • Exploratory Data Analysis • Descriptive Modelling • Predictive Modelling • Pattern Search and Analysis • Time Series Analysis			
Business Application Systems • Enterprise Resource Planning (ERP) Systems • Data Structures for Information Integration • ERP Functions in Production Planning • Online Analytical Processing (OLAP) • Data Warehouse Modelling • Extract, Transform and Load (ETL) Processes • Metadata and Subsystems in the Data Warehouse			
Objective qualification			
Business Analytics Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at least on a trial basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.			

Business Application Systems

Students gain a fundamental understanding of two complementary paradigms of business information processing. They become familiar with transaction-oriented information processing in ERP systems and are introduced to its significance for the integration of operational and cross-organisational tasks. Students understand the role of information integration for coordination, cooperation and communication tasks within the organisation. Furthermore, students become familiar with analysis-oriented information processing and are introduced to its significance in management support. They will gain a comprehensive understanding of the structure, design and application of analytical databases.

Literature**Business Analytics**

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
 Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Business Application Systems

Kurbel, K.: Enterprise Resource Planning and Supply Chain Management in Industry. DeGruyter Oldenbourg Verlag, Munich 2016

**Related courses****Rules for the choice of courses**

You must enrol in two lectures.

Compulsory module

Business Analytics

Business Application Systems

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Business application systems	2,0	Lecture	german
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Literature

- Kurbel, K.: Enterprise Resource Planning and Supply Chain Management in Industry. De Gruyter Oldenbourg Verlag, Munich 2016

Business Analytics	2,0	Lecture	german
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Literature

- Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001
- Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020

Machine and Statistical Learning in Finance	2,0	Lecture	german
Literature			
• Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer. • James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer. • Supplementary reading material will be made available via Stud.IP during the course.			

Title	Specialisation - Finance		
Number	2215000000	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Finanzwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Marc Gürtler
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	2 assessment components for the selected courses: 1 written exam (60 min) or 1 oral exam (30 min) or 1 take-at-home exam, as well as 1 written exam (60 min) or 1 oral exam (30 min) or 1 term paper or 1 presentation or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
Machine and Statistical Learning in Finance			
- Fundamental methods and techniques of machine and statistical learning (e.g. linear regression, variable selection methods and tree-based methods) - Application of these methods to forecasting and estimation problems in finance - Implementation of these methods through software-based case studies			
Track – Finance Investment and Financing			
Track – Data Science Business Analytics			
- Introduction to Business Analytics - Data Mining - Cross-Industry Standard Process - Exploratory Data Analysis - Descriptive Modelling - Predictive Modelling - Pattern Search and Analysis - Time Series Analysis			
Objective qualification			
Machine Learning and Statistical Learning in Finance (compulsory)			
Students will master the fundamental methods of machine learning and statistical learning and will be able to use them to address forecasting and estimation problems in finance.			
- depending on the chosen track (1 compulsory module) -			
Track - Finance			

Investment and Financing

Students are familiar with the fundamental procedures for evaluating investment decisions under uncertainty. These include correction procedures, sensitivity and risk analyses, and the expected value-variance principle. Furthermore, students can evaluate investment projects using the Capital Asset Pricing Model (CAPM). They are also able to take sequential courses of action and real options into account when assessing investment projects. In the context of raising capital, students consider taxes and insolvency costs in their financing decisions. They are aware of the perverse incentives associated with debt and equity financing and can take countermeasures. In the context of debt financing, they are aware of the significance and incentive effect of collateral. Finally, students can optimally structure mezzanine financing forms with regard to their channelling function.

Track - Data Science**Business Analytics**

Students are able to solve problems in the field of business analytics using data mining models and methods. They view data analysis as a sequential process comprising modelling and analysis steps. In particular, for predictive modelling, they can select the appropriate modelling approach and implement it, at least on an illustrative basis. Students are familiar with mechanisms for discovering patterns in data and their application to purchase recommendations in e-commerce.

Literature

You must take two lectures.

Compulsory module**Machine and Statistical Learning in Finance****One elective module – compulsory****Investment and Finance****Business Analytics****Seminar optional. Machine Learning and Statistical Learning in Finance**

Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer.

James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (current edition), Springer.

Supplementary reading material will be made available via Stud.IP during the course.

Track – Finance**Investment and Financing**

Breuer, Wolfgang (2012): Investment I, 4th edition, Wiesbaden. Breuer, Wolfgang (2001): Investment II, Wiesbaden.

Breuer, Wolfgang/Gürtler, Marc/Schuhmacher, Joachim (1999): The Valuation of Corporate Real Options, in: Business Research and Practice, Vol. 51, pp. 213–232.

Busse von Colbe, Walther/Witte, Frank (2018): Investment Theory and Investment Analysis, 5th edition, Berlin. Kruschwitz, Lutz/Lorenz, Daniela (2019): Investment Analysis, 15th edition, Berlin.

Track - Data Science**Business Analytics**

Hand, D.; Mannila, H.; Smyth, P.: Principles of Data Mining. MIT Press, 2001

Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020



Related courses			
Rules for the choice of courses			
You must take two lectures. Compulsory module Machine and Statistical Learning in Finance One elective module – compulsory Investment and Finance Business Analytics Seminar optional.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Investment and Financing	2,0	Lecture	german
Literature			
• Breuer, Wolfgang (current edition): Investment I, 4th edition, Wiesbaden. Breuer, Wolfgang (2001): Investment II, Wiesbaden. • Breuer, Wolfgang/Gürtler, Marc/Schuhmacher, Joachim (current edition): The Valuation of Corporate Real Options, in: Business Research and Practice, Vol. 51, pp. 213–232. • Busse von Colbe, Walther/Witte, Frank (current edition): Investment Theory and Investment Analysis, 5th edition, Berlin. • Kruschwitz, Lutz/Lorenz, Daniela (current edition): Investment Analysis, 15th edition, Berlin.			
Machine and Statistical Learning in Finance	2,0	Lecture	german
Literature			
• Hastie, T., Tibshirani, R., & Friedman, J.: The Elements of Statistical Learning: Data Mining, Inference, and Prediction (latest edition), Springer. • James, G., Witten, D., Hastie, T., & Tibshirani, R.: An Introduction to Statistical Learning: with Applications in R/Python (latest edition), Springer. • Supplementary reading material will be made available via Stud.IP during the course.			
Bachelor's Specialisation Finance (Colloquium)	2,0	Colloquium	german

Title	Specialisation – Innovation Management		
Number	2225000050	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The Bachelor's course 'Introduction to Entrepreneurship' guides students through the entire start-up process, from the initial idea to the successful establishment of a start-up. The basic ways of thinking and acting that are particularly relevant for technology-orientated start-up projects are taught. Special emphasis is placed on the development, evaluation and utilisation of technological opportunities. Students learn to develop innovative ideas and evaluate them critically. They are enabled to design viable business models and create a comprehensive business plan. In addition, students acquire the ability to calculate and assess the value and profitability of companies or individual projects.			
Objective qualification			
Students are familiar with the financial, business and legal aspects of setting up a company. They are able to independently assess the economic and technological potential of new companies. They are capable of founding a company.			
Literature			
will be announced at the beginning of the course.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction to Innovation Management	4,0	Lecture/Exercise	german

Title	Specialisation - Cost Management		
Number	2214000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Controlling und Unternehmensrechnung
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	The module “Bachelor's Specialization in Economics (Cost Management Track)” builds on the module “Management Accounting.” to make decisions.		
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (20 mins) or 1 written assignment (term paper) or 1 take-home exam or written exam + (Students can earn up to 12 additional marks through presentations, which are added to their written exam mark)		
Course achievement			
Contents			
• Cost and Revenue Accounting as a Decision-Making Tool • Selected Cost and Revenue Accounting Systems • Fundamentals of Cost Management • Key Tools of Cost Management			
Objective qualification			
Students gain an in-depth understanding of the issues and methods involved in industrial accounting, particularly cost and revenue accounting as well as strategic cost management. On this basis, they are able to analyze related problems and make appropriate decisions.			
Literature			
• Ewert, R./Wagenhofer, A. (2014): Interne Unternehmensrechnung, Berlin et al., 8. Aufl. • Friedl, B. (2019): Praxishandbuch Kostenmanagement, München, 2. Aufl. (bzw. ggf. aktuellere Aufl.)			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Cost Accounting Systems	2,0	Lecture	german
Literature			
Ewert, R./Wagenhofer, (2014): Internal Business Accounting, 8th ed., Berlin et al.			
Strategic Cost Management	2,0	Lecture	german
Literature			
Baden, A. (1997): Strategic Cost Accounting, Wiesbaden			
Strategic Cost Management (Colloquium)	1,0	Colloquium	german
	1,0	Lecture	german
	1,0	Lecture	german
Audit Insights	2,0	Lecture	german
Cost Accounting Systems (Colloquium)	1,0	Colloquium	german
Fundamentals of Auditing	2,0	Lecture	german
Literature			
Baden, A. (1997): Strategic Cost Accounting, Wiesbaden			

Title	Specialisation - Marketing		
Number	2221000020	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Christof Backhaus
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 minutes) or 1 essay or 1 presentation or 1 portfolio or 1 oral exam or 1 take-home exam		
Course achievement			
Contents			
B2B Marketing: • Grundbegriffe und Besonderheiten des B2B Marketing • Das Marketing-Management eines Investitionsgüterherstellers • Geschäftstypenspezifische Sonderprobleme des B2B Marketing			
Digital Marketing: • Grundbegriffe und Konzepte des Digital Marketing • Wesentliche Geschäftsmodelle im Digital Marketing • Ansätze und Instrumente des Online-Kommunikations-Mix (z. B. SEO, SEA, Content Marketing) und deren Bedeutung für die digitale Kundenerfahrung. • Entwicklung integrierter Digital Marketing-Konzepte zur zielgruppenspezifischen Ausgestaltung des Digital Marketing und entsprechender Kampagnen • Kritische Analyse und Bewertung der Wirksamkeit von digitalen Marketingkampagnen			
Objective qualification			
In this module, students acquire the ability to apply and expand their basic marketing knowledge to the special problems of B2B marketing , internet marketing and market-oriented electronic commerce. After completing the module, they will be able to analyse the marketing situation of a capital goods manufacturer and develop a marketing concept. In addition, students will be able to recognise the special features of marketing in e-commerce and outline a concept for internet marketing.			
Literature			
• Backhaus, K./ Voeth, M. (2010): Industriegütermarketing, 10. Aufl., München. • Backhaus, K./ Voeth, M. (2015): Handbuch Business-to-Business-Marketing, 2. Aufl., Wiesbaden. • Seebacher, U. (2023): Praxishandbuch B2B-Marketing, 2. Aufl., Wiesbaden. • Purle, E. et al. (2023): B2B-Marketing und Vertrieb, 2. Aufl., Wiesbaden.			

- Chaffey, D./ Ellis-Chadwick, F. (2022): Digital Marketing, 8. Aufl., Harlow.
- Kingsnorth, S. (2022): Digital Marketing Strategy: An Integrated Approach to Online Marketing, 3. Aufl., London.
- Olbrich, R./ Schultz, C./ Holsing, C. (2025): Electronic Commerce und Online-Marketing, 3. Aufl., Berlin.
- Krowinska, A. et al. (2023): Digital Content Marketing, 1. Aufl., London.
- Folienskripte



Related courses			
Rules for the choice of courses			
Lectures compulsory. Exercises voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
B2B Marketing	2,0	Lecture	german
Digital Marketing	2,0	Lecture	german
Exercise Digital Marketing and B2B Marketing	2,0	Exercise	german

Title	Specialisation - Production and Logistics		
Number	2220060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Automobilwirtschaft und Industrielle Produktion - Lehrstuhl für Produktion und Logistik
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Advanced Planning Systems • Forecasting methods • Production programme planning • Materials management • Production control • Process planning • Procurement logistics • distribution logistics • Spare parts logistics • Transport systems and traffic • Reverse logistics			
Objective qualification			
Students have a basic understanding of production management and logistics issues. With the help of the quantitative and qualitative methods they have learned, they are able to model and solve industrial problems. Students also have a basic understanding of the most important tools such as simulation, optimisation and operational planning systems (APS, ERP).			
Literature			
• Günther/Tempelmeier (2009): Produktion und Logistik • Dyckhoff/Spengler (2010): Produktionswirtschaft • Pfohl (2010): Logistiksysteme • Thonemann (2010): Operations Management • eigene Foliensätze/Übungsaufgaben			



Related courses			
Rules for the choice of courses			
Lecture compulsory. Tutorials and colloquium voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Operations Management	4,0	Lecture	german
Literature			
- Günther, H.-O.; Tempelmeier, H. (2020): Supply Chain Analytics, 13th revised edition, Books on Demand, Norderstedt - Dyckhoff, H.; Spengler, T.S. (2010): Produktionswirtschaft, 3rd revised edition, Springer, Berlin - Pfohl, H.-C. (2025): Logistiksysteme, 10th edition., Springer, Berlin u. a. - Thonemann, U. (2018): Operations Management, 3rd revised edition, Pearson, Hallbergmoos Further textbooks and current academic publications will be announced during the course. Supplementary materials (in particular academic articles, case studies and lecture notes) will be made available as PDF documents via the learning platform.			
Bachelor-Colloquium - Production and Logistics	2,0	Colloquium	german
Exercise Operations Management	2,0	Exercise	german
Literature			
- Günther, H.-O.; Tempelmeier, H. (2020): Supply Chain Analytics, 13th revised edition, Books on Demand, Norderstedt - Dyckhoff, H.; Spengler, T.S. (2010): Production Management, 3rd revised edition, Springer, Berlin - Pfohl, H.-C. (2025): Logistics Systems, 10th ed., Springer, Berlin et al. - Thonemann, U. (2018): Operations Management, 3rd updated ed., Pearson, Hallbergmoos Further textbooks and current academic publications will be announced during the course. Supplementary materials (in particular academic articles, case studies and lecture notes) will be made available as PDF documents via the learning platform.			

Title	Specialisation - Law		
Number	2216340	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	The course builds on the lectures 'Fundamentals of Law 1' and 'Fundamentals of Law 2'.		
Expected performance/ Type of examination	1 written exam (120 min) or 1 oral exam (30 min) or 1 take-at-home exam		
Course achievement			
Contents			
Specialization in Law VL: This course provides students with in-depth knowledge of civil law, in particular the special part of the law of obligations, basic principles of labor law and tort law. Exercise in Advanced Law: The course provides students with practical application strategies for solving legal cases from the law of obligations - special part, tort law, i.e. tortious acts (§§ 823 ff. BGB) and basic principles of labor law.			
Objective qualification			
Students are able to understand and assess specific issues of civil law - law of obligations, individual employment law and tort law - and to apply them to practical cases and come to a conclusion independently.			
Literature			
• Löhnig, Martin; Fischinger, Philipp S.: Einführung in das Zivilrecht, aktuelle Auflage, C. F. Müller • Musielak, Hans-Joachim; Hau, Wolfgang: Grundkurs BGB, aktuelle Auflage, C. H. BECK • Medicus, Dieter; Petersen, Jens: Grundwissen zum Bürgerlichen Recht, aktuelle Auflage, Vahlen • Junker, Abbo: Grundkurs Arbeitsrecht, aktuelle Auflage, C. H. BECK • Krause, Rüdiger: Arbeitsrecht, aktuelle Auflage, Nomos			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Spezialisations Law	4,0	Lecture/Exercise	
Literature			
Löhnig, Martin; Fischinger, Philipp S.: Introduction to Civil Law, latest edition, C. F. Müller Musielak, Hans-Joachim; Hau, Wolfgang: Introductory Course on the German Civil Code (BGB), latest edition, C. H. BECK Medicus, Dieter; Petersen, Jens: Basic Knowledge of Civil Law, latest edition, Vahlen Junker, Abbo: Introductory Course in Employment Law, latest edition, C. H. BECK Krause, Rüdiger: Employment Law, latest edition, Nomos			

Title	Specialisation - Service Information Systems		
Number	2222000060	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam+ (60 min) (3 CP) or 1 take-at-home exam (3 CP)		
Course achievement	1 project work (3 CP) The coursework must be completed before the examination.		
Module grade composition	Upon request, the coursework can be included in the module grade. The coursework then accounts for 50% of the module grade. The request must be submitted before the coursework is completed and also applies to repeat examinations.		
Contents			
Fundamentals and Design of Digital Markets and E-Commerce from a Business Informatics Perspective (Digital Markets as Socio-Technical Information Systems Based on Human-Task-Technology).			
The course covers in particular:			
Concepts and models for describing and analyzing digital market mechanisms, transaction and interaction processes, and cross-channel customer interaction			
Fundamentals of digital service design and value creation in usage and interaction			
Business model and revenue logic of digital offerings, as well as key economic perspectives on digital value creation (e.g., information, network, and attention aspects)			
Principles of user-centered interaction design, as well as critical reflection on the influence of design on decisions and trust, taking relevant framework conditions into account			
Application in an application-oriented project to analyze a real-world context and to design a digital service approach			
Objective qualification			
Students understand digital markets as cross-organizational, socio-technical information systems and can explain and analyze key mechanisms of digital market organization (e.g., transaction phases, cross-channel interaction, business and revenue models). They are able to apply established models and concepts to systematically design, justify, and critically evaluate digital service solutions. Working in a team, they can systematically address a limited practical problem within a project context, while also reflecting on ethical and regulatory requirements for the design of digital interactions.			
Literature			
• Bodendorf, F., Robra-Bissantz, S.: E-Business-Management, Berlin 2009 • Laudon, K. et al.: Wirtschaftsinformatik: Eine Einführung, München 2006			

- Kollmann, T.: E-Business: Grundlagen elektronischer Geschäftsprozesse in der Net Economy, Wiesbaden 2008



Related courses			
Rules for the choice of courses			
One lecture and one project, to be completed in the same semester; colloquium voluntary			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Digital Markets	2,0	Lecture	german
Literature			
Lecture notes are available for download; further reading will be announced during the course.			
Design Digital Markets	2,0	Project	german
Literature			
The required literature will be announced at the first session, depending on the topic.			
Bachelor's Specialisation in Service Information Systems (Colloquium)	2,0	Colloquium	german

Title	Specialisation - Services Marketing		
Number	2201000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 mins) or 1 portfolio or 1 take-home exam		
Course achievement			
Contents			
• Consumer Behavior in Services • Customer Expectations of Services • Perception of Services • Customer Relationship Management • Service Design • Service Standards and Tangible Elements • The Role of Staff in the Service Process • The Role of the Customer in the Service Process • Service Distribution • Service Communication • Service Pricing			
Objective qualification			
In this module, students acquire a basic understanding of issues relating to the management of service companies and the marketing of services. Students learn a broad spectrum of methods for analysing business management issues in various service fields.			
Literature			
• Wirtz, J., & Lovelock, C. (2021). Services marketing: People, technology, strategy. World Scientific. •			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Colloquium	german
Services Marketing	4,0	Lecture/Exercise	german

Title	Specialisation - Economics		
Number	2212250	Module version	V4
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Markus Ludwig
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Knowledge from the module Fundamentals of Economics		
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
• Market and state failure • Equity and justice • Growth and development • Trade			
Objective qualification			
The module deepens and expands the content of the module Fundamentals of Economics. Students are able to use complex economic models to analyze the actions of private and state actors and assess economic effects.			
Literature			
• Todaro, Michael P., Smith, Stephen C.: Economic Development, Pearson, aktuelle Auflage. • Weil, David: Economic Growth, Routledge, aktuelle Auflage. • Pindyck, Robert S., Rubinfeld, Daniel L.: Mikroökonomie, Pearson Studium, aktuelle Auflage.			



Related courses			
Rules for the choice of courses			
Lectures compulsory, tutorials voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Development Economics	2,0	Lecture/Exercise	german
Literature			
• Todaro, Michael P., Smith, Stephen C.: Economic Development, Pearson, latest edition • Weil, David: Economic Growth, Routledge, latest edition			
Economics of the State	2,0	Lecture/Exercise	german
Literature			
• Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, current edition			
	2,0	Colloquium	german

Title	Specialisation – Business Management & Organisation		
Number	2223120	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Management
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Dietrich von der Oelsnitz
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Basic knowledge of management studies, in particular the main functions of planning, decision-making and control.		
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement			
Contents			
Personnel management • Tasks and the function of supervisors and • Presentation of the behavioral science principles of personnel management, in particular motivation theory • Basic approaches to personnel management • Practice-dominated management models such as the Harzburg model or "management by" concepts Strategic corporate management • Selected approaches to strategic analysis (e.g. experience curve concept, portfolio models and life cycle concepts) • Basic strategies of corporate management • The concept of hypercompetition			
Objective qualification			
After completing this module, students will be able to understand methods of strategic analysis and the basic strategies of sales-oriented corporate management. Furthermore, students will be introduced to the broad spectrum of possible management styles and models, including their behavioral theory background. After successfully completing the module, students will be able to recognize which leadership behavior is promising in which context.			
Literature			
Human resources management: • Oelsnitz, D. von der (2011): Einführung in die systemische Personalführung, Heidelberg. • Neuberger, O. (2002): Führen und führen lassen, 6. Auflage, Stuttgart. • Wunderer, R. (2003): Führung und Zusammenarbeit, 9. Auflage, München/Neuwied. Strategic corporate management: • Hungenberg, H. (2008): Strategisches Management in Unternehmen, 8. Auflage, Wiesbaden.			

- Welge, M. K. / Al-Laham, A. (2008): Strategisches Management, 8. Auflage, Wiesbaden.



Related courses			
Rules for the choice of courses			
Colloquia voluntary			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Leadership	2,0	Lecture	german
Literature			
• Oelsnitz, D. von der (2011): An Introduction to Systemic Human Resource Management, Heidelberg. • Neuberger, O. (2002): Leading and Being Led, 6th edition, Stuttgart. • Wunderer, R. (2003): Leadership and Collaboration, 9th edition, Munich/Neuwied.			
Strategic Business Management	2,0	Lecture	german
Literature			
• Hungenberg, H. (2008): Strategic Management in Organisations, 8th edition, Wiesbaden. • Welge, M. K. / Al-Laham, A. (2008): Strategic Management, 8th edition, Wiesbaden.			
Consulting Colloquium on Leadership	2,0	Colloquium	german
Consulting Colloquium "Strategic Business Management"	1,0	Colloquium	german

Elective Discipline Technology-oriented Management

Title	Specialisation - Digital Enterprises		
Number	2218130	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschafts-informatik/Abt. Data-Driven Enterprise
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Frederik Möller
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 Assessment: 1 term paper including 1 presentation or 1 written exam (120 mins), or 1 oral exam or 1 portfolio or 1 take-at-home exam		
Course achievement			
Contents			
In the "Data Ecosystems and Data Sovereignty" module, students acquire in-depth knowledge of the design and analysis of data ecosystems based on practical case studies and theoretical principles. In particular, they develop a deep understanding of digital technologies and data. The focus is on the special nature of data - it can be reproduced, used and shared at almost no cost. This gives rise to a variety of questions, such as: under what conditions do companies share data with other companies? In the exercise accompanying the lecture, students learn how to apply various research and modelling methods (e.g. e3-value).			
Objective qualification			
After completing the module, students will be able to recognise, model and describe data ecosystems. In particular, students will be able to apply basic elements and rules of data sovereignty.			
Literature			
• Azkan, Can; Möller, Frederik; Ebel, Martin; Iqbal, Taskeen; Otto, Boris; Pöppelbuss, Jens (2022): Hunting the Treasure: Modeling Data Ecosystem Participant Value. In: Proceedings of the 43rd International Conference on Information Systems. Copenhagen: Denmark. • Eitel, Andreas; Jung, Christian; Brandstädter, Robin; Hosseini, Seyed Hossein; Bader, Sebastian; Kühnle, Christian et al. (2021): Usage Control in the International Data Spaces. Hg. v. International Data Space Association (Position Paper Version 3.0). • Jarke, Matthias; Otto, Boris; Ram, Sudha (2019): Data Sovereignty and Data Space Ecosystems. In: Business and Information Systems Engineering 61 (5), S. 549–550. DOI: 10.1007/s12599-019-00614-2. • Jussen, Ilka; Schweihoff, Julia; Dahm, Valentin; Möller, Frederik; Otto, Boris (2023): Data Sharing Fundamentals: Definition and Characteristics. In: Proceedings of the 56th Hawaii International Conference on System Sciences. Hawaii: USA. • Park, Jaehong; Sandhu, Ravi (2004): The UCONABC Usage Control Model. In: ACM Trans. Inf. Syst. Secur. 7 (1), S. 128–174. DOI: 10.1145/984334.984339.			

- Zrenner, Johannes; Möller, Frederik Oliver; Jung, Christian; Eitel, Andreas; Otto, Boris (2019): Usage control architecture options for data sovereignty in business ecosystems. In: Journal of Enterprise Information Management 32 (3), S. 477–495. DOI: 10.1108/JEIM-03-2018-0058.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Data ecosystems and data sovereignty	4,0	Lecture/Exercise	german
Literature			
• Azkan, Can; Möller, Frederik; Ebel, Martin; Iqbal, Taskeen; Otto, Boris; Pöppelbuss, Jens (2022): Hunting the Treasure: Modeling Data Ecosystem Participant Value. In: Proceedings of the 43rd International Conference on Information Systems. Copenhagen: Denmark. • Eitel, Andreas; Jung, Christian; Brandstädter, Robin; Hosseini, Seyed Hossein; Bader, Sebastian; Kühnle, Christian et al. (2021): Usage Control in the International Data Spaces. Hg. v. International Data Space Association (Position Paper Version 3.0). • Jarke, Matthias; Otto, Boris; Ram, Sudha (2019): Data Sovereignty and Data Space Ecosystems. In: Business and Information Systems Engineering 61 (5), S. 549–550. DOI: 10.1007/s12599-019-00614-2. • Jussen, Ilka; Schweihoff, Julia; Dahm, Valentin; Möller, Frederik; Otto, Boris (2023): Data Sharing Fundamentals: Definition and Characteristics. In: Proceedings of the 56th Hawaii International Conference on System Sciences. Hawaii: USA. • Park, Jaehong; Sandhu, Ravi (2004): The UCONABC Usage Control Model. In: ACM Trans. Inf. Syst. Secur. 7 (1), S. 128–174. DOI: 10.1145/984334.984339. • Zrenner, Johannes; Möller, Frederik Oliver; Jung, Christian; Eitel, Andreas; Otto, Boris (2019): Usage control architecture options for data sovereignty in business ecosystems. In: Journal of Enterprise Information Management 32 (3), S. 477–495. DOI: 10.1108/JEIM-03-2018-0058.			

Title	Specialisation - Young Companies		
Number	2225000020	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The Bachelor's course 'Introduction to Entrepreneurship' guides students through the entire start-up process, from the initial idea to the successful establishment of a start-up. The basic ways of thinking and acting that are particularly relevant for technology-orientated start-up projects are taught. Special emphasis is placed on the development, evaluation and utilisation of technological opportunities. Students learn to develop innovative ideas and evaluate them critically. They are enabled to design viable business models and create a comprehensive business plan. In addition, students acquire the ability to calculate and assess the value and profitability of companies or individual projects.			
Objective qualification			
Students are familiar with the financial, business and legal aspects of setting up a company. They are able to independently assess the economic and technological potential of new companies. They are capable of founding a company.			
Literature			
will be announced at the beginning of the course.			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction Entrepreneurship	4,0	Lecture/Exercise	german

Title	Specialisation - Sustainable Enterprises		
Number	2224000060	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Recommended requirements	Basic knowledge of business administration and an interest in ethical issues in a corporate context are recommended.		
Expected performance/ Type of examination	1 written exam 120 (min) or 1 term paper or 1 presentation or 1 portfolio or 1 oral exam or 1 take-at-home exam		
Course achievement			
Contents			
The module teaches the key principles of business ethics and covers central concepts such as ethics, morality, responsibility and justice. It provides an overview of key ethical theories and their relevance to business activities. It addresses the responsibility of companies towards various stakeholders as well as the opportunities and limitations of corporate social responsibility and sustainability strategies. In addition, current ethical challenges – for example, in the context of digitalisation, global supply chains and technology-driven management – are critically analysed using practical examples and dilemmas.			
Objective qualification			
Upon completion of the module, students will have a sound understanding of key ethical theories and concepts. They will be able to contextualise entrepreneurial activity within society, identify ethical conflicts and reflect on them critically. Particular emphasis is placed on developing reflective skills – a key competence for responsible decision-making in business and society. Students learn to understand responsibility and sustainability not as add-ons, but as integral components of business practice.			
Literature			
• Lütge, C., & Uhl, M. (2018). Wirtschaftsethik. Lehrbuch/Studienliteratur. 1. Auflage. München: Vahlen. XII, 268 S. ISBN 978-3-8006-5323-9. • Göbel, E. (2024). Unternehmensethik: Grundlagen und praktische Umsetzung. 7., überarb. Aufl. Stuttgart: UTB. 369 S. ISBN 978-3-8252-8830-3. (Lehrbuch/Studienliteratur, Softcover) • Suchanek, A. (2021). Unternehmensethik: In Vertrauen investieren. 4. Auflage. Tübingen: Mohr Siebeck / UTB. 284 S. ISBN 978-3-8252-5419-3. • Küpper, H.-U. (2020). Einführung in die Wirtschaftsethik. 2. Auflage. München: Schäffer-Poeschel. 316 S. ISBN 978-3-7910-4873-6. •			
Specific references to literature on the respective topics will be presented and made available during the course of the lecture.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Ethics in Enterprises: Fundamentals of responsible Management	2,0	Lecture/Exercise	german
Living Sustainability: Applied Ethics in Business	2,0	Lecture/Exercise	german

Technology - Focus Energy

Title	Electromobility		
Number	2414330	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Elektrische Maschinen, Antriebe und Bahnen
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Markus Henke Prof. Dr. Regine Mallwitz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Basic knowledge of charging infrastructures and electrified vehicle concepts is taught. The essential structures of electrical machines and converters used in vehicles are presented based on classic vehicle technology aspects. Finally, current research topics are reflected on the learning content to show the current state of technology.			
Objective qualification			
The students are able to perform simple designs for the charging infrastructure, for charging devices and for the presented components in the vehicle electrical system, based on driving resistances, energy consumption and loss considerations. For this purpose, the interpretation of component maps and their integration into overall models is taught. Students will be familiar with the structure, mode of operation and boundary conditions of electric vehicles as well as the basic physical variables and concepts. They will be able to apply the concepts (in particular hybrid powertrain concepts, vehicle concepts, electrical machines, basic power electronic components) to different fundamental problems in the powertrain of mobile vehicles and to auxiliary consumers and specify suitable solution methods.			
Literature			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	4,0	Lecture	german

Title	Sustainable Energy Systems		
Number	2423640	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	elenia Institut für Hochspannungstechnik und Energiesysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Bernd Engel Prof. Dr. Michael Kurrat
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	Written exam (90 min) or oral exam (30 min)		
Course achievement			
Contents			
The system-oriented design of sustainable energy systems as individual systems and coupled systems in the context of climate protection and energy transition is dealt with. The course teaches approaches to the analysis and design of sustainable energy systems in the field of photovoltaics, wind energy, hydrogen, electrical and material storage as well as heat pump systems. Starting from the basics in the analysis and design of individual system components, common concepts for the aforementioned energy systems are dealt with. The knowledge gained here for the simple design and assessment of the systems (energy requirements, structure and interaction of the system components) is finally applied in the context of sector-coupled systems. In the final chapter, sector-coupled systems are outlined. The currently known and competing technologies are compared according to their individual and combined areas of application. Starting from the basics of system design (energy requirements, structure and interaction of system components), common concepts for the mentioned energy systems are treated. The knowledge gained here for the simple design and assessment of the system components is then applied in the context of sector-coupled systems.			
Objective qualification			
Students are able to design and analyze simple systems in the individual branches of technology and to assess their potentials by classifying them and using sustainability criteria. Students have a basic knowledge of energy systems engineering. They interpret and evaluate texts and data from energy technology. Students are able to select an appropriate level of abstraction for a given systems engineering problem and work at that level. They are able to formulate requirements, concepts and interfaces of energy transmission, distribution and storage. For power engineering they have a systematic approach characterized by the application of theories, models and they can apply scientific model concepts. They critically reflect on their own thinking, decisions and actions and are able to think logically (recognize fallacies and fallacies) and can critically interpret scientific data (origin, completeness, relevance, etc.) and formulate a reasoned opinion. They are able to communicate the results of scientific work in the given examples in writing and orally to others and to behave professionally (in the sense of reliability, commitment, correctness, precise work, perseverance, independence, etc.). The students work task-related and goal-oriented in the learning group and deal with group dynamic processes.			

Literature

Volker Quaschnig, Regenerative Energiesysteme: Technologie - Berechnung - Klimaschutz

Viktor Wesselak, Thomas Schabbach, Thomas Link, Joachim Fischer, Handbuch Regenerative Energietechnik

**Related courses****Rules for the choice of courses****Compulsory attendance**

Name of the course	SWS	Eventtype	Language
	4,0	Lecture/Exercise	german

Title	Electrical Transmission Systems Technology		
Number	2423420	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Elektrotechnik, Informationstechnik, Physik
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Michael Kurrat
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 minutes) or oral exam (30 min)		
Course achievement			
Contents			
• High-Voltage Technologies • Smart Grids • High-Voltage Direct Current Transmission • High-Temperature Superconductors			
Objective qualification			
After successful completion of the course, students have a fundamental understanding of latest and future technologies that are relevant for the transmission of electrical energy. They are informed about current and future developments regarding transmission grids and are able to formulate existing challenges. Students are also able to analyze, assess and design technologies, components, and systems on a fundamental level.			
Literature			
Hochspannungstechnik, A. Küchler, Springer Verlag Elektroenergiesysteme, A. Schwab, Springerverlag Elektrische Energieversorgung, K. Heuck, Vieweg Grundkurs Leistungselektronik, J. Specovius, Vieweg+Teubner Verlag Supraleitung, W. Buckel, VCH			



Related courses			
Rules for the choice of courses			
Bachelor's module			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

	2,0	Exercise	german
	2,0	Lecture	german

Title	Electrical Distribution Systems Technology		
Number	2423300	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Elektrotechnik, Informationstechnik, Physik
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Bernd Engel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 min)		
Course achievement			
Contents			
• Electrical Grid and Grid structures • Basic terms, energy history, future • Cable and overhead line • Transformer • Substations and Control rooms • Grid safety & security • Grid planning, calculation and AI • Grid financing and grid fees • Innovative grid operation using the example of medium and low voltage grids • Active power management in distribution grids			
Objective qualification			
After successfully completing the module, students will have basic knowledge of technologies that are relevant to the distribution of electrical energy now and in the future. They are informed about current and future developments in electrical energy distribution networks and can formulate existing challenges. They are able to analyse and assess technologies, components and systems and to design and dimension them in principle.			
Literature			
Elektrische Energieverteilung – Flosdorff, Hilgarth – Vieweg + Teubner Elektrische Energieversorgung – Heuck, Dettmann, Schulz – SpringerVieweg Taschenbuch der elektrischen Energietechnik – Schufft – Hanser Elektrische Anlagentechnik – Knies, Schierack – Hanser Elektroenergiesysteme – Schwab – Springer			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Lecture	german
Literature			
Elektrische Energieverteilung; Flosdorff, Hilgarth; Vieweg + Teubner Elektrische Energieversorgung; Heuck, Dettmann, Schulz; SpringerVieweg Taschenbuch der elektrischen Energietechnik; Schufft; Hanser Elektrische Anlagentechnik; Knies, Schierack; Hanser Elektroenergiesysteme; Schwab; Springer			
	1,0	Exercise	german
Literature			
Elektrische Energieverteilung; Flosdorff, Hilgarth; Vieweg + Teubner Elektrische Energieversorgung; Heuck, Dettmann, Schulz; SpringerVieweg Taschenbuch der elektrischen Energietechnik; Schufft; Hanser Elektrische Anlagentechnik; Knies, Schierack; Hanser Elektroenergiesysteme; Schwab; Springer			

Technology - Focus Mobility

Title	Fundamentals of Traffic Engineering		
Number	2539440	Module version	
Shorttext		Language	
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Intermodale Transport- und Logistiksysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Karsten Lemmer
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam 120 (min) or oral exam (30 min)		
Course achievement	1 course achievement: written report on the practical exercises		
Contents			
The transport engineering lecture provides a systematic overview of the fundamentals for understanding transport systems and their functions and structures as well as their technical realisation, primarily in the area of land transport. It is supplemented by excursions to manufacturers of means of transport and infrastructure facilities as well as operators of road, rail and air transport. Contents: Traffic engineering; terms, definitions, parameters of traffic elements; traffic systems; system interrelationships, traffic objects, means of transport, traffic routes, production and distribution concepts (shunting techniques, block trains, single wagonload traffic, freight transport centres, ...); traffic organisation (planning and scheduling, control and safety technology); telematics (communication and localisation); traffic physics (vehicle and traffic dynamics, modelling of traffic flows, flow dynamics); distribution of traffic, traffic control.			
Objective qualification			
After successfully completing this module, students will have acquired in-depth knowledge of the specific terminology and modelling concepts of the respective transport modes. They will have knowledge of the specialised terminology, regulations and codes of practice, including international standards. Students acquire knowledge of the physical, technological and operational fundamentals of the means of transport and infrastructure of all modes of transport, including their operational behaviour. Building on this, students are taught basic skills in dealing with various dynamic modelling concepts on the basis of microscopic physical models through to aggregated flow models. Students are able to simulate and investigate behaviour with the help of simulation models. Knowledge of the organisational forms of road, rail and air transport operations is imparted. Students will be able to assess their influence on transport operations.			
Literature			
1. Aberle, G.: Transportwirtschaft. Oldenbourg Verlag, 2009 2. Helbing, D.: Verkehrsdynamik. Springer, 1997 3. Pachl, J.: Systemtechnik des Schienenverkehrs. Springer Vieweg, 2018 4. Pischinger, S., Seiffert, U. (Hrsg.): Vieweg Handbuch Kraftfahrzeugtechnik. Springer Vieweg, 2016			

5. Schnabel, W., Lohse, D.: Grundlagen der Straßenverkehrstechnik und der Verkehrsplanung. Beuth/Kirschbaum, 2011
6. Schnieder, E.: Verkehrsleittechnik. Springer, 2007
7. Treiber, M., Kesting, A.: Verkehrsdynamik und -simulation. Springer, 2010.



Related courses			
Rules for the choice of courses			
The lecture is partly held in English.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	1,0	Exercise	german
	2,0	Lecture	german

Title	Traffic Control Engineering		
Number	2539400	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Intermodale Transport- und Logistiksysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Karsten Lemmer
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam (120 min)		
Course achievement	written report on practical exercises		
Contents			
• traffic engineering; • terminology and characteristics of traffic elements; • classification of traffic; • traffic objects, vehicles, infrastructure, production and distribution concepts; • operation and network management, traffic flow management, traffic organization; • traffic physics; • distribution of traffic, single vehicle control and information management.			
Objective qualification			
Students are able to analyse the functions, structures and technologies of traffic control systems as well as the physical, technological and operational fundamentals of land vehicles and infrastructure and to evaluate these using technical examples from the operations of road and railway transport. In doing so, they apply the technical terminology and the basics of transport technology as well as specific definitions and model concepts of road and rail transport and use them when working on technical examples. Students have the capacity of transferring what they have learned to the practical and operational conditions as they are presented in practical exercises at vehicle manufacturers and infrastructure facilities as well as operators of road and rail transport. They are able to explain traffic control concepts related to those practical examples. Students analyse the technical possibilities of influencing individual vehicle movement, traffic flows and traffic streams in mono- and multimodal networks and derive suitable solutions on the basis of case studies. Building on that, they discuss dynamic model concepts based on microscopic physical models up to aggregated flow models using practical examples and are able to apply those methods, means of description and tools to reproduce and analyse behaviour patterns with the aid of simulation models.			
Literature			
Remark			
The lecture traffic control engineering provides a systematic overview of the basics for understanding of transport systems and their functions and structures as well as their technical realization in ground transport.			

tation. It is supplemented by practical field trips to vehicle manufacturers, infrastructure facilities and operators of road and rail transport.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Traffic System Engineering	2,0	Lecture	german
Traffic System Engineering	2,0	Exercise	german

Title	Railway Vehicles		
Number	2539120	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Intermodale Transport- und Logistiksysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Jürgen Pannek
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam (90 min) or oral exam (30 min)		
Course achievement			
Contents			
• Fundamentals of rail transport and multimodal transport systems • Chassis and properties • Drive trains (energy source, drive engines, hybrids) • Brake Systems • Body construction (car body/interior fittings) • Couplings and transitions • Electrical equipment			
Objective qualification			
After completion of this module, students will be able to compare the design, construction and structure of various means of rail transport using selected examples. They will be able to investigate and assess the basic relationships between rail vehicle technology, operating modes and transport use as well as interactions with the environment and surroundings. The specific strengths and weaknesses of subsystem solutions for chassis, drive, brakes and body can be evaluated and discussed in the context of user requirements. Through the theoretical as well as practical oriented lecture the students acquire a transport related understanding regarding the common aspects of vehicle technology for the solution of cross-mode tasks, e.g. regarding logistic and environmental aspects, among others by means of design examples. They are able to recognise analogies and transfer and network transport-specific knowledge. In addition, the students can describe the basics of computer-aided design of rail vehicles, explain methodological knowledge for the optimization of complex products using case studies.			
Literature			
• Grundwissen Bahnberufe Gerd Holzmann, Ulrich Marks-Fährmann, Klaus Restetzki, Karl-Heinz Sudwischer, Verlag Europa-Lehrmittel, ISBN 3-8085-7401-1 • Fahrzeugtechnik Teil 1 und 2 Jürgen Janicki, Eisenbahn-Fachverlag ISBN 3-9801093-9-0 • Handbuch Schienenfahrzeuge : Entwicklung, Produktion, Instandhaltung, Christian Schindler (Hrsg.), Hamburg, Eurail Press, 2014 ISBN 9783777104270 • Electrical Railway Transportation Systems, First published:12 February 2018, Print ISBN:9781119386803 Online ISBN:9781119386827 DOI:10.1002/9781119386827 Copyright © 2018 by The Institute of Electrical and Electronic Engineers, Inc. All rights reserved.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise	german

Title	Intelligent and Connected Vehicles		
Number	2534390	Module version	
Shorttext		Language	english
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Fahrzeugtechnik
Hours per Week / ECTS	2 / 5,0	Module owner	Prof. Dr. Roman Henze
Workload (h)	150		
Class attendance (h)	28	Self studying (h)	122
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam (60 min)		
Course achievement	1 course achievement: protocol and/ or colloquium of the completed laboratory experiments		
Contents			
• Mobility applications for automated vehicles • Automation levels (driver assistance, highly automated / fully automated driving) • Use-cases and dependencies on the degree of automation • Basic technologies for automated driving (vehicle actuators, sensors, environmental perception and interpretation) and integration into future vehicle concepts • Car2X technologies and applications for connected automated driving In the laboratory part, questions from the field of intelligent and connected vehicles are dealt with using selected practical examples.			
Objective qualification			
After completing the module, students can explain the motivations for using automated vehicles in future mobility applications and explain the basic principle of the automation levels. Depending on the degree of automation, students are able to derive future use-cases or mobility applications and discuss the resulting technical requirements. Furthermore, the students become familiar with the tasks and challenges as well as the elements of the vehicle architecture for automated driving (vehicle actuators, sensors, environmental perception and interpretation). In the context of cooperative, connected driving, students will also be able to analyze the potential of Car2X communication to broaden the horizon of perception and explain the advantages and disadvantages of various communication technologies. By participating in the laboratory (implementation of own applications and experimental tests with automated vehicle demonstrators on a test track), students are able to apply and implement what they have learned in the lectures by solving selected practical questions.			
Literature			
• BERTRAM, T. (Hg.): Automatisiertes Fahren 2019. Von der Fahrerassistenz zum autonomen Fahren 5. Internationale ATZ-Fachtagung. Wiesbaden: Springer Fachmedien Wiesbaden, 2020 • FRANKE, K., GONTER, M., LESCHKE, A., KÜÇÜKAY, F.: SICHERHEIT - Steigerung der Fahrzeugsicherheit durch Car2X-Kommunikation. In: Automobiltechnische Zeitschrift: ATZ, Vol. 114 No.11, S. 918#924, 2012 • GUMPOLTSBERGER, G., POLLMEYER, S., NEU, A., HIRZMANN, G. (2017): Plattform für urbane und automatisierte Elektrofahrzeuge. In: ATZ Automobiltech Z 119 (3), S. 16#21. DOI: 10.1007/s35148-017-0014-z			

- HENZE, R. (2018): Vom Assistierten zum Hoch-Automatisierten Fahren. Habilitationsschrift: Technische Universität Braunschweig, Institut für Fahrzeugtechnik
- MENDIZABEL, J., BERBINEAU, M., VINEL, A., PFLETSCHINGER, S., BONNEVILLE, H., PIROVANO, A. et al.: Communication Technologies for Vehicles. 10th International Workshop, Nets4Cars/ Nets4Trains/Nets4Aircraft 2016, San Sebastián, Spain, June 6-7: Springer International Publishing, 2016
- MEYER, G., BEIKER, S. (Hg.) (2014): Road Vehicle Automation. 1st ed. 2014. Cham: Springer International Publishing (Lecture Notes in Mobility)
- MITTEREGGER, M., BRUCK, E. M., SOTEROPOULOS, A., STICKLER, A., BERGER, M., DANGSCHAT, J. S. et al. (2020): AVENUE21. Automatisierter und vernetzter Verkehr: Entwicklungen des urbanen Europa. Berlin, Heidelberg: Springer Berlin Heidelberg
- MIUCIC, R. (2019): Connected Vehicles. Cham: Springer International Publishing
- OPPERMANN, B. H.; STENDER-VORWACHS, J. (Hg.) (2020): Autonomes Fahren. Rechtsprobleme, Rechtsfolgen, technische Grundlagen
- C.H.BECK. RITZ, J. (2018): Mobilitätswende # autonome Autos erobern unsere Straßen. Wiesbaden: Springer Fachmedien Wiesbaden
- VDI-BERICHT 2288: 32. VDI/VW-Gemeinschaftstagung Fahrerassistenz und automatisiertes Fahren, Düsseldorf: VDI- Verlag, 2016
- WASCHL, H., KOLMANOVSKY, I., WILLEMS, F. (2019): Control Strategies for Advanced Driver Assistance Systems and Autonomous Driving Functions. Development, Testing and Verification. 1st ed. 2019. Cham: Springer International Publishing; Imprint: Springer (Lecture Notes in Control and Information Sciences, 476)
- WATZENIG, D., HORN, M. (2017): Automated Driving. Cham: Springer International Publishing
- WINNER, H., HAKULI, S., LOTZ, F., SINGER, C.: Handbuch Fahrerassistenzsysteme, Grundlagen, Komponenten und Systeme für aktive Sicherheit und Komfort, Springer Fachmedien Wiesbaden, 2015.



Related courses			
Rules for the choice of courses			
Both courses (lecture and laboratory) must be taken. If the module is chosen, the laboratory #Intelligent and connected vehicles# can no longer be taken in the laboratory module Automotive Engineering.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Intelligent and Connected Vehicles	1,0	Lecture	english
Intelligent and Connected Vehicles	1,0	Laboratory	english

Title	Governance and Political Economy of Mobility and Transport		
Number	1815260	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Vergleichende Regierungslehre und Politikfeldanalyse
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Nils C. Bandelow
Workload (h)	150 (h)		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 examination with compulsory attendance (with permitted absences): • 1 portfolio (consisting of two to six complementary components (e.g., presentation, (poster) presentation, minutes, debate contribution), as well as, if applicable, a written paper, a written examination, or an oral examination to conclude the portfolio) or • 1 term paper (approx. 10 pages) or • 1 oral examination (20 min.) or • 1 written examination (60 min.) or • 1 take-home examination		
Course achievement			
Contents			
The module covers the concepts, background, and key arguments of the most important theories in political economy and governance research. These foundational concepts are applied to selected current issues and findings and discussed critically. Theories of political economy include classical political economy and the economic theory of politics (including contemporary perspectives). Theories of governance research encompass normative and analytical approaches in institutional economics and their application in political science.			
Objective qualification			
Academic Expertise: This required elective module is designed for advanced undergraduate students interested in political science issues related to political economy and governance research. Students acquire in-depth knowledge of key concepts, theories, and empirical findings in political economy, as well as analytical and normative approaches in governance research. They gain detailed familiarity with the structures of at least one policy area and are able to apply key concepts to these structures and critically evaluate them against the backdrop of theoretical approaches and empirical findings.			
Methodological Competence: Students acquire skills in applying model-based approaches in political economy, including game-theoretic perspectives, as well as other formal and analytical methods. They learn to apply theoretical models to specific policy areas and to critically assess their explanatory power and scope. Furthermore, the module strengthens the ability to methodologically integrate economic, political science, and other disciplinary perspectives and to make them compatible with interdisciplinary approaches.			
Social Skills: This module brings together students from various academic disciplines, including those with backgrounds in the social sciences, economics, and engineering. Participants develop skills in engaging in constructive and respectful dialogue with individuals who hold different professional, normative, and political perspectives. They enhance their ability to present complex arguments, work in groups, and discuss con-			

controversial positions objectively. The seminar is designed to be interdisciplinary and brings together students from different fields who contribute their subject-specific perspectives to the discussion of the course content. This requires regular participation in the interactive discussions, group work, and exercises within the course.

Self-competence: Students reflect on their own disciplinary perspective in relation to related disciplines, particularly business administration and engineering approaches. They develop an awareness of the specific contribution that social science analysis can make to solving interdisciplinary problems and learn to analytically contextualize their own disciplinary positioning. This requires regular attendance at both courses.

Literature

This will be announced during the modules.



Related courses

Rules for the choice of courses

2 courses:

- [1] 1 course on "Governance in Selected Policy Areas" and
- [2] 1 course on "Political Economy"

Both courses must be taken together in one semester.

Compulsory attendance

Attendance is required in the two seminars of the module.

Name of the course	SWS	Eventtype	Language
Governance in Selected Policy Fields	2,0	Core course	german
Literature			
The relevant literature will be discussed during the first seminar session. The basic texts can be found in: Schwedes, Canzler, Knie (eds.) (2016): Handbook of Transport Policy. 2nd edition. Wiesbaden: Springer VS.			
Political Economy	2,0	Core course	german
Literature			
The relevant literature will be discussed in the first seminar session. The key texts can be found in: May, Christian; Mertens, Daniel; Nölke, Andreas; Schedelik, Michael (2023): Political Economy: Comparative – International – Historical; Springer Fachmedien; Wiesbaden			

Title	Basics of track-guided traffic and public transport		
Number	4310920	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Planung des öffentlichen Verkehrs
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Siefer
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (90 Min.)		
Course achievement			
Contents			
[Fundamentals of track-bound traffic and public transport (V)] - Principles of operational, tactical and strategic planning in public transport - system-technical basics of rail traffic - organisational and legal fundamentals of railways according to EBO and public transport according to BOStrab - Technology and building materials for traffic route construction- Drainage and dimensioning basics for traffic route construction - Legal and financial basics of track-guided transport - Operational and technological basics of track plan design - Basics of passenger and freight transport strategies - Basics of environmental aspects of rail transport - Basics of train haulage (locomotives, multiple units, braking technology) - Basics of safety systems (interlocking technology and train control systems)			

Objective qualification

The students acquire a basic understanding of planning processes in public transport systems, including strategic, tactical and operational planning practice. Then, the students analyse the system interrelationships in track-guided transport systems both of the railways according to the Railway Construction and Operation Regulations (EBO) and according to the Tram Construction and Operation Regulations (BOStrab). This includes the technological, construction material, drainage and dimensioning principles of traffic route construction in the inner-city area according to BOStrab as well as for railways according to EBO. Furthermore, the legal and financial principles of service planning of track-guided traffic as well as the operational and technological basics of the cycle-rail system are presented. The students also learn the basics of track plan design, safety systems in the road and railway sector, driving dynamics as well as environmental aspects of rail transport.

Literature

Vorlesungsskript, Präsentation

**Related courses****Rules for the choice of courses****Compulsory attendance****Name of the course****SWS****Eventtype****Language**

4,0

Lecture/Exercise

german

Title	Mobile Machines and Commercial Vehicles		
Number	2517180	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für mobile Maschinen und Nutzfahrzeuge
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Thomas Vietor
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	There are no special professional requirements for participation in the course.		
Expected performance/ Type of examination	written exam (90 min) or oral exam (30 min)		
Course achievement			
Contents			
• principles of vehicles and components • main features of agricultural engineering • heavy commercial vehicles • trailers and semi-trailers • technology in intralogistics • use and construction of earth-moving machines • legal requirements (Machinery Directive)			
Objective qualification			
After successful completion of this module, students are able to: • describe different technical designs and typical areas of application of mobile machines, commercial vehicles, buses and industrial trucks. • categorize the variety of mobile machines at a glance and assign the application areas of the machines. • calculate, compare and evaluate machine concepts and components through comprehensive knowledge in the areas of structure, process technology, powertrain technology, chassis and wheel-to-ground interaction. • decide which mobile machine including equipment is suitable based on the requirements and the work task. • name the basic requirements of the Machinery Directive, its national implementation and the use of harmonized standards in the development of mobile machinery.			
Literature			
• Braun, H.; Kolb, G.: LKW - Ein Lehrbuch und Nachschlagewerk. Bonn: Kirschbaum Verlag 2012, ISBN 9783781218505. • Eichhorn, H. (Hrsg.): Landwirtschaftliches Lehrbuch: Landtechnik. Stuttgart: Ulmer 1999, ISBN 3800110865. • Hoepke, E.; Breuer, S. (Hrsg.): Nutzfahrzeugtechnik: Grundlagen, Systeme, Komponenten. Wiesbaden: Springer Vieweg 2016. ISBN 9783658095376.			

- Kunze, G.; Göhring, H.; Jacob, K.; Scheffler, M. (Hrsg.): Baumaschinen: Erdbau- und Tagebaumaschinen, Wiesbaden: Vieweg & Teubner 2012, ISBN: 9783834815927.
- MAN Truck & Bus AG (Hrsg.): Grundlagen der Nutzfahrzeugtechnik, Lkw und Bus. Lehrbuch der MAN Academy. Bonn: Kirschbaum Verlag 2016, ISBN 9783781219946.
- Pischinger, S.; Seiffert, U. (Hrsg.): Vieweg Handbuch Kraftfahrzeugtechnik. Wiesbaden: Springer Vieweg 2016, ISBN 9783658095277.
- Renius, K. T.: Fundamentals of Tractor Design. Cham: Springer Verlag 2020, ISBN 9783030328047.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise	german

Title	Traffic and Urban Planning		
Number	4302330	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Verkehr und Stadtbauwesen
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bernhard Friedrich
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written Exam (120min) (in the Master's programme in Social Sciences as a course achievement)		
Course achievement			
Contents			
Objective qualification			
Literature			
Wird in der Lehrveranstaltung bekannt gegeben			

↑

Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	4,0	Lecture/Exercise	german

Technology - Focus Sustainability

Title	Electromobility		
Number	2414330	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Elektrische Maschinen, Antriebe und Bahnen
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Markus Henke Prof. Dr. Regine Mallwitz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Basic knowledge of charging infrastructures and electrified vehicle concepts is taught. The essential structures of electrical machines and converters used in vehicles are presented based on classic vehicle technology aspects. Finally, current research topics are reflected on the learning content to show the current state of technology.			
Objective qualification			
The students are able to perform simple designs for the charging infrastructure, for charging devices and for the presented components in the vehicle electrical system, based on driving resistances, energy consumption and loss considerations. For this purpose, the interpretation of component maps and their integration into overall models is taught. Students will be familiar with the structure, mode of operation and boundary conditions of electric vehicles as well as the basic physical variables and concepts. They will be able to apply the concepts (in particular hybrid powertrain concepts, vehicle concepts, electrical machines, basic power electronic components) to different fundamental problems in the powertrain of mobile vehicles and to auxiliary consumers and specify suitable solution methods.			
Literature			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	4,0	Lecture	german

Title	Environmental and Social Sustainability in Engineering		
Number	2513350	Module version	v3
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	2	Institution	Institut für Werkzeugmaschinen und Fertigungstechnik
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam+ (120 min) or oral exam+ (30 min)		
Course achievement	Presentation and/or written report in the context of a teamproject (On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 10% of the respective grade.)		

Contents

I. Introduction

Global environmental and social sustainability challenges in the context of product and process engineering

- I = Impact
- P = Population
- A = Affluence
- T = Technology
- Lecture#'s Framework

II. Social Sustainability

Social and cultural studies of technology: basic approaches in the context of sustainable engineering

Concepts and theories of inequality and power in the context of sustainable engineering

Methods and techniques of critical design

Approaches to critical analysis & design

III. Environmental sustainability

Relative environmental sustainability

- Weak perspective of sustainability and Triple Bottom Line
- Efficiency and effectiveness

Absolute environmental sustainability

- Strong perspective of sustainability
- Earth#'s carrying capacity Planetary boundaries
- Safe Operating space

- Operationalization challenges

Assessment of Environmental Impacts (I)

- Areas of Protection
- Endpoint indicators

Assessment of Environmental Impacts (II)

- Midpoint indicators

IV. Life Cycle Engineering

Systems and Life Cycle Thinking for sustainable engineering

- Foreground system
- Background system

Methods and Tools in Life Cycle Engineering

- Decision making in sustainable engineering
- LCE framework and fields of action
- Methods and tools in Life Cycle Engineering, e.g. Eco-design, Design for X

LCA-based Life Cycle Engineering o Life Cycle Assessment

- LCA-based Life Cycle Engineering # method and challenges, e.g. data acquisition, variabilities resulting from technical parameters Interpretation and visualization for engineering applications and decision-making

Objective qualification

With regard to environmental sustainability students are # able to name the global challenges on environmental sustainability and describe the levers of product and process engineering on those impacts based on the IPAT equation. Furthermore, the students can reflect on each of the terms of the equation and their complex interactions # able to explain the concepts of relative and absolute sustainability. In this regard, the students are able to describe the concept of planetary boundaries regarding the earth's carrying capacity. The students are furthermore able to reflect on the challenges related to the allocation of safe operating spaces. # able to describe different environmental impact categories including the impact pathway of the emissions causing this impact and name their end-point indicators. # able to apply systems thinking to critically analyze on the life cycle of technical products and processes. # able to critically reflect on the influence exerted by the surrounding background systems to a technology with regard to its environmental impact. # able to describe the scope and fields of action of Life Cycle Engineering (LCE). # are able to name methods and tools in LCE, from qualitative to quantitative approaches, and are able to discuss their application potentials within engineering activities. # able to explain the core life cycle assessment (LCA) method, including key terms (e.g. environmental impact, functional unit, system boundary). Furthermore, the students are able to understand the challenges of LCA-based Life Cycle Engineering and can name strategies to address those challenges. With regard to social sustainability students are # able to identify how local and global inequalities are inscribed in engineering practices and understand the social impact of engineering products on the basis of fundamental concepts of inequality (e.g. subjective, structural and symbolic dimensions of inequality, intersectionality and diversity, gender studies). # aware of the mutual influence society, engineering and scientific knowledge production have on each other and can explain basic approaches and concepts of social and cultural studies of technology (SST, SCOT, ANT etc.), which theoretically grasp this relation of mutual construction. Furthermore, they can apply these concepts to different fields of engineering and technological products. # able to identify social actors/stakeholders who are involved in engineering practices, overseen, affected by their outcomes or intended to use the respective product of these practices in the future. They know suitable methods (e.g. PD, VSD, OD) to communicate and work with these social actors/stakeholders and can employ them in different contexts. # able to recognize and analyze conflicts of interests and dilemma situations in engineering processes, which might result from taking into account a) marginalized, vulnerable or so far overseen social actors/stakeholders, b) different dimensions of sustainability (e.g. social, economic, ecological) or c) ethical considerations. # able to reflect on their own perspectives, interests and responsibilities as future engineers, in order to make conscious and socially responsible design decisions.

Literature

- Hauschild, Michael Z., Sami Kara, and Inge Røpke. "Absolute sustainability: Challenges to life cycle engineering." *Cirp Annals* 69.2 (2020): 533-553.
- Hermann, Christoph, and Sami Kara, eds. *Sustainable Production, Life Cycle Engineering and Management*. Springer Book Series; <https://www.springer.com/series/10615>
- Clift, Roland, et al. "The challenges of applying planetary boundaries as a basis for strategic decision-making in companies with global supply chains." *Sustainability* 9.2 (2017): 279.
- Hauschild, Michael Z., Christoph Herrmann, and Sami Kara. "An integrated framework for life cycle engineering." *Procedia CIRP* 61 (2017): 2-9.
- MacKenzie, Donald / Wajcman, Judy (Eds.) (1999): *The Social Shaping of Technology*, 2nd Ed. Buckingham, Philadelphia: Open University Press.
- Oudshoorn, Nelly/ Pinch, Trevor (Eds.) (2003): *How Users matter. The Co-Construction of Users and Technology*. Cambridge, Ma.: MIT Press.
- Simonsen, Jesper/ Robertson, Toni (2013): *Routledge International Handbook of Participator Design*. London: Routledge
- Escobar, Arturo (2018): *Designs for the Pluriverse*. Durham and London: Duke University Press
- Bath, Corinna (2013): *Searching for methodology*. In: Ernst, Waltraud/ Horwath, Ilona (Hrsg.): *Gender in Science and Technology. Interdisciplinary Approaches*, transcript, Bielefeld, 57#78.

Weitere Literatur wird in der Vorlesung bekannt gegeben.

Remark

This module is offered over two semesters, and there is a combined exam in the summer semester

**Related courses****Rules for the choice of courses****Compulsory attendance**

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	english
	2,0	Team Project	english

Title	Total Life-Cycle-Management		
Number	2522990	Module version	v2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam+ (120 min) or oral exam+ (30 min)		
Course achievement	1 course achievement: presentation and/or written report in the context of a teamproject (On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade.)		
Module grade composition	(On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade.		
Contents			
• central challenges and relations between global economic and ecological developments • meaning and background of the concept of sustainability and resulting consequences for companies • existing life cycle concepts and appropriate life cycles of technical products • reference Framework for Total Life Cycle Management • complex systems in the context of life cycle management methods • engineering methods for the analysis and quantification of ecological and economic impacts • Sensitization for problem shifts • simulation-based business game for holistic thinking (team project)			
Objective qualification			
Students... • can spot and identify relevant challenges and interrelationships between global economic and ecological developments and place them within the framework of reference of Total Life Cycle Management. • can name the central elements of sustainable development and analyse them with the help of the framework. • are able to analyse life cycle oriented concepts in order to develop sustainable life cycles of technical products. • are able to think in complex dynamic systems and to outline the model of viable systems. • are able to distinguish between life-phase and life-cycle related disciplines and to discuss them with the help of the St. Gallen management concept and the framework of Total Life Cycle Management. • are able to reproduce the procedure of a life cycle assessment, naming the framework conditions (e.g. environmental impact, functional unit) and discuss the results of a life cycle assessment. • are able to independently carry out an economic impact analysis using the Life Cycle Costing method. • are able to organise themselves effectively within group work, to divide the work, to ensure that goals are achieved on time and to use solution-oriented communication.			
Literature			

1. HERRMANN, Christoph. Ganzheitliches Life Cycle Management. Springer, 2009.



Related courses			
Rules for the choice of courses			
Lecture and exercise have to be attended			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Life Cycle Engineering	2,0	Lecture	german
Life Cycle Engineering	1,0	Team Project	german

Title	Total Life-Cycle-Management with Laboratory		
Number	2545010	Module version	v2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	
Hours per Week / ECTS	3 / 7,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	154
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam+, 120 (min) or oral exam+ (30 min)		
Course achievement	2 course achievements: 1. presentation and/or written report in the context of a teamproject (On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade.) 2. protocol and presentation of the laboratory experiments		
Contents			
• central challenges and relations between global economic and ecological developments • meaning and background of the concept of sustainability and resulting consequences for companies • existing life cycle concepts and appropriate life cycles of technical products • reference Framework for Total Life Cycle Management • complex systems in the context of life cycle management methods • engineering methods for the analysis and quantification of ecological and economic impacts • Sensitization for problem shifts • simulation-based business game for holistic thinking (team project) • methods and tools for product and process engineering across life cycle phases for the development of product-service systems, material and energy efficiency in the product life cycle and life cycle assessment (laboratory)			
Objective qualification			
Students ... • can spot and identify relevant challenges and interrelationships between global economic and ecological developments and place them within the framework of reference of Total Life Cycle Management. • can name the central elements of sustainable development and analyse them with the help of the framework. • are able to analyse life cycle oriented concepts in order to develop sustainable life cycles of technical products. • are able to think in complex dynamic systems and to outline the model of viable systems. • are able to distinguish between life-phase and life-cycle related disciplines and to discuss them with the help of the St. Gallen management concept and the framework of Total Life Cycle Management. • are able to reproduce the procedure of a life cycle assessment, naming the framework conditions (e.g. environmental impact, functional unit) and discuss the results of a life cycle assessment. • are able to independently carry out an economic impact analysis using the Life Cycle Costing method. • are able to organise themselves effectively within group work, to divide the work, to ensure that goals are achieved on time and to use solution-oriented communication.			

- are able to categorize Product-Service-Systems and to develop industrial product-service systems using the IPSS layer method.
- are able to make economic evaluations and consider economic and ecological effects of Product-Service-Systems using the Business Model Canvas and SWOT analysis.

Literature

HERRMANN, Christoph. Ganzheitliches Life Cycle Management. Springer, 2009.

**Related courses****Rules for the choice of courses**

Lecture; teamproject and laboratory have to be attended

Compulsory attendance

Name of the course	SWS	Eventtype	Language
Life Cycle Engineering	2,0	Lecture	german
Life Cycle Engineering	1,0	Team Project	german
Total Life-Cycle-Management - Laboratory	1,0	Laboratory	german

Title	Basics of Environmental and Resource Protection		
Number	4306640	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dock- horn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examina- tion	Written exam (120 Min.) or oral exam (approx. 60 Min.)		
Course achievement			
Contents			
[Basic Natural Sciences for Environmental and Resource Protection (V)] The class covers advanced questions of biological, chemical and physical processes as well as engineering fundamentals for technical resource and environment protection. Material flow cycles, resource economy and alternative treatment concepts are also part of the course. [Eco-Balancing (VÜ)] The class teaches methods and procedures for creating eco-balances, offers tutored case studies for creating eco-balances and discusses the special aspects of eco-balancing in the field of waste management.			
Objective qualification			
Students will gain essential knowledge and skills for understanding scientific and technical basics of environmental and resource protection. They will have advanced knowledge of biological, chemical and physical processes as well as engineering fundamentals for resource and environment protection (material flow cycles, resource economy, alternative treatment concepts). They will be able to create mass balances as well as eco-balances and thus will be able to critically discuss environmental impacts and resource efficiencies of various measures and products. They will be able to evaluate measures in regard to environmental impact taking into consideration social, scientific and ethical questions. They will be able to use eco-balances to understand and scientifically assess environmentally relevant problems and thus be able to support the implementation of environmental targets.			
Literature			
Used power point presentations are available as download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Scientific and technical fundamentals of environmental and resource protection	2,0	Lecture	german
	2,0	Lecture/Exercise	german

Title	Sustainable Energy Systems		
Number	2423640	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	elenia Institut für Hochspannungstechnik und Energiesysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Bernd Engel Prof. Dr. Michael Kurrat
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	Written exam (90 min) or oral exam (30 min)		
Course achievement			
Contents			
The system-oriented design of sustainable energy systems as individual systems and coupled systems in the context of climate protection and energy transition is dealt with. The course teaches approaches to the analysis and design of sustainable energy systems in the field of photovoltaics, wind energy, hydrogen, electrical and material storage as well as heat pump systems. Starting from the basics in the analysis and design of individual system components, common concepts for the aforementioned energy systems are dealt with. The knowledge gained here for the simple design and assessment of the systems (energy requirements, structure and interaction of the system components) is finally applied in the context of sector-coupled systems. In the final chapter, sector-coupled systems are outlined. The currently known and competing technologies are compared according to their individual and combined areas of application. Starting from the basics of system design (energy requirements, structure and interaction of system components), common concepts for the mentioned energy systems are treated. The knowledge gained here for the simple design and assessment of the system components is then applied in the context of sector-coupled systems.			
Objective qualification			
Students are able to design and analyze simple systems in the individual branches of technology and to assess their potentials by classifying them and using sustainability criteria. Students have a basic knowledge of energy systems engineering. They interpret and evaluate texts and data from energy technology. Students are able to select an appropriate level of abstraction for a given systems engineering problem and work at that level. They are able to formulate requirements, concepts and interfaces of energy transmission, distribution and storage. For power engineering they have a systematic approach characterized by the application of theories, models and they can apply scientific model concepts. They critically reflect on their own thinking, decisions and actions and are able to think logically (recognize fallacies and fallacies) and can critically interpret scientific data (origin, completeness, relevance, etc.) and formulate a reasoned opinion. They are able to communicate the results of scientific work in the given examples in writing and orally to others and to behave professionally (in the sense of reliability, commitment, correctness, precise work, perseverance, independence, etc.). The students work task-related and goal-oriented in the learning group and deal with group dynamic processes.			

Literature

Volker Quaschnig, Regenerative Energiesysteme: Technologie - Berechnung - Klimaschutz

Viktor Wesselak, Thomas Schabbach, Thomas Link, Joachim Fischer, Handbuch Regenerative Energietechnik

**Related courses****Rules for the choice of courses****Compulsory attendance**

Name of the course	SWS	Eventtype	Language
	4,0	Lecture/Exercise	german

Title	Ecology		
Number	4302470	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Abteilung Geochemie
Hours per Week / ECTS	8 / 10,0	Module owner	Prof. Dr. Harald Biester
Workload (h)	300		
Class attendance (h)	112	Self studying (h)	188
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
[Geoecology (V)] Fundamentals of soil science - soil functions - mineral and organic soil substrate - processes of soil formation - properties of soils depending on soil type - water, air and heat balance of soils. Fundamentals of climatology: structure and composition of the atmosphere - Radiation, heat and water budget/balance; surface-atmosphere exchange – The atmosphere in motion: micro-, meso- and macroscale circulation regimes. Fundamentals in groundwater and surface water chemistry, thermodynamics of weathering, Gases in water/carbonate equilibrium reactions, important redox-reaction in natural systems, biogeochemical cycling. [Ecology (V)] Characteristics of organisms - Organisms and their environment - Population ecology - Dispersal, migration and introduction of alien species - Evolutionary mechanisms - Interactions: Competition, predation, mutualism and parasitism - Ecosystem function and dynamics terrestrial, limnetic, marine and urban ecosystems - Global ecosystem transformation. [Environmental Systems Analysis (V+Ü)] Fundamentals of modeling of environmental processes - Digital terrain analysis - Classification and regression trees - Linear compartmental models - Models of complex nonlinear systems - Methods of system analysis: stability, attractors in phase space, chaotic behavior, sensitivity analysis - Development of own models, use of freely available programs like R (cran.r-project.org) and SAGA.			
Objective qualification			
After successful completion of the module, students have a basic understanding of abiotic and biotic relationships and interactions as well as geoecological functions and processes in the compartments atmosphere, biosphere, hydrosphere and pedosphere. Through the lecture Fundamentals of Geoecology they gain basic knowledge of the soil, water and atmosphere compartments in the geosystem. After completing the lecture Ecology for Environmental Scientists, they have basic knowledge of the processes and mechanisms of ecology of organisms, populations, communities, habitats and important biomes, as well as specific problems of conservation and global change. As a result, they are able to understand the ecological processes that influence biological communities and assess the importance of ecological processes for environmental planning. Through the lecture and exercise Environmental Systems Analysis, they are able to design conceptual models of environmental systems and translate them into mathematical models with the goal of a deeper			

understanding of their dynamics. They will be able to use case studies to understand impacts of human actions on ecological processes and the consequences for society.

Literature

Nentwig, W., Bacher, S., & Brandl, R. (2011). Ökologie kompakt. Heidelberg: Spektrum Akademischer Verlag.

-Begon, M., Howarth, R. W., & Townsend, C. R. (2016). Ökologie. Springer-Verlag. Beides als E-Book vorhanden

[Umweltsystemanalyse]

-Imboden DM, Koch S. (2003). Systemanalyse : Einführung in die mathematische Modellierung natürlicher Systeme. Springer.

-Matthiopoulos J. (2011). How to be a quantitative ecologist. Wiley,



Related courses

Rules for the choice of courses

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	2,0	Lecture	german
	2,0	Exercise	german
	2,0	Lecture	german

Title	Environmental Protection		
Number	4337060	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dock- horn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examina- tion	Written exam (120 Min.)		
Course achievement			
Contents			
[Environmental Protection for Engineers (V)] Basics of biological, chemical and physical treatment processes for water, wastewater, exhaust air and solid waste, basics of ecology, fundamentals of energy management, basic environmental legislation (national), principles of international environmental law, introduction to environmental guidelines and sustainability [Geology for Engineers (V)] Introduction to formation and structure of earth, plate boundary processes, the geological concept of the rock cycle, basics of the geological time scale, introduction to endogenic and exogenic processes and their impact on landscape and land use.			
Objective qualification			
Students will gain essential knowledge of fundamental biological, physical and chemical processes, required for accomplishing environmental protection. In addition, they will acquire necessary knowledge of ecological, economic, social and political correlations to understand the engineers' responsibilities in the field of environmental protection. They will be able to derive engineering solutions for environmental problems. Students will also gain knowledge of the essential geological processes, which determine the features that constitute earth's surface, the geologic history and structure of earth. They will acquire skills to classify and differentiate natural and anthropogenic processes. Students will be able to develop and optimize engineering solutions for environmental and geological problems.			
Literature			
Power point presentations for both classes are available for download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Environmental Protection for Engineers	2,0	Lecture	german
	2,0	Lecture	german

Title	Water Supply and Wastewater and Waste Management		
Number	4335010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dock- horn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 Min.)		
Course achievement			
Contents			
[Recycling and Waste Management (VÜ)] Collection of wastes, transport systems, biological, chemical and physical treatment processes for solid wastes, waste collection route planning, planning and dimensioning of waste treatment plants, aspects of hygiene, quantity and quality of wastewater and exhaust air from various treatment plants and for various treatment technologies, methods for ecological evaluation of waste treatment technologies, introduction of models for quality control of secondary raw materials [Water Supply and Wastewater Management (V)] Basics of drinking water supply, treatment and distribution, basics of wastewater discharge, separate and combined sewer systems, dimensioning and construction of sewer systems, basics of wastewater treatment, mechanical, chemical and biological treatment steps, nutrient removal, sewage sludge treatment and disposal			
Objective qualification			
Students will gain essential knowledge and skills for understanding and solving problems in the field of municipal and industrial waste and wastewater management, water supply and closed loop recycling. They will be able to use their acquired engineering skills to solve environmental problems for municipal and industrial employers in the fields of water supply, wastewater management, waste management und recycling. They will be able to critically discuss various process options and find adequate solutions taking into consideration social, scientific and ethical concerns.			
Literature			
Comprehensive lecture notes are available for download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture/Exercise	german
Water Supply and Wastewater Management	2,0	Lecture/Exercise	german

Technology - Focus Work and Production in the Future

Title	Human Factors and Ergonomics		
Number	2545000000	Module version	
Shorttext		Language	
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Werkzeugmaschinen und Fertigungstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 examination element: written exam+ (120 min) or oral exam+ (30 min)		
Course achievement	1 course achivement: presentation and/or written report in the context of a teamproject (On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade.)		
Contents			
• Introduction to industrial science • Work science models • Work organization • Personnel management and qualification • Time Management • Organisation of working time • Ergonomics in the workplace • Ergonomics Design of interfaces • Influences of the working environment • Fundamentals of occupational health and safety			
Objective qualification			
Students • are able to present the challenges of an ageing society and their consequences for industrial science by means of practical case studies and empirical studies and apply the resulting findings within the Human-Technology-OrganisationModel (MTO-Model), • are able to evaluate models for the determination of work-related times by REFA and Methods-Time-Measurement within the company time management, • are able to analyse possibilities and restrictions for the interpretation of times in relation to working time models and shift schedules, • are able to reproduce the forms of remuneration on the basis of the concepts used in practice and apply them to the performance and motivation of employees using the theoretical principles of incentive systems, • evaluate the workplace and work design, taking into account various methods for evaluating loads as well as basic rules for designing workplaces.			

- are able to design work content and workplaces with a focus on ergonomics best practice examples from industry and theoretical measures and procedures related to ergonomics,
- describe the physical, chemical, biological, organizational, social and cultural factors influencing the working environment within industrial science by teaching the theory,
- plan different application scenarios under consideration of the requirements of occupational safety.

Literature

Schlick, C.; Bruder, R.; Luczak, H.: Arbeitswissenschaft. Berlin: Springer Vieweg 2018.

Schmidt, L.; Schlick, C. M.; Grosche, J.: Ergonomie und Mensch-Maschine-Systeme. Berlin, Heidelberg: Springer-Verlag 2008.

**Related courses****Rules for the choice of courses****Compulsory attendance**

Name of the course	SWS	Eventtype	Language
	1,0	Exercise	german
	2,0	Lecture	german

Title	Construction Industry and Operation		
Number	4321010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Bauwirtschaft und Baubetrieb
Hours per Week / ECTS	5 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
Workload (h)	180		
Class attendance (h)	70	Self studying (h)	110
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 Min.)		
Course achievement			
Contents			
Lean Construction; production planning; introduction to construction methods and processes; general site facilities; performance estimation of construction machinery; introduction to construction machinery; introduction to occupational health and safety measures; machinery and methods of soil engineering; lifting devices; formwork; Logistics of concrete and masonry work; characteristics of construction; introduction to sustainable planning and construction; organizational and operational structure; tendering and contracting; wages and salary; Work time values; methods of cost estimation; building contract; introduction to quality management; application of Building Information Modeling (BIM)			
Objective qualification			
After completing the module, students will be able to apply basic knowledge of production planning, scheduling and construction process engineering to the execution of construction works. They will be able to determine the general facilities as well as machinery and equipment required for a construction project as well as determine their performance. Furthermore, the students acquire the ability to apply the principles of cost and performance accounting to simple projects. In this context, the students are able to take into account selected aspects of construction contract law and quality management for the project preparation and implementation.			
Literature			
Lehrmaterial: Skript zur Vorlesung "Grundlagen der Bauverfahrenstechnik"			
Lehrmaterial: Übungsskript zur Vorlesung "Grundlagen der Bauverfahrenstechnik"			
Lehrmaterial: Skript zur Vorlesung "Grundlagen der Bauwirtschaft"			
Lehrmaterial: Übungsskript zur Vorlesung "Grundlagen der Bauwirtschaft"			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Lecture	german
	2,0	Exercise	german

Title	Enterprise Organisation		
Number	2545000010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Werkzeugmaschinen und Fertigungstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	none		
Expected performance/ Type of examination	1 examination element: written exam+ (120 min) or oral exam+ (30 min)		
Course achievement	1 course achievement: presentation and/or written report in the context of a teamproject (on application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade).		
Module grade composition	On application, the result of the course achievement is taken into account in the assessment of the written examination+ or of the oral examination+, respectively, and can account maximum 20% of the respective grade.		
Contents			
• Introduction to enterprise organization • Organization of manufacturing companies • Integrated management systems • Human resources management and leadership • Cross-cutting processes • Product development process • Order processing • Production • Logistics			
Objective qualification			
Students ... • are able to analyse the reference model of the company organisation with regard to internal processes and functions and the associated environmental influences • reproduce the product, order and factory process within the company organisation (e.g. using the VDI guideline 5200) • present the challenges in the field of production and logistics as well as their consequences for company organisation by means of practical case studies and empirical studies and apply the knowledge gained in the context of Industry 4.0 and digitization • understand the need for integrated management systems to support operational processes in terms of quality, environment & energy, data, risk and technology			

- describe further cross-sectional functions in the area of accounting/controlling as well as financing and investment
- learn about the role of employees in companies (e.g. personnel management, organisation, leadership)
- are able to identify the interests of relevant shareholders and stakeholders and apply them in the context of practical issues
- are able to present the challenges of the business environment and their consequences in the context of economics, ecology and social issues

Literature

- Wiendahl, H.-P.: Betriebsorganisation für Ingenieure. München: Hanser 2019
- Dillerup, R.: Unternehmensführung. München: Verlag Franz Vahlen 2013
- Hering, E.: Handbuch Betriebswirtschaft für Ingenieure. Berlin: Springer-Verlag 2000

**Related courses****Rules for the choice of courses****Compulsory attendance**

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise	german

Technology - Focus Future City

Title	Construction Industry and Operation		
Number	4321010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Bauwirtschaft und Baubetrieb
Hours per Week / ECTS	5 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
Workload (h)	180		
Class attendance (h)	70	Self studying (h)	110
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 Min.)		
Course achievement			
Contents			
Lean Construction; production planning; introduction to construction methods and processes; general site facilities; performance estimation of construction machinery; introduction to construction machinery; introduction to occupational health and safety measures; machinery and methods of soil engineering; lifting devices; formwork; Logistics of concrete and masonry work; characteristics of construction; introduction to sustainable planning and construction; organizational and operational structure; tendering and contracting; wages and salary; Work time values; methods of cost estimation; building contract; introduction to quality management; application of Building Information Modeling (BIM)			
Objective qualification			
After completing the module, students will be able to apply basic knowledge of production planning, scheduling and construction process engineering to the execution of construction works. They will be able to determine the general facilities as well as machinery and equipment required for a construction project as well as determine their performance. Furthermore, the students acquire the ability to apply the principles of cost and performance accounting to simple projects. In this context, the students are able to take into account selected aspects of construction contract law and quality management for the project preparation and implementation.			
Literature			
Lehrmaterial: Skript zur Vorlesung "Grundlagen der Bauverfahrenstechnik"			
Lehrmaterial: Übungsskript zur Vorlesung "Grundlagen der Bauverfahrenstechnik"			
Lehrmaterial: Skript zur Vorlesung "Grundlagen der Bauwirtschaft"			

Lehrmaterial: Übungsskript zur Vorlesung "Grundlagen der Bauwirtschaft"



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Lecture	german
	2,0	Exercise	german

Title	Advanced Module in Medical Methodology 2		
Number	4217730	Module version	V2
Shorttext		Language	english german
Frequency of offer	irregular	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Peter L. Reichertz Institut für Medizinische Informatik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Thomas Deserno
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	written exam (90 minutes) or oral exam (30 minutes) or Portfolio or Take-Home-Exam.		
Course achievement			
Contents			
The courses in this module vary from semester to semester. They are announced timely on the web page of PLRI.			
Objective qualification			
Passing this module, the students have earned a fundamental understanding of the methodological aspects of medical informatics. They can plan and conduct clinical trials and apply appropriate statistics to evaluate the recorded data. They can assess the systematics of scientific research in the broad biomedical field of applied computer science. They can compare IT tools for medical statistics and significance tests.			
Literature			
will be announced in the course			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Smart Living	2,0	Lecture	german
Literature			
will be announced in the course			

Smart Living	1,0	Exercise	german
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Title	Water Supply and Wastewater and Waste Management		
Number	4335010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dock- horn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 Min.)		
Course achievement			
Contents			
[Recycling and Waste Management (VÜ)] Collection of wastes, transport systems, biological, chemical and physical treatment processes for solid wastes, waste collection route planning, planning and dimensioning of waste treatment plants, aspects of hygiene, quantity and quality of wastewater and exhaust air from various treatment plants and for various treatment technologies, methods for ecological evaluation of waste treatment technologies, introduction of models for quality control of secondary raw materials [Water Supply and Wastewater Management (V)] Basics of drinking water supply, treatment and distribution, basics of wastewater discharge, separate and combined sewer systems, dimensioning and construction of sewer systems, basics of wastewater treatment, mechanical, chemical and biological treatment steps, nutrient removal, sewage sludge treatment and disposal			
Objective qualification			
Students will gain essential knowledge and skills for understanding and solving problems in the field of municipal and industrial waste and wastewater management, water supply and closed loop recycling. They will be able to use their acquired engineering skills to solve environmental problems for municipal and industrial employers in the fields of water supply, wastewater management, waste management und recycling. They will be able to critically discuss various process options and find adequate solutions taking into consideration social, scientific and ethical concerns.			
Literature			
Comprehensive lecture notes are available for download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture/Exercise	german
Water Supply and Wastewater Management	2,0	Lecture/Exercise	german

Title	Traffic and Urban Planning		
Number	4302330	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Verkehr und Stadtbauwesen
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Bernhard Friedrich
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written Exam (120min) (in the Master's programme in Social Sciences as a course achievement)		
Course achievement			
Contents			
Objective qualification			
Literature			
Wird in der Lehrveranstaltung bekannt gegeben			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	4,0	Lecture/Exercise	german

Technology - Focus Innovation & Design

Title	Fundamentals of Sustainable Product Development and Engineering Design		
Number	2516500	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Konstruktionstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Thomas Vietor
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	written exam (120 min) or oral exam (30 min)		
Course achievement			
Contents			
• Introduction to the development process • Fundamentals of technical and socio-technical systems and systems thinking • Fundamentals of methodological development • Problem-solving thinking and problem-solving methods • Methods for task clarification and requirements definition Development of basic solutions • Concepts of Systems Engineering • Strategies for designing sustainable products & systems			
Objective qualification			
The students are capable of: • describing the development process of technical systems using product examples • planning, carrying out and review a development project using the general approaches and selected methods • naming principle methods used for task explanation and development fundamental solutions and by applying them for the development of new products • explaining the basics of systems thinking and apply them to any system • describing the importance of a holistic approach in the context of product development, especially for aspects of sustainability • describing the Systems Engineering (SE) approach and apply it using selected SE methods • naming and applying methods for the consideration of costs and the planning of projects • planning a development task independently and apply individual methods in a targeted manner			
Literature			
1. Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicherProduktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 20072. 2. Roth, K.: Konstruieren mit Konstruktionskatalogen Band I - Konstruktionslehre. 3. Auflage, Springer-Verlag, 2000			

3. Roth, K.: Konstruieren mit Konstruktionskatalogen Band II - Konstruktionskataloge. 3. Auflage, Springer-Verlag, 2001
4. Haberfellner, R., Daenzer, W. F.: Systems Engineering: Methodik und Praxis. 11. Auflage, Verlag IndustrielleOrganisation, 2002
5. Lindemann, U.: Methodische Entwicklung technischer Produkte - Methoden flexibel und situationsgerecht anwenden.3. Auflage, Springer-Verlag, 2009
6. Ropohl, G., Systemtechnik - Grundlagen und Anwendung, Hanser, München, 1975



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Fundamentals of Sustainable Product Development and Engineering Design	2,0	Lecture	english
Literature			
1. Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicher-Produktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 2007 2. Roth, K.: Konstruieren mit Konstruktionskatalogen Band I - Konstruktionslehre. 3. Auflage, Springer-Verlag, 2000 3. Roth, K.: Konstruieren mit Konstruktionskatalogen Band II - Konstruktionskataloge. 3. Auflage, Springer-Verlag, 2001 4. Haberfellner, R., Daenzer, W. F.: Systems Engineering: Methodik und Praxis. 11. Auflage, Verlag IndustrielleOrganisation, 2002 5. Lindemann, U.: Methodische Entwicklung technischer Produkte - Methoden flexibel und situationsgerecht anwenden.3. Auflage, Springer-Verlag, 2009 6. Ropohl, G., Systemtechnik - Grundlagen und Anwendung, Hanser, München, 1975			
Fundamentals of Sustainable Product Development and Engineering Design	1,0	Exercise	english
Literature			
1. Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicher-Produktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 2007 2. Roth, K.: Konstruieren mit Konstruktionskatalogen Band I - Konstruktionslehre. 3. Auflage, Springer-Verlag, 2000 3. Roth, K.: Konstruieren mit Konstruktionskatalogen Band II - Konstruktionskataloge. 3. Auflage, Springer-Verlag, 2001 4. Haberfellner, R., Daenzer, W. F.: Systems Engineering: Methodik und Praxis. 11. Auflage, Verlag IndustrielleOrganisation, 2002 5. Lindemann, U.: Methodische Entwicklung technischer Produkte - Methoden flexibel und situationsgerecht anwenden.3. Auflage, Springer-Verlag, 2009 6. Ropohl, G., Systemtechnik - Grundlagen und Anwendung, Hanser, München, 1975			

Title	Product Development and Engineering Design		
Number	2516200	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Konstruktionstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Thomas Vietor
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Fundamental knowledge in the disciplin construction (machine elements, technical mechanics)		
Expected performance/ Type of examination	1 examination element: written exam (120 min) or oral exam (30 min)		
Course achievement			
Contents			
• Introduction into the construction process and principle technical systems • Principles of the methodological construction • Problem-solving thinking and problem-solving-methods (brainstorming, moderation technology, gallery method and method 635) • Methods for the task explaining and finding-requirements • Development of fundamental solutions • Construction-catalog • General function-structures and physical effects • Strategies for designing products			
Objective qualification			
The students are capable of... • planning, carrying out and review a development project using the general approaches and selected methods • naming principle methods used for task explanation and development fundamental solutions and by applying them for the development of new products • naming and applying methods for the consideration of costs and the planning of projects • depicting, explaining and assessing the physical casual-correlations based on given solution-variables • explaining the function-definition in the construction methodology, and to rebuild and modify the functions-structure in the development of fundamental solutions • analyzing challenges by using the learned problem-solution-methods (e.g. gallery method or method 635) and to work out structured solutions			
Literature			
1. Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicher Produktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 2007 2. Roth, K.: Konstruieren mit Konstruktionskatalogen Band I - Konstruktionslehre. 3. Auflage, Springer-Verlag, 2000			

3. Roth, K.: Konstruieren mit Konstruktionskatalogen Band II - Konstruktionskataloge. 3. Auflage, Springer-Verlag, 2001
4. Haberfellner, R., Daenzer, W. F.: Systems Engineering: Methodik und Praxis. 11. Auflage, Verlag Industrielle Organisation, 2002
5. Lindemann, U.: Methodische Entwicklung technischer Produkte - Methoden flexibel und situationsgerecht anwenden. 3. Auflage, Springer-Verlag, 2009

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Related courses			
Rules for the choice of courses			
Lecture and exercise must be attended.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Exercise	german

Title	Water Supply and Wastewater and Waste Management		
Number	4335010	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dock- horn
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 Min.)		
Course achievement			
Contents			
[Recycling and Waste Management (VÜ)] Collection of wastes, transport systems, biological, chemical and physical treatment processes for solid wastes, waste collection route planning, planning and dimensioning of waste treatment plants, aspects of hygiene, quantity and quality of wastewater and exhaust air from various treatment plants and for various treatment technologies, methods for ecological evaluation of waste treatment technologies, introduction of models for quality control of secondary raw materials [Water Supply and Wastewater Management (V)] Basics of drinking water supply, treatment and distribution, basics of wastewater discharge, separate and combined sewer systems, dimensioning and construction of sewer systems, basics of wastewater treatment, mechanical, chemical and biological treatment steps, nutrient removal, sewage sludge treatment and disposal			
Objective qualification			
Students will gain essential knowledge and skills for understanding and solving problems in the field of municipal and industrial waste and wastewater management, water supply and closed loop recycling. They will be able to use their acquired engineering skills to solve environmental problems for municipal and industrial employers in the fields of water supply, wastewater management, waste management und recycling. They will be able to critically discuss various process options and find adequate solutions taking into consideration social, scientific and ethical concerns.			
Literature			
Comprehensive lecture notes are available for download			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture/Exercise	german
Water Supply and Wastewater Management	2,0	Lecture/Exercise	german

Key Skills

Title	Key qualifications		
Number	2299000090	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Department Wirtschafts-wissenschaften
Hours per Week / ECTS	8 / 9,0	Module owner	Studiendekan der Wirt-schaftswissenschaften
Workload (h)	210		
Class attendance (h)	84	Self studying (h)	126
Compulsory requirements			
Expected performance/ Type of examina-tion			
Course achievement	The examination arrangements depend on the modules chosen and can be found in the information for the respective modules.		
Contents			
Various in the elective courses of the overall program.			
Objective qualification			
Area I: Overarching reference/Embedding of the field of study Students are able to classify their field of study in social, historical, legal or career-oriented contexts (depending on the focus of the course). They are able to recognize, analyze and evaluate superordinate, subject-specific connections and their significance. Students gain an insight into the networking possibilities of the field of study and application references of their field of study in professional life. Area II: Cultures of knowledge The students - get to know the theories and methods of other, non-subject-specific cultures of knowledge, - learn to work and interact in an interdisciplinary manner with students from other fields of study, - are able to discuss and evaluate current controversies from individual subject areas, - are familiar with gender-related perspectives on various subject areas and the effects of gender differences, - can deal intensively with application examples from other disciplines Area III: Action-oriented offers Students are enabled to implement theoretical knowledge in an action-oriented manner. They acquire procedural knowledge (knowledge about procedures and courses of action) as well as metacognitive knowledge (including knowledge about their own strengths and weaknesses). Depending on the focus of the course, students acquire the ability to: - communicate knowledge and apply communication techniques, - conduct discussions and negotiations effectively, reflect on themselves and evaluate themselves appropriately, - work cooperatively in a team, manage conflicts, - use information and communication media or			

- express themselves in another language. The action-oriented courses enable students to use knowledge acquired in other areas more effectively, to work more easily and constructively with other people and thus to facilitate the acquisition and development of new knowledge. They acquire key qualifications that facilitate their entry into professional life and contribute to success in all professional situations.

Literature

will be announced by the respective lecturers



Related courses

Rules for the choice of courses

Elective courses from the overall program of interdisciplinary courses at TU Braunschweig (pool model)

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Scientific Work

Title	Scientific work - Seminar		
Number	2299000200	Module version	V2
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Department Wirtschaftswissenschaften
Hours per Week / ECTS	6 / 8,0	Module owner	Studiendekan der Wirtschaftswissenschaften
Workload (h)	240		
Class attendance (h)	56	Self studying (h)	184
Compulsory requirements			
Expected performance/ Type of examination	2 term papers; attendance is required in the seminars (with permitted absences)		
Course achievement			
Module grade composition	The module mark is made up of equal parts from the two seminar assessments.		
Contents			
The content of the seminar depends on the topic to be dealt with.			
Objective qualification			
The students: 1. learn how to carry out independent academic work. 2. are enabled, through presentation, discussion and argumentation, to present, defend and critically examine academic work within their subject area, and thereby learn to engage in academic discourse. 3. are able to engage in substantive debate on the topics presented by other participants. 4. are equipped to participate in cooperative learning methods and group work. 5. develop their capacity for self-reflection and the self-regulation of their own learning processes.			
Literature			
Depending on the chosen course and the specific task			



Related courses			
Rules for the choice of courses			
Two seminars from the range of courses offered by the Department of Economics must be completed.			
Compulsory attendance			
Compulsory attendance at seminars in accordance with Section 7a of the APO. A key learning objective in the area of social and personal skills is achieved through collaborative work in small groups, where students learn and develop the skills necessary for academic discourse, including critical reflection. This is only possible if students are present. The compulsory attendance requirement is limited to the lectures in the seminars enrolled in.			
Name of the course	SWS	Eventtype	Language
Bachelor-Seminar Decision Support	3,0	Seminar	german
Literature			
The literature varies depending on the chosen topic.			
Bachelor-Seminar Marketing & Customer Analytics	3,0	Seminar	english german
Literature			
Will be announced during the event.			
Bachelor-Seminar Finance	3,0	Seminar	german
Literature			
See the department's website			
Bachelor's Seminar Marketing	3,0	Seminar	english german
Literature			
To be announced during the event.			
Bachelor-Seminar Service Information Systems	3,0	Seminar	german
Literature			
depending on the topic to be covered			
Bachelor-Seminar Data-Driven Enterprise	3,0	Seminar	english german
Literature			
Rüter, A., et al.: IT Governance in Practice, Springer 2010			
Bachelor's Seminar – Business Management & Organisation	3,0	Seminar	german
Bachelor's Seminar on Business Start-ups and Succession	3,0	Seminar	english german
Literature			
Rüter, A., et al.: IT Governance in Practice, Springer 2010			
Bachelor Seminar - Production & Logistics	3,0	Seminar	german

Bachelor's Thesis

Title	Bachelor thesis		
Number	2299000190	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Department Wirtschafts- wissenschaften
Hours per Week / ECTS	0 / 12,0	Module owner	Studiendekan der Wirt- schaftswissenschaften
Workload (h)	360		
Class attendance (h)	30	Self studying (h)	330
Compulsory requirements			
Expected performance/ Type of examina- tion	1 written assignment (written paper) and 1 presentation		
Course achievement			
Module grade composition	The written assignment (term paper) accounts for 5/6 of the module mark. The presentation accounts for 1/6 of the module mark.		
Contents			
An academic study of a topic in the field of economics or technology-oriented management, which must address a relevant issue relating to technology-oriented management in the broader sense.			
Objective qualification			
Students are able to undertake research projects in the field of technology-oriented management. They identify problems independently, incorporate the latest research findings into their comprehensive analyses, and are able to structure their work and present their findings. They apply research methods and present their findings both in a written paper and orally.			
Literature			
depending on the specific task at hand			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

