



Description of the degree program

PO 5

Date: 01.10.2026

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Compulsory Elective Discipline Law

Title	Mobility Law		
Number	2216000040	Module version	
Shorttext		Language	english
Frequency of offer	irregular	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Knowledge from the module Basics of Law is assumed.		
Expected performance/ Type of examination	1 exam (60 min) or 1 take-home exam		
Course achievement			
Contents			
• Regulation of Mobility in international, EU and German law • Regulation of Autonomous Driving in international, EU and Gational law • Liability and torts in Mobility context • Regulation on Mobility as a service, Passenger Transportation Law • Mobility Data Law and intelligent infrastructure • Regulation of innovative Mobility • Excursuses: Air Traffic Law and Maritime Mobility Law			
Objective qualification			
The lecture Mobility Law is intended to give students a basic understanding of the regulatory challenges in the mobility context. Students are to become familiar with understanding legal texts and laws and applying the regulations to specific use cases. The focus of the lecture is on current challenges in the mobility context, so that students are given a basic knowledge and understanding of the system with regard to the regulation of innovation.			
Literature			
Textbooks and additional literature will be announced in the lecture.			



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

Title	Energy Law		
Number	2216000010	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The Energy Law module covers the fundamentals of energy law, divided into Energy Law I and Energy Law II. The Energy Law I course serves to present the basics of energy law at the European and German levels. At the beginning of the course, the development of energy law over the last few decades is presented. The lecture focuses on the regulation of network operation and related topics such as unbundling, network connection, network usage and network usage fees. The course will cover the main contractual structures of energy supply relationships and the position of end consumers in the energy industry. Another focus is on the supply of end consumers, e.g. basic supply and contract adjustment options. The lecture is interactive and offers opportunities for discussion. The topics discussed are illustrated with numerous practical examples. The Energy Law II lecture is primarily devoted to the law governing the ‘energy transition’. It complements the Energy Law I lecture, but it is not mandatory to have attended Energy Law I beforehand. One of the main topics of the lecture is an introduction to renewable energy law (EEG), including historical developments and European references, such as expansion targets, connection and feed-in priority, tenders/tariffs and financing. In addition, an in-depth look will be taken at the specific legal situation of onshore and offshore wind turbines (including planning and approval, contract design). The course will also cover the most important legal principles governing the expansion of the electricity grid (from EnWG, EnLAG, NABEG, BBPIG). Finally, there will be an opportunity to consider current developments in energy law, e.g. with regard to sector coupling or green hydrogen. The lecture is interactive and offers opportunities for discussion. The topics discussed will be illustrated with numerous practical examples.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).			

After completing the module in energy law, students will be able to independently deal with the specialist laws in energy law and determine relevant legal standards. Technical case studies from other lectures will be taken up and jointly evaluated on the basis of the existing legal situation. The area-specific 'state of the art' will also be learned with examples from technical practice.

Literature

Legal Codes, in their current edition

- Energierecht, dtv. Beck

textbooks, each in the current edition

- Kühling/Rasbach/Busch, Energierecht
- Baumgart, Energierecht



Related courses

Rules for the choice of courses

Both events must be visited.

Compulsory attendance

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

Title	Law for Entrepreneurs		
Number	2216000030	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The content of Law for Entrepreneurs depends on the chosen combination of lectures. ‘Law for Start-ups’, ‘Patent and Trademark Law’ and ‘Public Procurement Law’ are available. Two of these three courses must be chosen. The lecture Law for Start-ups imparts the practical knowledge necessary for the successful launch of a start-up company. Among other things, students learn about different types of companies. They also learn step by step what is required to start a business and what legal issues they will face when the company enters into business operations, e.g. in the areas of trademark and patent law, commercial and unfair competition law, and labour law. The lecture will refer to other economics lectures, e.g. on business models, in order to work out the legal challenges that arise from them. The lecture on patent and trademark law covers the basics of German and European patent law, the relevant patent requirements and procedures at the German Patent and Trademark Office (DPMA) and the European Patent Office (EPO). The requirements for patenting and the relevant case law are then applied and examined, particularly in relation to computer-implemented inventions, i.e. inventions that contain a significant amount of software. To a lesser extent, utility models and their differences from patents, as well as registered designs and Community designs, are also discussed. The lecture on public procurement law covers the scope and procedure of public procurement processes as well as the legal remedies available under public procurement law. It is based on the provisions of EU public procurement law in accordance with Part 4 of the GWB (German Act against Restraints of Competition) and the VgV (German Public Procurement Ordinance). However, where appropriate, excursions are made into sub-threshold public procurement law and the special procurement regimes for sectoral contracts, defence and security-related contracts and concessions. The first focus of the lecture is on the question of when public procurement law applies and, if so, which public procurement regime is to be applied. Based on above-threshold procurement law, an overview of the procedure is provided, beginning with the possible types of procedures, the requirements to be placed on bidders and the subject matter of the contract, the necessary notices, and ending with the evaluation of bids and the conclusion of the procurement procedure. Finally, the legal protection options under public procurement law (primary and secondary legal protection) are discussed.			

in detail. The lecture takes into account current developments in public procurement law and deals with the respective topics using example cases from public procurement practice.

The lectures are interactive and provide opportunities for discussion. The topics discussed are illustrated using numerous practical examples.

Objective qualification

The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).

After completing the Law for Entrepreneurs module, students will be able to independently identify the relevant specialist laws and standards and, by working with the law, resolve legal issues in public procurement law, patent and trademark law and/or in the context of starting and running a business. As regulation in this area is very fast-moving, in addition to teaching technical skills, teaching legal methodological skills is particularly important in order to enable students to apply the law independently. After completing the module, students will be aware of the content of the lectures so that they can act in a legally compliant manner when using the internet independently (for commercial purposes) or when starting a business. They will also have learned to ask the right questions of lawyers who support them in enforcing their rights.

Literature

Gesetzestexte in der jeweils aktuellen Auflage:

Gesellschaftsrecht, dtv. Beck
 Bürgerliches Gesetzbuch, dtv. Beck
 Patentrecht, dtv. Beck Beck
 Vergaberecht, dtv. Beck Beck

Die Lehrbücher werden in den Veranstaltungen bekannt gegeben.



Related courses

Rules for the choice of courses

Two of these three courses must be chosen.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Law for StartUps	2,0	Lecture	german
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Literature

Wird in der Veranstaltung bekanntgegeben.

Patent Law and Trademark Law	2,0	Lecture	german
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Literature

- Patent and Design Law (dtv-Beck)
- Competition and Antitrust Law (dtv-Beck)

Procurement Law	2,0	Lecture	german
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Title	Law of Digitalisation		
Number	2216000020	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke Prof. Dr. Sarah Rachut
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
In the Law of Digitalisation module, the fundamentals of this area of law are divided between the courses 'IT, AI and Data Law' and 'IT Security Law'. In the wake of ubiquitous digitalisation, the way we communicate, evaluate information, work and consume has changed fundamentally. The IT, AI and Data Law lecture therefore deals with the legal requirements of digital transformation. Students learn the legal basis for data use and compliance with data protection law. They learn the basics of copyright law and what needs to be taken into account from a legal perspective when creating a web presence (homepage, web shop, social media account). They are also made aware of the risks of warnings in online distribution. Finally, the lecture on IT security law takes a closer look at (global) developments in cyber attacks and traces the associated regulatory developments at national and EU level. Students learn about the rights and obligations of the parties involved and are able to evaluate IT security risks from a legal perspective (in particular civil and criminal liability issues) . The lecture takes a holistic approach and enables students to independently develop scientific and practice-oriented solutions in conjunction with the relevant specialist literature in order to supervise the necessary IT steps. The lectures are interactive and offer opportunities for discussion. The topics discussed are illustrated using numerous practical cases.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).			

After completing the module Law of Digitalisation, students will be able to independently find the relevant specialist laws and standards and solve legal issues in IT, AI and Data Law as well as IT security law by working with the law.

Literature

Legal Codes, each in their current edition:

- Datenschutzrecht, dtv. Beck
- IT- und Computerrecht, dtv. Beck

Textbooks, each in the current edition:

- Informations- und Kommunikationsrecht
- Kühling/Klar/Sackmann, Datenschutzrecht
- Hornung/Schallbruch (Hrsg.) IT-Sicherheitsrecht



Related courses

Rules for the choice of courses

Both events must be visited.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
IT- and Data Law	2,0	Lecture	german
Literature			
This will be announced during the lecture.			
IT Security Law	2,0	Lecture	german

Title	Environmental and Technology Law		
Number	2216000000	Module version	V3
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Knowledge from the module Basics of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The course covers the fundamentals of technology law and environmental law. Following an introduction to the historical and European and international legal principles of the aforementioned areas of law, the various aspects of these areas of law are examined in greater detail with reference to other fields such as natural sciences and economics. In each case, reference is made to the knowledge already acquired by the students. The environmental law lecture focuses in particular on construction and immission control law, recycling law, nature conservation law and climate protection law. The Technology Law lecture also addresses the law on industrial installations, product liability law, mobility law, product and device safety law, patent law, criminal law relating to technology, data protection law and the creation of technical standards.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant corporate/product/production design (compliance). After completing the Environmental and Technology Law module, students will be able to independently deal with specialist laws in environmental and technology law and identify relevant legal and technical standards. Technical case studies from other lectures or from students' internships will be taken up and jointly evaluated on the basis of the existing legal situation. This enables students to identify the relevant supervisory authorities and independently check whether their plant or machine requires official approval or whether it is subject to notification. In this context, the 'state of the art' as an important legal term is also brought to life with examples from technical practice in order to sensitise students to the need to take future developments into account. Furthermore, students learn about legal issues relating to mitigating the effects of climate change in order to better assess and implement their significance and consequences from an economic perspective. In addition, they learn about liability responsibilities and are able to identify liability and sanction risks in production processes.			

Literature

Legal Codes, each in their current edition:

- Umweltrecht dtv. Beck

Textbooks, each in the current edition:

- Ensthaler, Jürgen, Technikrecht: Rechtliche Grundlagen des Technologiemanagments
- Schlacke, Umweltrecht
- Rodi, Handbuch Klimaschutzrecht

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

Both events must be visited.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Environmental Law	2,0	Lecture	german
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Literature

This will be announced during the session.

Technology Law	2,0	Lecture	german
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Literature

This will be announced during the event.

Compulsory Elective Discipline Economics

Title	Recent Developments in Regional Economics		
Number	2212000040	Module version	V2
Shorttext		Language	english
Frequency of offer	irregular	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Felix Rösel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 home work or 1 portfolio or 1 take-home exam		
Course achievement			
Contents			
• Local economic development • Location choice of firms and individuals • Empirical research methods • Geospatial data			
Objective qualification			
Students have an understanding of recent developments in regional economics that are relevant to (urban) mobility. Students are able to find, read, understand, discuss and compare empirical papers on topics such as transport, migration, housing, local public goods, local labor markets, and other topics. Students will be familiar with modern empirical research tools such as causal inference methods and geospatial data.			
Literature			
Literature will be announced in the seminar.			



Related courses			
Rules for the choice of courses			
Attendance is required.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Title	Empirical Economic Research		
Number	2212000020	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 Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Markus Ludwig
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Prior enrollment in introductory courses in empirical economic research, statistics, or econometrics is recommended.		
Expected performance/ Type of examination	1 written exam (90 mins) or 1 portfolio or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination performance: 1 written exam (90 mins) or 1 portfolio or 1 take-at-home exam		
Contents			
With the ever-increasing volume of socio-economic data, professional fields with a quantitative focus are becoming increasingly important. Quantitative issues include, amongst other things, the evaluation of economic policy measures, the forecasting of economic trends, and the prediction of consumer behaviour based on socio-demographic characteristics. The course 'Empirical Economic Research' takes this development into account. In the lecture, students acquire advanced knowledge of the theoretical foundations of regression models. The focus is on methods of pooled cross-sectional and panel data analysis; time series and machine learning methods are also covered. Students hone their analytical skills in the field of empirical economic research and develop their statistical thinking. The lecture is designed to be practice-oriented, with the application of methods taught using case studies from current research. A central component of the course is a student-led empirical data project, which is carried out using generative language models (LLMs, e.g. GitHub Copilot) as an assistive tool. In doing so, students learn how to use AI tools responsibly within the empirical research process. In the accompanying seminar, students practise working with datasets and the practical application of the methods using statistical software (R or Python), whilst simultaneously working on their own data project. Selected topics: - Pooled cross-sectional data: difference-in-differences estimators, controlled experiments, instrumental variables methods - Panel data: fixed-effects estimators - Time series (overview): AR/ARMA models and forecasts - Machine learning (overview): fundamentals and econometric applications - AI-supported empirical research: project structure, reproducibility, critical evaluation of AI output			

Students will acquire in-depth knowledge of the fundamental methods in the field of panel data and time series analysis. They develop an intuitive approach to the preparation and analysis of these specific data types. Students are able to apply the methods learnt in their own research projects and to independently interpret and contextualise research findings in this field.

Selected topics:

Pooled cross-sectional data: difference-in-differences estimation method, experiments

Panel data: fixed-effects estimation method

Time series: AR models, ARMA models

Time series: forecasts

Objective qualification

Students have an in-depth understanding of the fundamental methods of pooled cross-sectional and panel data analysis, as well as an overview of key time-series and machine learning methods. They are able to apply these methods in their own empirical research projects and to interpret and contextualise research findings independently. Furthermore, they are proficient in the methodologically responsible use of generative AI tools in the empirical research process – from project structuring and reproducibility to the critical evaluation of AI output.

Literature

- Wooldridge, Jeffrey: Introductory Econometrics: A Modern Approach, Cengage Learning, aktuelle Auflage.
- Stock, James, Watson, Mark: Introduction to Econometrics, Pearson/Addison Wesley, aktuelle Auflage.
- Hill, R. Carter, Griffiths, William E., Lim, Guay C.: Principles of Econometrics, Wiley, aktuelle Auflage.



Related courses

Rules for the choice of courses

Compulsory attendance

Name of the course	SWS	Eventtype	Language
Empirical Economics 2	4,0	Lecture/Exercise	german

Literature

- Wooldridge, Jeffrey: Introductory Econometrics: A Modern Approach, Cengage Learning, aktuelle Auflage
- Stock, James, Watson, Mark: Introduction to Econometrics, Pearson/Addison Wesley, aktuelle Auflage
- Hill, R. Carter, Griffiths, William E., Lim, Guay C.: Principles of Econometrics, Wiley, aktuelle Auflage.

Title	Cost-benefit analysis		
Number	2212000010	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 Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Felix Rösel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Contents			
Selected topics from cost-benefit analysis: • Fundamentals of welfare theory • Theory of cost-benefit analysis (and other ex-ante analysis methods) • Application of cost-benefit analysis in transportation, health, the environment, and other areas			
Objective qualification			
Students are knowledgeable about the theoretical foundations and empirical implementation of economic methods for evaluating economic policy measures. In particular, they are proficient in ex ante analysis methods (especially cost-benefit analysis) and are able to independently develop and critically evaluate suitable study and research designs for current economic policy issues.			
Literature			
Cost-benefit analysis: Boardman, Anthony, Greenberg, David, Vining, Aidan, Weimer, David: Cost-Benefit Analysis: Concepts and Practice, Pearson New International Edition, current edition.Hanusch, Horst: Benefit-Cost Analysis, Vahlen, current edition.Pindyck, Robert S., Rubinfeld, Daniel L.: Mikroökonomie, Pearson Studium, current edition.			



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

Cost-Benefit Analysis	4,0	Lecture/Exercise	german
Literature			
• Boardman, Anthony, Greenberg, David, Vining, Aidan, Weimer, David: Cost-Benefit Analysis: Concepts and Practice, Pearson New International Edition, latest edition • Hanusch, Horst: Cost-Benefit Analysis, Vahlen, latest edition • Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, latest edition			

Title	Urban and Regional Economics		
Number	2212000000	Module version	V2
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Felix Rösel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Contents			
Selected topics from urban and regional economics: Location theories Spatial structure and sector theories Regional economic growth theories			
Objective qualification			
Students have an in-depth understanding of the spatial dimension of economic activity. They have a firm grasp of theories relating to location choice (transport costs, agglomeration benefits, natural resources), theories on spatial structures and industries, as well as regional economic development, and apply these independently to new issues. Students are familiar with research findings and methods, thereby extending their existing economic knowledge to issues in regional studies and regional policy.			
Literature			
- Farhauer, Oliver, Kröll, Alexandra: Location theories: Regional and urban economics in theory and practice, Springer, current edition. - Maier, Gunther, Tödtling, Franz: Stadt- und Regionalökonomik 1: Standorttheorie und Raumstruktur, Springer, current edition.			

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Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Urban and Regional Economics	4,0	Lecture/Exercise	german
Literature			
- Farhauer, Oliver, Kröll, Alexandra: Location Theories: Regional and Urban Economics in Theory and Practice, Springer, latest edition - Maier, Gunther, Tödtling, Franz: Urban and Regional Economics 1: Location Theory and Spatial Structure, Springer, latest edition.			

Compulsory Elective Discipline Economic Sciences

Title	Business Model Innovation: Concepts and Applications		
Number	2201000040	Module version	
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), for example in marketing.		
Expected performance/ Type of examination	1 portfolio or 1 take-home exam, or 1 written exam (120 mins)		
Course achievement	for Organization, Governance, Education / MA Social Sciences instead of the examination performance: 1 portfolio or 1 take-home exam		
Contents			
Contents of the lecture include: • Relevance, significance, and understanding of business model innovation • Models for analyzing environmental factors, industry dynamics, and one's own company • Building blocks of business model innovation and related methods • Organizational success factors and barriers to business model innovation; transformation of existing business models. The course content includes: Application of concepts, models, and methods of business model innovation to a real-world example.			
Objective qualification			
Lecture & seminar required Nach Abschluss des Moduls sind die Studierenden in der Lage: To understand the fundamentals of business model innovation and to recognise the factors that play a role in the development of business model innovations. Furthermore, they will understand and be able to critically discuss how innovations are developed and which methods are appropriate for this purpose. To argue, based on theory, why certain corporate measures are expected to have an impact on innovation success. To apply methodological knowledge to develop, evaluate and critically reflect on business model innovations themselves. To formulate precise problems and research questions based on a complex practical issue in the field of innovation management, and to develop solutions using the content and methods learnt in the lecture and further methods taught in the seminar. To independently research and structure English-language academic and practical literature to support their arguments.			

To work on projects with other team members, critically discussing alternative approaches and reaching decisions; to demonstrate initiative in implementing the work steps; to understand complex interrelationships and present them clearly; and to present the results convincingly.
Cooperate effectively in group work, reflect on individual contributions resulting from the division of labour, integrate these into a coherent overall concept, and resolve any conflicts that arise.

Literature

- Gassmann, O., Frankenberger, K., & Csik, M. (2013). The St. Gallen business model navigator. *Int. J. Prod. Dev*, 18, 249-273.
- Grant, R. M. (1991). The resource-based theory of competitive advantage: implications for strategy formulation. *California management review*, 33(3), 114-135.
- Hackman, J. R., & Oldham, G. R. 1976. Motivation through the design of work: Test of a theory. *Organizational Behavior and Human Performance*, 16: 250–279.
- Heskett, J. L., Jones, T. O., Loveman, G. W., Sasser, W. E., & Schlesinger, L. A. (1994). Putting the service-profit chain to work. *Harvard business review*, 72(2), 164-174.
- Hueske, A. K., & Guenther, E. (2015). What hampers innovation? External stakeholders, the organization, groups and individuals: a systematic review of empirical barrier research. *Management Review Quarterly*, 65, 113-148.
- Johnson, M. Clayton Christensen, Henning Kagermann (2008), "Reinventing your business model." Harvard Business School Publishing Corporation.
- Junni, P., Sarala, R. M., Taras, V. A. S., & Tarba, S. Y. (2013). Organizational ambidexterity and performance: A meta-analysis. *Academy of Management Perspectives*, 27(4), 299-312.
- Kowalkowski, Christian and Wolfgang Ulaga (2017), *Service Strategy in Action –A Practical Guide for Growing Your B2B Service and Solution Business*, Milton Keynes.
- Kozlenkova, I. V., Samaha, S. A., & Palmatier, R. W. (2014). Resource-based theory in marketing. *Journal of the academy of marketing science*, 42, 1-21.
- Mitchell, R. K., Agle, B. R., & Wood, D. J. (1997). Toward a theory of stakeholder identification and salience: Defining the principle of who and what really counts. *Academy of Management review*, 22(4), 853-886.
- Ommen, N. O., Blut, M., Backhaus, C., & Woisetschlager, D. M. (2016). Toward a better understanding of stakeholder participation in the service innovation process: More than one path to success. *Journal of Business Research*, 69(7), 2409-2416.
- Osterwalder, Alexander, et al. *Value proposition design: How to create products and services customers want*. John Wiley & Sons, 2014.
- Osterwalder, Pigneur (2010): *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers*, John Wiley & Sons, Hoboken/NJ.
- Peteraf, M. A. (1993). The cornerstones of competitive advantage: a resource-based view. *Strategic Management journal*, 14(3), 179-191.
- Porter, M. E. (2001). The value chain and competitive advantage. *Understanding business processes*, 2, 50-66.
- Porter (2008), *The Five Competitive Forces That Shape Strategy*, Harvard Business Review.
- Teece, David (2010), *Business Models, Business Strategy and Innovation*, Long Range Planning 43, 172-194.
- Venkatesh, Viswanath, Michael G. Morris, Gordon B. Davis, and Fred D. Davis (2003), "User Acceptance of Information Technology: Toward a Unified View," *MIS Quarterly*, 27 (3), 425–478.

Additional literature will be announced during the events.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Business Model Innovation: Concepts and Applications	4,0	Lecture/Exercise	english

Title	Controlling 1		
Number	2214000020	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 / 5,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge of economics is a prerequisite for the module.		
Expected performance/ Type of examination	1 Klausur (90 min) oder 1 Take-at-Home-Exam Upon request, the grade for the coursework can be included in the final grade for the module. The grade for the coursework will then account for 50% of the overall module grade. The request must be made before the coursework is completed and is also binding for repeat examinations.		
Course achievement	1 Referat oder 1 Hausarbeit oder 1 Präsentation oder 1 Portfolio for Organization, Governance, Education / MA Social Sciences instead of the examination performance: 1 written exam, 90 minutes or take-at-home exam		
Contents			
Selected contents - depending on the respective current course: • Value-oriented KPI systems • Budgeting systems • Transfer pricing systems • Decision making from a prescriptive and descriptive perspective, respectively			
Objective qualification			
The students have an in-depth understanding of the issues and methods of coordination-oriented management control. On this basis, they are able to analyze related problems, critically examine proposed concepts, and provide well-founded support for corresponding processes in practice. Furthermore, the students are capable of collaboratively de-veloping closely interrelated topics of decision-oriented management control in groups, coordinating these topics step by step within plenary sessions, and engaging in critical discussion.			
Literature			
• Weber/Schäffer: Einführung in das Controlling, Stuttgart, aktuelle Auflage • Ewert/Wagenhofer: Interne Unternehmensrechnung, Berlin et al., aktuelle Auflage • Eisenführ/Weber/Langer: Rationales Entscheiden, Berlin et al., aktuelle Auflage • Kahneman/Tversky: Schnelles Denken, langsames Denken, München, aktuelle Auflage			



Related courses			
Rules for the choice of courses			
In this module, the courses Coordination Instruments of Controlling(V1,5, Ü0,5) and Decision-oriented controlling (V2) are compulsory.			
Optional colloquia and tutorials are voluntary.			
Compulsory attendance			
Under close supervision, students develop a topic and present their findings step by step to the class; the coordination of topics and critical discussion among students regarding the presentations are central components of the course, so attendance is mandatory.			
Name of the course	SWS	Eventtype	Language
Controlling coordination tools	2,0	Lecture/Exercise	german
Literature			
Ewert, R./Wagenhofer: Interne Unternehmensrechnung, Berlin et al., aktuelle Auflage			
Decision-oriented controlling (course achievement)	2,0	Series of lectures	german
Literature			
Vorlesungsunterlagen per Download, weitere Literatur wird in der Veranstaltung bekannt gegeben.			

Title	Controlling 2		
Number	2214000030	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 Controlling und Unternehmensrechnung
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge of economics is a prerequisite for the module.		
Expected performance/ Type of examination	Details regarding PA ·2 contact hours per week, 2.5 ECTS ·Assessment methods: 1 written exam (45 mins) or 1 oral exam (20 mins) or 1 term paper or 1 take-at-home exam or written exam+ Details regarding AC ·2 contact hours per week, 2.5 ECTS Students work on a topic under close supervision and present their findings step-by-step to the whole class; the coordination of topics and critical discussion among students regarding the presentations is a core component of the course, therefore attendance is compulsory.		
Course achievement	• Coursework: 1 presentation or 1 essay or 1 presentation or 1 portfolio • Upon request, the mark for the coursework may be included in the final module mark. The mark for the coursework will then account for 50% of the overall module mark. The request must be submitted before the coursework is completed and is also binding for resits. • For Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 written examination, 90 minutes, or a take-at-home exam		
Contents			
Selected contents - depending on the respective current course: • Benchmarking and efficiency analysis • Actual developments in management control • Sector- or functional-area controlling, e.g., sports controlling or R&D controlling • Project controlling			
Objective qualification			
The students have an in-depth understanding of the issues and methods of benchmarking and efficiency analysis. On this basis, they are able to analyze related problems, critically examine proposed concepts, and provide well-founded support for corresponding performance analyses in practice. Furthermore, the students are capable of collaboratively developing current, closely interrelated management control topics in groups, coordinating these topics step by step within plenary sessions, and engaging in critical discussion.			
Literature			
• Weber/Schäffer: Einführung in das Controlling, Stuttgart, aktuelle Auflage • Bogetoft, P., Otto, L. (2011): Benchmarking with DEA, SFA, and R. Springer, New York.			

- Cook, W. D./Zhu, J. (2008): Data Envelopment Analysis, o. V.



Related courses			
Rules for the choice of courses			
In this module, the courses Performance Analytics (V1) and Current Topics in Controlling (VR2) are compulsory. Enrolment policy – Any colloquia offered for PA are optional.			
Compulsory attendance			
Compulsory attendance in accordance with Section 7a of the APO The primary learning objective in the area of social and personal skills is achieved through collaborative work and topic coordination within a small group, where students acquire and develop the skills necessary for academic discourse, including critical reflection. This is only possible if students attend. Compulsory attendance is limited to topic coordination and lectures in the course 'Current Topics in Controlling'.			
Name of the course	SWS	Eventtype	Language
Performance Analytics	2,0	Lecture	english german
Current topics in management accounting	2,0	Series of lectures	german
Literature			
• Weber/Schäffer: Einführung in das Controlling, Stuttgart, aktuelle Auflage • Ahn, H. (2003), Effektivitäts- und Effizienz-sicherung - Controlling-Konzept und Balanced Scorecard, Frankfurt/M. et al. • Ahn, H./Dyckhoff, H. (2004), Zum Kern des Controllings - Von der Rationalitätssicherung zur Effektivitäts- und Effizienz-sicherung, in: Scherm/Pietsch (Hrsg.): Controlling - Theorien und Konzeptionen, München, S. 501-525			
Performance Analytics – Colloquium	1,0	Colloquium	german

Title	Controlling 3		
Number	2214000040	Module version	V2
Shorttext		Language	english german
Frequency of offer	irregular	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Controlling und Unternehmensrechnung
Hours per Week / ECTS	2 / 5,0	Module owner	Prof. Dr. Heinz Ahn
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements	Prerequisite for enrollment is prior attendance of one of the modules Controlling I or Controlling II.		
Recommended requirements	Basic knowledge of economics is a prerequisite for the module.		
Expected performance/ Type of examination	1 oral presentation oder 1 term paper oder 1 presentation oder 1 portfolio		
Course achievement			
Contents			
• Application of management control methods • Application of experiments regarding cognitive biases			
Objective qualification			
The students are capable of developing a topic regarding management control methods and cognitive biases, respectively, in the style of a journal article.			
Literature			
• Goldenstein/Hunoldt/Walgenbach: Wissenschaftliche(s) Arbeiten in den Wirtschaftswissenschaften: Themenfindung – Recherche – Konzeption – Methodik – Argumentation, Wiesbaden, aktuelle Auflage			



Related courses			
Rules for the choice of courses			
In this module, the course Projects in Performance Analysis (VR2) is mandatory.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Performance analysis projects	2,0	Lecture	english german
Literature			
Vorlesungsunterlagen per Download, weitere Literatur wird in der Veranstaltung bekannt gegeben.			

Title	Customer Relationship Management: Concepts and Applications		
Number	2201000050	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 / 5,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), for example in marketing.		
Expected performance/ Type of examination	1 portfolio or 1 take-home exam, or 1 written exam (120 mins)		
Course achievement	for Organization, Governance, Education / MA Social Sciences instead of the examination performance: 1 portfolio or 1 take-home exam		
Contents			
Contents of the lecture include: • Relevance, importance and understanding of customer relationship management • Theoretical foundations of CRM • Target indicators of CRM • Lifecycle perspective of the customer relationship • Acquisition and new customer management • Customer loyalty programs • Types and management of switching barriers • Customer evaluation and segmentation • Expansion of customer relationships • Complaint management • Termination prevention and reactivation management • Customer data and privacy Contents of the exercise include learning and applying methods • to calculate customer value • to evaluate the customer relationship (e.g. satisfaction, loyalty, recommendation) • to calculate customer churn or the probability of churn • to evaluate the success of promotions and reactivation measures			
Objective qualification			
Students have an understanding of issues that arise in the context of recording, designing and evaluating customer relationships. Based on the concepts and methods they have learned, students will be able to independently record, conceptually structure and analyze customer relationship management issues in various industry contexts. They have methodological and application knowledge for the qualitative and quantitative analysis of customer and company data required to answer customer relationship management tasks.			
Literature			

- Kumar, V. and Werner Reinartz (2018): Customer Relationship Management: Concept, Strategy, and Tools, 3. ed., Springer.
- Textbooks and further literature will be announced in the lectures
- Supplementary literature (PDF documents, lecture notes for download)



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

Title	Data Driven Decision Making		
Number	2218000030	Module version	V2
Shorttext		Language	english
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschaftsinformatik - Lehrstuhl für Decision Support
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Module: "Mobility and Transport Planning and Intelligent Data Analysis"		
Expected performance/ Type of examination	1 exam (60 min) or 1 take-at-home exam		
Course achievement	Exercises (for the exercise(s)) (2.5 CP) only for Organisation, Governance, Education instead of the examination additionally 1 exam (60 min) or 1 take-at-home exam		
Contents			
• Information and Decision Modeling • Stochastic and Dynamic Optimization • Approximate Dynamic Programming • Examples of the Application of Models and Methods			
Objective qualification			
Students develop a comprehensive understanding of the principles governing the integration of information and decision-making models into information systems. They are familiar with dynamic and stochastic modeling and solution techniques in the field of mobility. Furthermore, students can apply these techniques to new business management problems.			
Literature			
See course listing for sample literature.			



Related courses			
Rules for the choice of courses			
Both lectures are required.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Data Driven Decision Making	2,0	Lecture	english
Literature			
• Mattfeld, D.; Vahrenkamp, R.: Logistiknetzwerke. Springer Gabler, 2014. • Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020			
Serious Gaming in Data Driven Decision Making	2,0	Exercise	english
Literature			
• Mattfeld, D.; Vahrenkamp, R.: Logistiknetzwerke. Springer Gabler, 2014. • Berthold, M. R.; Borgelt, C.; Höppner, F.; Klawonn, F.; Silipo, R.: Guide to intelligent data analysis. Springer, 2020			

Title	Digital Business Engineering		
Number	2227000020	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 term paper & 1 presentation or 1 portfolio or 1 written exam (120 min) or 1 oral exam (30 minutes) or 1 term paper or 1 presentation or 1 take-at-home exam		
Course achievement			
Contents			
Digital Business Engineering In the “Digital Business Engineering” module, students gain in-depth knowledge of business model transformation through the strategic use of digital technologies and data, using real-world case studies. Business engineering provides the theoretical foundation. Business engineering describes the engineering-based design of business models and is a model-based, method-oriented approach to corporate transformation. In the seminar accompanying the lecture, students learn to apply techniques used in business engineering (e.g., customer process design, information architecture design, SWOT analysis, etc.). The goal of the seminar is for students to independently address a problem using the methods and techniques provided by the department.			
Objective qualification			
Digital Business Engineering Upon completion of the module, students will be able to apply business engineering techniques. Furthermore, students will be able to explain business engineering concepts and apply them to unfamiliar problems.			
Literature			
Digital Business Engineering • OSTERWALDER, Alexander; PIGNEUR, Yves. Business model generation: a handbook for visionaries, game changers, and challengers. John Wiley & Sons, 2010. • OSTERWALDER, Alexander; PIGNEUR, Yves; TUCCI, Christopher L. Clarifying business models: Origins, present, and future of the concept. Communications of the association for Information Systems, 2005, 16. Jg., Nr. 1, • MÖLLER, Frederik, et al. Designing business model taxonomies—synthesis and guidance from information systems research. Electronic Markets, 2022, S. 1-26.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Digital Business Engineering	4,0	Lecture/Exercise	german
Literature			
• OSTERWALDER, Alexander; PIGNEUR, Yves. <i>Business model generation: a handbook for visionaries, game changers, and challengers</i>. John Wiley & Sons, 2010. • OSTERWALDER, Alexander; PIGNEUR, Yves; TUCCI, Christopher L. Clarifying business models: Origins, present, and future of the concept. <i>Communications of the association for Information Systems</i>, 2005, 16. Jg., Nr. 1, • MÖLLER, Frederik, et al. Designing business model taxonomies—synthesis and guidance from information systems research. <i>Electronic Markets</i>, 2022, S. 1-26.			

Title	Digital Business Models and Sustainability		
Number	2227000030	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 term paper & 1 presentation or 1 portfolio or 1 written exam (120 min) or 1 oral exam (30 minutes) or 1 term paper or 1 presentation or 1 take-at-home exam		
Course achievement			
Contents			
Digital Business Models and Sustainability This course teaches students how to systematically visualise and analyse business models. Established methods are examined to determine the extent to which they meet the economic, environmental and social objectives of sustainability. New approaches to solving selected problems will be developed. Key content includes: • Approaches to modelling (digital) business models • Fundamentals of a sustainable economy • Derivation of criteria for sustainability-oriented modelling • Tools for analysing business models, • and Development of new ideas, methods and tools. In the practical session accompanying the lecture, students independently apply selected methods and approaches from the lecture to case studies.			
Objective qualification			
Digital Business Models and Sustainability Students expand their methodological knowledge of business models by comparing different approaches to business model design and applying them to the context of sustainable development. They learn to critically evaluate existing modelling techniques, thereby strengthening their analytical skills. Upon completion of the course, students will be able to describe the fundamentals of sustainable development and apply them independently to case studies.			
Literature			
Digital Business Models and Sustainability • Hahn, R. (2022). Sustainability management: Global perspectives on concepts, instruments, and stakeholders.			

- Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L., & Breuer, H. (2018). The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation. *Sustainable Production and Consumption*, 15, 145-162.
- Osterwalder, A., & Pigneur, Y. (2010). *Business model generation: a handbook for visionaries, game changers, and challengers* (Vol. 1). John Wiley & Sons.
- Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business models for sustainability: A co-evolutionary analysis of sustainable entrepreneurship, innovation, and transformation. *Organization & environment*, 29(3), 264-289.
- Schoormann, T., Stadtländer, M., & Knackstedt, R. (2021). Designing business model development tools for sustainability—a design science study. *Electronic Markets*, 1-23



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Digital Business Models and Sustainability	4,0	Lecture/Exercise	german
Literature			
• Hahn, R. (2022). Sustainability management: Global perspectives on concepts, instruments, and stakeholders. • Lüdeke-Freund, F., Carroux, S., Joyce, A., Massa, L., & Breuer, H. (2018). The sustainable business model pattern taxonomy—45 patterns to support sustainability-oriented business model innovation. <i>Sustainable Production and Consumption</i>, 15, 145-162. • Osterwalder, A., & Pigneur, Y. (2010). <i>Business model generation: a handbook for visionaries, game changers, and challengers</i> (Vol. 1). John Wiley & Sons. • Schaltegger, S., Lüdeke-Freund, F., & Hansen, E. G. (2016). Business models for sustainability: A co-evolutionary analysis of sustainable entrepreneurship, innovation, and transformation. <i>Organization & environment</i>, 29(3), 264-289. • Schoormann, T., Stadtländer, M., & Knackstedt, R. (2021). Designing business model development tools for sustainability—a design science study. <i>Electronic Markets</i>, 1-23.			

Title	Digital transformation: Research		
Number	2222000040	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	The prerequisite for the module is basic knowledge in economics.		
Expected performance/ Type of examination	1 portfolio or 1 exam+		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 term paper or 1 exam (120 min) or 1 portfolio or 1 take-at-home exam		
Contents			
The interactive module consists of a course with lecture components, independent, individual analysis, literature and project work, presentations, and discussions on a self-selected research topic in the field of digital transformation with digital services or digital cooperation. The knowledge acquired covers selected theoretical foundations of research, essential research methods (e.g., empirical studies or experiments), and specifically design-oriented research in business informatics. Independent theoretical work, engagement with scientific contributions, short presentations on individual topics, and flipped classrooms serve to deepen students' own understanding. Students acquire further skills and abilities in their own small research project (work in small teams possible), which either scientifically solves a challenge of service digitization (e.g., in learning or in various B2C industries) or contributes to research methodology.			
Objective qualification			
Students understand the changes in companies and organizations, in markets, and in society resulting from the use of digital technologies and are able to reflect on these changes critically. They are able to explain aspects of digital transformation using selected theories and, on this basis, design, present, and discuss their own concepts, including prototypical digital systems. For the “Cooperation” focus, students concentrate on the nature, basic approach, and impact of design-oriented research in business informatics and independently implement a small research project. The module is based on a higher proportion of individual work and reflection on the role of research in digital transformation.			
Literature			
Course materials are provided on Stud.IP, along with additional literature.			



Related courses			
Rules for the choice of courses			
Lecture required Colloquium optional			
Compulsory attendance			
Attendance at presentations and discussion sessions is required. The dates for these will be set at the beginning of the semester.			
Name of the course	SWS	Eventtype	Language
Digital transformation: Research	2,0	Lecture	german
Literature			
Vorlesungsunterlagen per Download, weitere Literatur wird in der Veranstaltung bekannt gegeben.			

Title	Digital transformation: Cooperation		
Number	2222000050	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	The prerequisite for the module is basic knowledge in economics.		
Expected performance/ Type of examination	1 portfolio 1 exam+		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 term paper or 1 exam (120 min) or 1 portfolio or 1 take-at-home exam		
Contents			
The interactive module consists of a course with lecture components, independent analysis, literature or project work, presentations, and discussions (partly individual, partly in teams) on the topic of digital transformation: collaboration. The knowledge acquired covers selected theoretical principles, taught in lectures and Stud.IP Nanos: Cooperation and collaboration, digital cooperation and collaboration, hybrid (digital/human) collaboration systems, the role of cooperation and collaboration in companies (e.g., New Work, participatory leadership), markets (peer-2-peer, DIY, maker markets), and society (e.g., neighborhood platforms), as well as for social sustainability. Methods such as independent theoretical work, engagement with scientific contributions in the field of digital cooperation and collaboration, short lectures on individual topics, and flipped classrooms serve to deepen students' own understanding. Students acquire further skills and abilities in a so-called impact learning project, in which they use digital cooperation/collaboration to solve a real-life social or economic problem of their own choosing, successfully implement the corresponding project at least once, and anchor it sustainably.			
Objective qualification			
Students understand the changes in companies and organizations, in markets, and in society brought about by the use of digital technologies and are able to reflect on them critically. They are able to explain aspects of digital transformation using selected theories and, on this basis, design, present, and discuss their own concepts, including prototypical digital systems. For the “Cooperation” focus, students concentrate on the role of cooperation and collaboration in digital markets, in companies, and overall in various relationships between organizational and individual actors.			

The module is based on a higher proportion of teamwork and focuses on practical design within the framework of a so-called impact learning project.

Literature

Course materials are provided on Stud.IP, along with additional literature.



Related courses

Rules for the choice of courses

Required lecture
Colloquium optional

Compulsory attendance

Attendance at presentations and discussion sessions is required. The dates for these will be set at the beginning of the semester.

Name of the course	SWS	Eventtype	Language
Digital Transformation: Collaborations	4,0	Lecture	german

Literature

- Vorlesungsunterlagen zum Download
- Weitere Literatur wird in der Veranstaltung bekannt gegeben

Title	Digital transformation: Services		
Number	2222000020	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	The prerequisite for the module is basic knowledge in economics.		
Expected performance/ Type of examination	1 assignment or 1 exam (120 min) or 1 portfolio or 1 take-at-home-exam or 1 exam+		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 term paper or 1 exam (120 min) or 1 portfolio or 1 take-at-home exam		
Contents			
The interactive module consists of a course with lecture components, independent analysis, literature or project work, presentations, and discussions on the topic of digital transformation: services. The knowledge acquired covers selected theoretical principles, taught in lectures and Stud.IP Nanos: service definitions, servitization, digital services, service dominant logic, service design, platforms, business models, and service ecosystems. Methods such as market analyses, flipped classrooms, or short lectures on individual topics serve to deepen students' own understanding. Students acquire further skills and abilities through the independent design of digital services and hybrid systems, design principles, and the implementation of workshops. Independent reflection is encouraged, for example, through the writing of statements or in a debate on social impact and sustainability aspects.			
Objective qualification			
Students understand the changes in companies and organizations, in markets, and in society brought about by the use of digital technologies and are able to reflect on them critically. They are able to explain aspects of digital transformation using selected theories and, on this basis, design, present, and discuss their own concepts, including prototypical digital systems. For the “Services” specialization, students focus on the perspective based on so-called service logic, which holds that (digital) services help companies succeed in digital markets.			
Literature			
Course materials are provided on Stud.IP, along with additional literature.			



Related courses			
Rules for the choice of courses			
Colloquium optional			
Compulsory attendance			
Attendance at presentations and discussion sessions is required. The dates for these will be set at the beginning of the semester.			
Name of the course	SWS	Eventtype	Language
Digital Transformation: Services	4,0	Lecture	german
Literature			
Vorlesungsunterlagen per Download, weitere Literatur wird in der Veranstaltung bekannt gegeben.			

Title	Digital transformation: Visions		
Number	2222000030	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	The prerequisite for the module is basic knowledge in economics.		
Expected performance/ Type of examination	1 portfolio or 1 exam+		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 term paper or 1 exam (120 min) or 1 portfolio or 1 take-at-home exam		
Contents			
The interactive module consists of a course with lecture components, independent analysis, literature or project work, presentations, and discussions on the topic of digital transformation: services. The knowledge acquired covers selected theoretical principles, taught in lectures and Stud.IP Nanos: digital economy, digital management, (digital) transformation, digitalization, and sustainability. Methods such as market analyses, flipped classrooms, and short lectures on individual topics serve to deepen students' understanding. Students acquire further skills and abilities through the independent design of digital services and hybrid systems, design principles, and the implementation of workshops. Independent reflection is encouraged, for example, through the writing of statements or in a debate on social impact or sustainability aspects.			
Objective qualification			
Students understand the changes in companies and organizations, in markets, and in society brought about by the use of digital technologies and are able to reflect on them critically. They are able to explain aspects of digital transformation using selected theories and, on this basis, design, present, and discuss their own concepts, including prototypical digital systems. For the “Visions” specialization, students focus on the future of digital markets and digital society based on an analysis of the impact and influence of digital systems and the associated transformation.			
Literature			
Course materials are provided on Stud.IP, along with additional literature.			



Related courses			
Rules for the choice of courses			
Lecture required Colloquium optional			
Compulsory attendance			
Attendance at presentations and discussion sessions is required. The dates for these will be set at the beginning of the semester.			
Name of the course	SWS	Eventtype	Language
Digital Transformation: Visions	4,0	Lecture	german
Literature			
Vorlesungsunterlagen per Download, weitere Literatur wird in der Veranstaltung bekannt gegeben.			

Title	Empirical Economic Research		
Number	2212000020	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 Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Markus Ludwig
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Prior enrollment in introductory courses in empirical economic research, statistics, or econometrics is recommended.		
Expected performance/ Type of examination	1 written exam (90 mins) or 1 portfolio or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination performance: 1 written exam (90 mins) or 1 portfolio or 1 take-at-home exam		
Contents			
With the ever-increasing volume of socio-economic data, professional fields with a quantitative focus are becoming increasingly important. Quantitative issues include, amongst other things, the evaluation of economic policy measures, the forecasting of economic trends, and the prediction of consumer behaviour based on socio-demographic characteristics. The course 'Empirical Economic Research' takes this development into account. In the lecture, students acquire advanced knowledge of the theoretical foundations of regression models. The focus is on methods of pooled cross-sectional and panel data analysis; time series and machine learning methods are also covered. Students hone their analytical skills in the field of empirical economic research and develop their statistical thinking. The lecture is designed to be practice-oriented, with the application of methods taught using case studies from current research. A central component of the course is a student-led empirical data project, which is carried out using generative language models (LLMs, e.g. GitHub Copilot) as an assistive tool. In doing so, students learn how to use AI tools responsibly within the empirical research process. In the accompanying seminar, students practise working with datasets and the practical application of the methods using statistical software (R or Python), whilst simultaneously working on their own data project. Selected topics: - Pooled cross-sectional data: difference-in-differences estimators, controlled experiments, instrumental variables methods - Panel data: fixed-effects estimators - Time series (overview): AR/ARMA models and forecasts - Machine learning (overview): fundamentals and econometric applications - AI-supported empirical research: project structure, reproducibility, critical evaluation of AI output			

Students will acquire in-depth knowledge of the fundamental methods in the field of panel data and time series analysis. They develop an intuitive approach to the preparation and analysis of these specific data types. Students are able to apply the methods learnt in their own research projects and to independently interpret and contextualise research findings in this field.

Selected topics:

Pooled cross-sectional data: difference-in-differences estimation method, experiments

Panel data: fixed-effects estimation method

Time series: AR models, ARMA models

Time series: forecasts

Objective qualification

Students have an in-depth understanding of the fundamental methods of pooled cross-sectional and panel data analysis, as well as an overview of key time-series and machine learning methods. They are able to apply these methods in their own empirical research projects and to interpret and contextualise research findings independently. Furthermore, they are proficient in the methodologically responsible use of generative AI tools in the empirical research process – from project structuring and reproducibility to the critical evaluation of AI output.

Literature

- Wooldridge, Jeffrey: Introductory Econometrics: A Modern Approach, Cengage Learning, aktuelle Auflage.
- Stock, James, Watson, Mark: Introduction to Econometrics, Pearson/Addison Wesley, aktuelle Auflage.
- Hill, R. Carter, Griffiths, William E., Lim, Guay C.: Principles of Econometrics, Wiley, aktuelle Auflage.



Related courses

Rules for the choice of courses

Compulsory attendance

Name of the course

SWS

Eventtype

Language

Empirical Economics 2

4,0

Lecture/Exercise

german

Literature

- Wooldridge, Jeffrey: Introductory Econometrics: A Modern Approach, Cengage Learning, aktuelle Auflage
- Stock, James, Watson, Mark: Introduction to Econometrics, Pearson/Addison Wesley, aktuelle Auflage
- Hill, R. Carter, Griffiths, William E., Lim, Guay C.: Principles of Econometrics, Wiley, aktuelle Auflage.

Title	Energy Law		
Number	2216000010	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The Energy Law module covers the fundamentals of energy law, divided into Energy Law I and Energy Law II. The Energy Law I course serves to present the basics of energy law at the European and German levels. At the beginning of the course, the development of energy law over the last few decades is presented. The lecture focuses on the regulation of network operation and related topics such as unbundling, network connection, network usage and network usage fees. The course will cover the main contractual structures of energy supply relationships and the position of end consumers in the energy industry. Another focus is on the supply of end consumers, e.g. basic supply and contract adjustment options. The lecture is interactive and offers opportunities for discussion. The topics discussed are illustrated with numerous practical examples. The Energy Law II lecture is primarily devoted to the law governing the ‘energy transition’. It complements the Energy Law I lecture, but it is not mandatory to have attended Energy Law I beforehand. One of the main topics of the lecture is an introduction to renewable energy law (EEG), including historical developments and European references, such as expansion targets, connection and feed-in priority, tenders/tariffs and financing. In addition, an in-depth look will be taken at the specific legal situation of onshore and offshore wind turbines (including planning and approval, contract design). The course will also cover the most important legal principles governing the expansion of the electricity grid (from EnWG, EnLAG, NABEG, BBPIG). Finally, there will be an opportunity to consider current developments in energy law, e.g. with regard to sector coupling or green hydrogen. The lecture is interactive and offers opportunities for discussion. The topics discussed will be illustrated with numerous practical examples.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).			

After completing the module in energy law, students will be able to independently deal with the specialist laws in energy law and determine relevant legal standards. Technical case studies from other lectures will be taken up and jointly evaluated on the basis of the existing legal situation. The area-specific 'state of the art' will also be learned with examples from technical practice.

Literature

Legal Codes, in their current edition

- Energierecht, dtv. Beck

textbooks, each in the current edition

- Kühling/Rasbach/Busch, Energierecht
- Baumgart, Energierecht



Related courses

Rules for the choice of courses

Both events must be visited.

Compulsory attendance

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

Title	Law for Entrepreneurs		
Number	2216000030	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The content of Law for Entrepreneurs depends on the chosen combination of lectures. ‘Law for Start-ups’, ‘Patent and Trademark Law’ and ‘Public Procurement Law’ are available. Two of these three courses must be chosen. The lecture Law for Start-ups imparts the practical knowledge necessary for the successful launch of a start-up company. Among other things, students learn about different types of companies. They also learn step by step what is required to start a business and what legal issues they will face when the company enters into business operations, e.g. in the areas of trademark and patent law, commercial and unfair competition law, and labour law. The lecture will refer to other economics lectures, e.g. on business models, in order to work out the legal challenges that arise from them. The lecture on patent and trademark law covers the basics of German and European patent law, the relevant patent requirements and procedures at the German Patent and Trademark Office (DPMA) and the European Patent Office (EPO). The requirements for patenting and the relevant case law are then applied and examined, particularly in relation to computer-implemented inventions, i.e. inventions that contain a significant amount of software. To a lesser extent, utility models and their differences from patents, as well as registered designs and Community designs, are also discussed. The lecture on public procurement law covers the scope and procedure of public procurement processes as well as the legal remedies available under public procurement law. It is based on the provisions of EU public procurement law in accordance with Part 4 of the GWB (German Act against Restraints of Competition) and the VgV (German Public Procurement Ordinance). However, where appropriate, excursions are made into sub-threshold public procurement law and the special procurement regimes for sectoral contracts, defence and security-related contracts and concessions. The first focus of the lecture is on the question of when public procurement law applies and, if so, which public procurement regime is to be applied. Based on above-threshold procurement law, an overview of the procedure is provided, beginning with the possible types of procedures, the requirements to be placed on bidders and the subject matter of the contract, the necessary notices, and ending with the evaluation of bids and the conclusion of the procurement procedure. Finally, the legal protection options under public procurement law (primary and secondary legal protection) are discussed.			

in detail. The lecture takes into account current developments in public procurement law and deals with the respective topics using example cases from public procurement practice.

The lectures are interactive and provide opportunities for discussion. The topics discussed are illustrated using numerous practical examples.

Objective qualification

The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).

After completing the Law for Entrepreneurs module, students will be able to independently identify the relevant specialist laws and standards and, by working with the law, resolve legal issues in public procurement law, patent and trademark law and/or in the context of starting and running a business. As regulation in this area is very fast-moving, in addition to teaching technical skills, teaching legal methodological skills is particularly important in order to enable students to apply the law independently. After completing the module, students will be aware of the content of the lectures so that they can act in a legally compliant manner when using the internet independently (for commercial purposes) or when starting a business. They will also have learned to ask the right questions of lawyers who support them in enforcing their rights.

Literature

Gesetzestexte in der jeweils aktuellen Auflage:

Gesellschaftsrecht, dtv. Beck
 Bürgerliches Gesetzbuch, dtv. Beck
 Patentrecht, dtv. Beck Beck
 Vergaberecht, dtv. Beck Beck

Die Lehrbücher werden in den Veranstaltungen bekannt gegeben.



Related courses

Rules for the choice of courses

Two of these three courses must be chosen.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Law for StartUps	2,0	Lecture	german
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Literature

Wird in der Veranstaltung bekanntgegeben.

Patent Law and Trademark Law	2,0	Lecture	german
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Literature

- Patent and Design Law (dtv-Beck)
- Competition and Antitrust Law (dtv-Beck)

Procurement Law	2,0	Lecture	german
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Title	Ethical Leadership and Sustainable Business Practice: Applied Perspectives on Organisations and Society		
Number	2224000030	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Prerequisite for the module is a basic knowledge of business administration in the field of business ethics as well as in academic work, if applicable.		
Expected performance/ Type of examination	1 portfolio or 1 term paper or 1 presentation or 1 written exam (90 minutes) or 1 oral exam or 1 take-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 portfolio or 1 term paper or 1 presentation or 1 written exam (90 minutes) or 1 oral exam or 1 take-home exam		
Contents			
This module combines theoretical foundations of ethical leadership with practice-oriented applications. Students analyse real-world organisational challenges and develop sustainable solutions, taking into account responsibility, leadership culture, and organisational contexts.			
Objective qualification			
The aim is to develop ethical judgement in order to be able to make responsible decisions in innovation and management processes. Current debates and practical examples encourage reflection on the contribution of organisations to value-oriented and sustainable change.			
Literature			
Specific references to literature on the respective topics will be presented and made available during the course of the seminar.			



Related courses			
Rules for the choice of courses			
1 course of your choice			
Compulsory attendance			
The examination performance requires active participation in the block seminars, especially in the context of group presentations and individual contributions. An assessment of the examination performance is only possible if these contributions are made in the seminar. Participation is therefore necessary for reasons of assessability.			
Name of the course	SWS	Eventtype	Language
Ethical leadership, sustainable action: Practical perspectives on organisation and society	3,0	Seminar	english german

Title	Innovation and Societal Change		
Number	2224000050	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Prerequisite for the module is a basic knowledge of business administration in the field of business ethics.		
Expected performance/ Type of examination	1 written exam (90 minutes) or 1 take-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 written exam (90 minutes) or 1 take-home exam		
Contents			
Innovation and Societal Change This module explores the interconnections between innovation, digitalisation, and societal transformation. It examines ethical challenges related to technological developments and analyses the role of organisations as key actors in driving societal change.			
Objective qualification			
Innovation and Social Change After completing this module, students will have an in-depth understanding of the organization and processes within and between companies. They will learn how to systematically develop and maintain a company's knowledge base. Students will be able to explain the actions and behavior of organizational members and understand organizations as socio-technical systems.			
Literature			
Innovation and Social Change • Becker, C. U. (2024). Business ethics: Methods, theories and application (2nd ed.). Routledge. • Holmes, W., & Porayska#Pomsta, K. (Eds.). (2023). The Ethics of Artificial Intelligence in Education: Practices, Challenges, and Debates (1st ed.). Routledge. • Hope, A., & Laasch, O. (2024). Responsible business: Foundations of ethical and sustainable management (3rd ed.). Routledge. • Moriarty, J. (2022). Business ethics: A contemporary introduction (1st ed.). Routledge. • Schoenherr, J. R. (2022). Ethical artificial intelligence from popular to cognitive science: Trust in the age of entanglement (1st ed.). Apress.			



Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Innovation and Societal Change	4,0	Lecture/Exercise	english german

Title	Consumer Behaviour & Sales Management		
Number	2221000000	Module version	V1
Shorttext		Language	english 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 / 5,0	Module owner	Prof. Dr. Christof Backhaus
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 exam (120 min)		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min)		
Contents			
Selected content - depending on the event selection: Special features of international marketing Consumer behaviour and organisational buying behaviour Techniques of data collection and data analysis in marketing			
Objective qualification			
Students understand the central importance of sales management as a strategic pillar for generating revenue, acquiring customers, and fostering long-term customer loyalty. They recognize the role of sales as a crucial interface between the company and the market, as well as a key instrument for implementing marketing strategy, particularly in the context of personal customer relationships. In addition, they are familiar with key concepts and theories of consumer behavior and can apply them to practical issues. Students acquire conceptual and analytical skills that enable them to critically reflect on and independently evaluate empirical research—both with a view to further academic qualifications and for application in business practice.			
Literature			
• Johnston, Mark W., Marshall, Greg W. & Ogilvie, Jessica L. (2025). Sales Force Management – Leadership, Innovation, Technology, 14. ed., New York: Routledge. • Michael R. Solomon, CristelAntonia Russell (2024): Consumer Behavior: Buying, Having, and Being. Global Edition. 14. Auflage, Pearso • Foscht, T., Swoboda, B. und Schramm-Klein, H. (2017): KonsumentenverhaltenGrundlagen–perspektiven, Anwendungen, 6. Auflage, Wiesbaden. •			



Related courses			
Rules for the choice of courses			
Both events are a must.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Consumer Behaviour	2,0	Lecture	german
Sales Management	2,0	Lecture	german
Literature			
• Johnston, Mark W. and Marshall, Greg W. (2021). Sales Force Management – Leadership, Innovation, Technology, 13th ed., New York: Routledge. • as well as further reading for the individual chapters, as listed in the course materials.			
Sales Management	2,0	Exercise	german
Literature			
• Johnston, Mark W. and Marshall, Greg W. (2021). Sales Force Management – Leadership, Innovation, Technology, 13th ed., New York: Routledge. • as well as further reading for the individual chapters, as listed in the course materials.			

Title	Cost-benefit analysis		
Number	2212000010	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 Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Felix Rösel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Contents			
Selected topics from cost-benefit analysis: • Fundamentals of welfare theory • Theory of cost-benefit analysis (and other ex-ante analysis methods) • Application of cost-benefit analysis in transportation, health, the environment, and other areas			
Objective qualification			
Students are knowledgeable about the theoretical foundations and empirical implementation of economic methods for evaluating economic policy measures. In particular, they are proficient in ex ante analysis methods (especially cost-benefit analysis) and are able to independently develop and critically evaluate suitable study and research designs for current economic policy issues.			
Literature			
Cost-benefit analysis: Boardman, Anthony, Greenberg, David, Vining, Aidan, Weimer, David: Cost-Benefit Analysis: Concepts and Practice, Pearson New International Edition, current edition.Hanusch, Horst: Benefit-Cost Analysis, Vahlen, current edition.Pindyck, Robert S., Rubinfeld, Daniel L.: Mikroökonomie, Pearson Studium, current edition.			



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

Cost-Benefit Analysis	4,0	Lecture/Exercise	german
Literature			
• Boardman, Anthony, Greenberg, David, Vining, Aidan, Weimer, David: Cost-Benefit Analysis: Concepts and Practice, Pearson New International Edition, latest edition • Hanusch, Horst: Cost-Benefit Analysis, Vahlen, latest edition • Pindyck, Robert S., Rubinfeld, Daniel L.: Microeconomics, Pearson Studium, latest edition			

Title	Management of industrial production systems		
Number	2220000030	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
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), particularly in the areas of production and logistics management, operations research and statistics		
Expected performance/ Type of examination	1 Portfolio oder 1 Take-Home-Examen		
Course achievement	only for Organisation, Governance, Education instead of the exam: 1 Portfolio oder 1 Take-Home-Examen		
Contents			
The lecture 'Management of Industrial Production Systems' covers the business evaluation, model-based planning and design of production facilities and systems throughout their life cycle. The focus is on project management in plant engineering, investment and cost estimation methods, investment decisions taking uncertainties into account, capacity planning and the configuration of production systems. In addition, maintenance strategies and their influence on system performance are analysed. Students learn to abstract and structure complex decision-making problems in production systems and to apply quantitative methods for analysis, evaluation and design in a targeted manner. Accompanying the lecture, the seminar involves the development and step-by-step analysis of a case study in which the methods taught are applied, explored in greater depth and reflected upon. The course integrates analysis, evaluation and decision-making into a coherent approach and is supplemented by practical examples and discussions.			
Objective qualification			
Upon successful completion of the module, students will be able to ... explain and apply fundamental concepts, models and methods for the planning and design of production systems throughout their life cycle apply and adapt methods of investment appraisal, cost estimation and capacity planning to practical problems analyse production systems in a structured manner and identify key factors influencing their performance, apply quantitative evaluation methods and optimisation models to assess alternative design and decision-making options in uncertain market conditions.			

reflect on, apply and transfer the knowledge acquired to practical examples and real-life decision-making situations by working on an accompanying case study.

Literature

Dyckhoff, H.; Spengler, T. S. (2010): Production Management. Berlin, Heidelberg: Springer Berlin Heidelberg.

Geldermann, J. (2014). Plant and Energy Management: Cost and Investment Estimation and Technical Evaluation of Industrial Plants. Munich: Vahlen

Günther, H.O.; Tempelmeier, H. (2016): Production and Logistics, 12th edition, Springer-Verlag, Berlin.

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.



Related courses

Rules for the choice of courses

Compulsory lecture

Compulsory attendance

Name of the course	SWS	Eventtype	Language
Management of industrial production systems	2,0	Lecture/Exercise	german

Literature

- Dyckhoff, H.; Spengler, T. S. (2010): Production Management. Berlin, Heidelberg: Springer Berlin Heidelberg.
- Geldermann, J. (2014). Plant and Energy Management: Cost and Investment Estimation and Technical Evaluation of Industrial Plants. Munich: Vahlen
- Günther, H.O.; Tempelmeier, H. (2016): Production and Logistics, 12th edition, Springer-Verlag, Berlin.

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	Machine learning and data science in the financial sector		
Number	2215000050	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 Finanzwirtschaft
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Marc Gürtler
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement	For Organization, Governance, and Education, instead of the exam: 1 written exam (120 min) or 1 take-at-home exam		
Contents			
• Methods for analyzing cross-sectional data sets (multivariate linear regression) • Methods for analyzing panel data sets • Application of the methods to selected issues in financial risk management • Presentation of practical examples using relevant standard software			
Objective qualification			
Students are familiar with relevant methods for examining and analyzing cross-sectional data sets. In particular, students gain in-depth insights into the estimation and inference of multivariate linear regressions. Students will learn methods for examining and analyzing panel data sets. They will be able to apply the methods learned to issues in financial risk management and gain in-depth insights into the empirical analysis of financial instruments and current projects at the institute.			
Literature			
• Hastie et al. (2009): The Elements of Statistical Learning • James et al. (2021): An Introduction to Statistical Learning • Ergänzende Literatur wird über Stud.IP bereitgestellt			



Related courses			
Rules for the choice of courses			
The course Empirical Finance is required. The colloquium is optional.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Machine learning and data science in the financial sector	4,0	Lecture/Exercise	german
Literature			
See the department's website			
Master's Specialisation in Finance (Colloquium)	2,0	Colloquium	german

Title	Nachhaltigkeit in Produktions- und Logistiksystemen		
Number	2220000020	Module version	V2
Shorttext		Language	english 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
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), particularly in the areas of production and logistics management, as well as operations research and statistics.		
Expected performance/ Type of examination	1 Portfolio oder 1 Take-Home-Examen		
Course achievement	only for Organisation, Governance, Education instead of the exam: 1 Portfolio oder 1 Take-Home-Examen		
Contents			
The module 'Sustainability in Production and Logistics Systems' covers fundamental concepts, methods and areas of application for designing sustainable production and logistics systems. It addresses key concepts of sustainable development, their application in an industrial context, as well as corporate sustainability strategies and relevant political and regulatory frameworks. The focus is on the modelling, analysis and assessment of energy and material flows as the basis for designing sustainable systems. Selected aspects of the circular economy are also covered. Methodological priorities include life-cycle-based sustainability assessment (LCSA) for analysing ecological, economic and social impacts, as well as multi-criteria decision-making (MCDM) methods for the structured evaluation of alternative courses of action and the derivation of well-founded decisions. Accompanying the lecture, the seminar involves the development and step-by-step analysis of a case study in which the methods taught are applied, explored in depth and reflected upon. The course integrates analysis, assessment and decision-making into a coherent approach and is supplemented by practical examples and discussions.			
Objective qualification			
The Production and Logistics specialisation builds on the quantitative and qualitative methods of economics learned in the orientation. The methods learnt are extended and further methods are introduced. Furthermore, additional subject areas are addressed in which the methods are applied. The course enables students to independently apply and develop quantitative and qualitative methods in economics. In addition, students will be able to apply and adapt the methods they have learnt in cooperation with different subject areas to the specific challenges of the subject.			
Literature			
Textbooks and further reading will be given in the lectures			



Related courses			
Rules for the choice of courses			
The lecture is compulsory			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Sustainability in Production and Logistics	2,0	Lecture	german
Literature			
- Baumast, A.; Pape, J. (2008): Betriebliches Umweltmanagement: Nachhaltiges Wirtschaften in Unternehmen, Eugen Ulmer: Stuttgart - Deutsches Institut für Normung (2006): Umweltmanagement – Ökobilanz – Anforderungen und Anleitungen (ISO 14044:2006). Beuth-Verlag. Berlin. Ausgabedatum: 2006-10 - Erbguth, W.; Schlacke, S. (2010): Umweltrecht, Nomos: Baden-Baden - Spengler, T. (1998): Industrielles Stoffstrommanagement, Erich Schmidt: Berlin - Walther, G. (2010): Nachhaltige Wertschöpfungsnetzwerke – Überbetriebliche Planung und Steuerung von Stoffströmen entlang des Produktlebenszyklus, Gabler-Verlag: Wiesbaden.			
Exercise on asset management and sustainability in production and logistics	2,0	Exercise	german
Literature			
- Bernecker (2013): Planung und Bau verfahrenstechnischer Anlagen: Projektmanagement und Fachplanungsfunktionen, 4. Auflage, Springer-Verlag, Berlin. - Bronner (2001): Industrielle Planungstechniken: Unternehmens-, Produkt- und Investitionsplanung, Kostenrechnung und Terminplanung, Springer-Verlag, Berlin. - Geldermann, Jutta (2014): Anlagen- und Energiewirtschaft – Kosten- und Investitionsschätzung sowie Technikbewertung von Industrieanlagen, Verlag Franz Vahlen, München. - Günther, Hans-Otto; Tempelmeier, Horst (2016): Produktion und Logistik, 12. Auflage, Springer-Verlag, Berlin. - Thonemann, Ulrich (2015): Operations Management – Konzepte, Methoden und Anwendungen, 3. Auflage, Pearson Studium, München. - Birolini, Alessandro (2017): Reliability Engineering: Theory and Practice, 8. Auflage, Springer-Verlag, Berlin. - Peters et al. (2003): Plant Design and Economics for Chemical Engineers, 5th Edition, McGraw-Hill, New York.			

Title	Operations Management in the Automotive Industry		
Number	2220000010	Module version	V2
Shorttext		Language	english
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 / 5,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), particularly in the areas of production and logistics management, as well as operations research and statistics.		
Expected performance/ Type of examination	1 exam 120 (min) or 1 take-at-home exam (on the 2 lectures of the chosen combination)		
Course achievement	only for Organisation, Governance, Education instead of the exam: 1 Portfolio oder 1 Take-Home-Examen		
Contents			
The module 'Operations Management in the Automotive Industry' covers advanced concepts and methods for the application-specific planning of production systems in the automotive industry. These range from strategic (network planning) and tactical (assembly line balancing) to operational (assembly line sequencing) issues. In addition, current issues in the automotive industry are addressed and translated into the relevant planning problems and models. The focus is on the modelling, analysis and optimisation of production systems in the automotive industry. The methodological focus of the course lies in the modelling and mathematical optimisation of complex real-world problems to support decision-making and derive alternative courses of action. To complement the lecture, the seminar focuses on the application and further development of mathematical optimisation models, as well as simulation exercises in which the methods taught are applied, explored in greater depth and reflected upon.			
Objective qualification			
Upon successful completion of the module, students will be able to ... • identify and explain the planning problems specific to the automotive industry, as well as their interdependencies. • interpret and analyse verbal descriptions of planning problems. • develop mathematical models based on the verbal problem statements. • describe and evaluate the limitations of manual planning approaches. • explain the benefits of computer-aided modelling environments. • classify and critically reflect on current industrial developments and research findings in the subject area. • apply, deepen and reflect on their knowledge within the context of the practical exercises.			
Literature			

- Meyr, H. (2004): Supply chain planning in the German automotive industry, in: OR Spectrum, Vol. 26, No. 4, pp. 447-470
- Boyer, K.; Leong, G. K. (1996): Manufacturing flexibility at the plant level, in: Omega, Vol. 24, No. 5, pp. 495-510.
- Fleischmann, B. et al. (2006): Strategic Planning of BMWs Global Production Network, in: Interfaces, Vol. 36, No. 3, pp. 194-208
- Boysen et al. (2007): A classification of assembly line balancing problems, in: European Journal of Operational Research, Vol. 183, No. 2, pp. 674-693
- Boysen, N.; Fliedner, M.; Scholl A. (2009): Sequencing mixed-model assembly lines: survey, classification and model critique. In: European Journal of Operational Research, 192, pp. 349-373.

Further textbooks and recent 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.



Related courses			
Rules for the choice of courses			
Compulsory lecture			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Operations Management in the Automotive Industry	4,0	Lecture/Exercise	english
Literature			
Examples:			
• Meyr, H. (2004): Supply chain planning in the German automotive industry, in: OR Spectrum, Vol. 26, No. 4, pp. 447-470 (online available) • Brabazon, P. G.; MacCarthy, B. (2004): Virtual-build-to-order as a mass Customization order fulfilment model, in: Concurrent Engineering Research and Applications, Vol. 12, No. 2, pp. 155-165 (online available) • Boysen et al. (2007): A classification of assembly line balancing problems, in: European Journal of Operational Research, Vol. 183, No. 2, pp. 674-693 (online available) • Boyer, K.; Leong, G. K. (1996): Manufacturing flexibility at the plant level, in: Omega, Vol. 24, No. 5, pp. 495-510. • Fleischmann, B. et al. (2006): Strategic Planning of BMWs Global Production Network, in: Interfaces, Vol. 36, No. 3, pp. 194-208			

Exercise Supply Chain Management & Operations Management in the Automotive Industry	2,0	Exercise	english
Literature			
Examples: • Meyr, H. (2004): Supply chain planning in the German automotive industry, in: OR Spectrum, Vol. 26, No. 4, pp. 447-470 (online available) • Brabazon, P. G.; MacCarthy, B. (2004): Virtual-build-to-order as a mass Customization order fulfilment model, in: Concurrent Engineering Research and Applications, Vol. 12, No. 2, pp. 155-165 (online available) • Boysen et al. (2007): A classification of assembly line balancing problems, in: European Journal of Operational Research, Vol. 183, No. 2, pp. 674-693 (online available) • Boyer, K.; Leong, G. K. (1996): Manufacturing flexibility at the plant level, in: Omega, Vol. 24, No. 5, pp. 495-510. • Fleischmann, B. et al. (2006): Strategic Planning of BMWs Global Production Network, in: Interfaces, Vol. 36, No. 3, pp. 194-208			

Title	Organization and Changemanagement		
Number	2223000000	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 Management
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Dietrich von der Oelsnitz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A requirement for this module is a basic understanding of business administration, specifically in the areas of management and organization.,		
Expected performance/ Type of examination	1 written exam (90 minutes) or 1 take-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 written exam (90 minutes) or 1 take-home exam		
Contents			
Practical and theoretical knowledge in the areas of organization, the management of teams, and interorganizational networks are covered.			
Objective qualification			
After completing this module, students will have an in-depth understanding of the organization and processes within and between companies. They will learn how to systematically develop and maintain a company's knowledge base. Students will be able to explain the actions and behavior of organizational members and understand organizations as socio-technical systems.			
Literature			
• Oelsnitz, D. von der (2009): Die innovative Organisation, 2. Aufl., Stuttgart. • Schulte-Zurhausen, M. (2014): Organisation, 6. Aufl., München. • Schreyögg, G. (2024): Organisation, 7. Aufl., Wiesbaden.			



Related courses			
Rules for the choice of courses			
Lecture & seminar required			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Organisation and Change	4,0	Lecture/Exercise	german
Literature			
• Oelsnitz, D. von der (2009): Die innovative Organisation, 2. Aufl., Stuttgart. • Schulte-Zurhausen, M. (2014): Organisation, 6. Aufl., München. • Schreyögg, G. (2024): Organisation, 7. Aufl., Wiesbaden.			

Title	Planning of Mobility and Transportation and Intelligent Data Analysis		
Number	2218000020	Module version	V2
Shorttext		Language	english
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 / 5,0	Module owner	Prof. Dr. Dirk Mattfeld
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Module “Quantitative Methods in Economics”, in particular the lectures on “Operations Research” and “Statistics”		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	only for Organisation, Governance, Education instead of the exam: 1 exam (120 min) or 1 take-at-home exam		
Contents			
Planning of Mobility and Transportation •Modeling of logistics networks •Network algorithms •Location planning •Transportation planning •TSP and VRP Intelligent Data Analysis •Data Mining •Pattern recognition •Regression •Decision trees and regression trees •Neural networks			
Objective qualification			
Students have a comprehensive understanding of models and methods used in mobility and transportation planning. They are able to apply the knowledge they have acquired to other areas of business planning. Students have a comprehensive understanding of models and methods used in data analysis and decision support. They are familiar with algorithmic approaches to system analysis and the generation of recommendations for action.			
Literature			
See course listings for sample literature.			



Related courses			
Rules for the choice of courses			
Both lectures are required.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Intelligent Data Analysis	2,0	Lecture	english
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			
Planning for Mobility and Transportation Purposes	2,0	Lecture	english
Literature			
Mattfeld, D.; Vahrenkamp, R.: Logistiknetzwerke. Springer Gabler, 2014.			

Title	Principles of Strategy & Entrepreneurship		
Number	2225000000	Module version	
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam + Presentation (Portfolio)		
Course achievement			
Contents			
In our research-oriented master's course “Principles of Strategy & Entrepreneurship,” we will explore core issues of strategic management and examine the process of founding new companies. The course covers seven main areas: 1. Fundamentals: Origins of the concept of strategy 2. Strategy and economics: Influence of classical economics on the concept of strategy 3. Strategy formation: Different perspectives on the strategy formation process 4. Competitive strategies: Strategy in competitive contexts 5. Cooperative strategies: Strategies in cooperative contexts 6. Strategic entrepreneurship: Strategic perspectives on the creation of new businesses 7. Digital strategy: Digital platform strategies.			
Objective qualification			
After completing this course, students should be able to: 1. Understand the development of the concepts of strategy and entrepreneurship, 2. Read and critically analyze academic literature, 3. Develop and discuss conceptual arguments, and 4. Translate research findings into practical implications. These skills prepare students not only for future research-related activities (e.g., master's theses, doctorates), but also for career opportunities in consulting, strategy departments, start-ups, business development, and general management.			
Literature			
will be announced at the start of the course.			



Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
No			
Name of the course	SWS	Eventtype	Language
Principles of Strategy & Entrepreneurship	4,0	Lecture/Exercise	english
Literature			
will be announced at the beginning of the course			

Title	Law of Digitalisation		
Number	2216000020	Module version	V3
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke Prof. Dr. Sarah Rachut
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Basic knowledge from the module Fundamentals of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
In the Law of Digitalisation module, the fundamentals of this area of law are divided between the courses 'IT, AI and Data Law' and 'IT Security Law'. In the wake of ubiquitous digitalisation, the way we communicate, evaluate information, work and consume has changed fundamentally. The IT, AI and Data Law lecture therefore deals with the legal requirements of digital transformation. Students learn the legal basis for data use and compliance with data protection law. They learn the basics of copyright law and what needs to be taken into account from a legal perspective when creating a web presence (homepage, web shop, social media account). They are also made aware of the risks of warnings in online distribution. Finally, the lecture on IT security law takes a closer look at (global) developments in cyber attacks and traces the associated regulatory developments at national and EU level. Students learn about the rights and obligations of the parties involved and are able to evaluate IT security risks from a legal perspective (in particular civil and criminal liability issues) . The lecture takes a holistic approach and enables students to independently develop scientific and practice-oriented solutions in conjunction with the relevant specialist literature in order to supervise the necessary IT steps. The lectures are interactive and offer opportunities for discussion. The topics discussed are illustrated using numerous practical cases.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant company/product/production design (compliance).			

After completing the module Law of Digitalisation, students will be able to independently find the relevant specialist laws and standards and solve legal issues in IT, AI and Data Law as well as IT security law by working with the law.

Literature

Legal Codes, each in their current edition:

- Datenschutzrecht, dtv. Beck
- IT- und Computerrecht, dtv. Beck

Textbooks, each in the current edition:

- Informations- und Kommunikationsrecht
- Kühling/Klar/Sackmann, Datenschutzrecht
- Hornung/Schallbruch (Hrsg.) IT-Sicherheitsrecht



Related courses

Rules for the choice of courses

Both events must be visited.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
IT- and Data Law	2,0	Lecture	german
Literature			
This will be announced during the lecture.			
IT Security Law	2,0	Lecture	german

Title	Risk management and sustainability		
Number	2215000060	Module version	V2
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Marc Gürtler
Workload (h)			
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (120 min) or 1 take-at-home exam		
Course achievement	For Organization, Governance, and Education, instead of the exam: 1 written exam (120 min) or 1 take-at-home exam		
Contents			
• Management of Interest Rate Risk • Management of Equity Price Risk (Portfolio Management) • Management of Currency Risk • Management of Credit Risk in Banks • Valuation of Financial Instruments Under Risk			
Objective qualification			
Students will acquire knowledge in the measurement, valuation, and management of financial risks and will be able to apply this knowledge to issues faced by banks and insurance companies on the one hand, and industrial enterprises on the other. In particular, students gain in-depth insights into the topics of “credit risk,” “interest rate risk,” “currency risk,” and “equity price risk.”			
Literature			
• Gürtler (2013): Financial Risk Management • Breuer (2000): Corporate Currency Management • Breuer/Gürtler/Schuhmacher (2010): Portfolio Management I • Breuer/Gürtler (2003): International Management • Hartmann-Wendels/Pfingsten/Weber (2007): Banking			



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

Financial Risk Management	4,0	Lecture/Exercise	german
Literature			
vergleiche Homepage des Lehrstuhls			
Risk Management and Sustainability	4,0	Lecture/Exercise	german
Literature			
See the department's website			

Title	Urban and Regional Economics		
Number	2212000000	Module version	V2
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Volkswirtschaftslehre
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Felix Rösel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 written exam (90 mins) or 1 oral exam (30 mins) or 1 take-at-home exam		
Contents			
Selected topics from urban and regional economics: Location theories Spatial structure and sector theories Regional economic growth theories			
Objective qualification			
Students have an in-depth understanding of the spatial dimension of economic activity. They have a firm grasp of theories relating to location choice (transport costs, agglomeration benefits, natural resources), theories on spatial structures and industries, as well as regional economic development, and apply these independently to new issues. Students are familiar with research findings and methods, thereby extending their existing economic knowledge to issues in regional studies and regional policy.			
Literature			
- Farhauer, Oliver, Kröll, Alexandra: Location theories: Regional and urban economics in theory and practice, Springer, current edition. - Maier, Gunther, Tödtling, Franz: Stadt- und Regionalökonomik 1: Standorttheorie und Raumstruktur, Springer, current edition.			

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Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Urban and Regional Economics	4,0	Lecture/Exercise	german
Literature			
- Farhauer, Oliver, Kröll, Alexandra: Location Theories: Regional and Urban Economics in Theory and Practice, Springer, latest edition - Maier, Gunther, Tödtling, Franz: Urban and Regional Economics 1: Location Theory and Spatial Structure, Springer, latest edition.			

Title	Strategic Brand Management: Concepts and Applications		
Number	2201000030	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 / 5,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), for example in marketing.		
Expected performance/ Type of examination	1 Portfolio oder 1 Take-Home-Examen, oder 1 Klausur (120 min)		
Course achievement	for Organization, Governance, Education / MA Social Sciences instead of the examination performance: 1 Portfolio oder 1 Take-Home-Examen, oder 1 Klausur (120 min)		
Contents			
Lecture topics include: Seminar topics include: • Understanding brands and the importance of brands • The concept of brand awareness • Measuring brand associations • Secondary brand associations • Tools for building brand associations • Brand strategy and positioning • Brand architecture • Measuring brand performance • International brand management • Internal brand management • Organizational aspects of brand management • Sector-specific characteristics in retail, industrial goods, and the luxury sector. Working on a real-world practical problem in the field of brand management in cooperation with a corporate partner			
Objective qualification			
Upon successful completion of the course, students will have a fundamental understanding of brands and knowledge of the factors that play a role in brand development. Furthermore, they understand and can critically discuss how brands are developed and positioned, as well as which tools are suitable for these purposes. They can use theory to explain why certain brand-related measures are expected to be effective and possess the methodological knowledge to measure the brand and quantify influencing factors. Students can formulate precise problems and research questions based on a complex practical issue in the field of brand management and develop a solution using the content and methods learned in the lecture.			
Literature			

- Keller, Kevin L. und V. Swaminathan (2019): Strategic Brand Management - Building, Measuring, and Managing Brand Equity, 5th ed., Prentice Hall
- Supplementary journal paper per chapter
- Lecture notes for download.
- Supplementary information and literature as bibliography and/or download for the exercise.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Strategic Brand Management: Concepts and Applications	4,0	Lecture/Exercise	german

Title	Strategic Innovation Management		
Number	2225000010	Module version	
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Bastian Kindermann
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam + Presentation (Portfolio)		
Course achievement			
Contents			
The master's course "Strategic Innovation Management" offers participants a holistic orientation for the process of innovation management. The course content covers topics such as strategy development, the creation of innovation-oriented corporate cultures and leadership, and expansion into global markets. In addition, specific innovation strategies related to open innovation and (digital) platforms are discussed.			
Objective qualification			
After completing this course, participants should be able to: 1. Understand key concepts of strategy and innovation management, 2. Systematically develop and manage innovation processes, 3. Actively shape innovation-friendly structures and cultures in organizations, 4. Develop practical competition and innovation strategies. These skills prepare participants not only for future research-related work (e.g., master's theses, doctorates), but also for career opportunities in innovation and strategy departments, in startups, in management consulting, as well as in business development and general management.			
Literature			
wird zu Beginn der Veranstaltung bekanntgegeben.			



Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
No			
Name of the course	SWS	Eventtype	Language
Strategic Innovation Management	4,0	Lecture/Exercise	english
Literature			
will be announced at the beginning of the course			

Title	Strategic Business Ethics		
Number	2224000040	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	
Module duration	1	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Prerequisite for the module is a basic knowledge of business administration in the field of business ethics.		
Expected performance/ Type of examination	1 term paper or 1 presentation or 1 written exam (90 min) or 1 oral exam or 1 portfolio or 1 take-at-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 term paper or 1 presentation or 1 written exam (90 min) or 1 oral exam or 1 portfolio or 1 take-at-home exam		
Contents			
This module addresses strategic aspects of business ethics, with a particular focus on corporate social responsibility (CSR), global responsibility, and ethical challenges in business decision-making within international and digital contexts.			
Objective qualification			
Strategic Business Ethics Depending on their individual focus, students acquire in-depth theoretical and practical knowledge in strategic business ethics. They are able to apply and critically evaluate or question ethical concepts in the areas of responsible leadership, ethically informed decision-making processes, and sustainable business practices in a digital and global context.			
Literature			
Strategic Business Ethics • Becker, C. U. (2024). Business ethics: Methods, theories and application (2nd ed.). Routledge. • Dathe, T., Dathe, R., Dathe, I., & Helmold, M. (2022). Corporate social responsibility (CSR), sustainability and environmental social governance (ESG): Approaches to ethical management. Routledge. • Moriarty, J. (2022). Business ethics: A contemporary introduction (1st ed.). Routledge. • Schein, E. H., & Schein, P. (2018). Organisationskultur und Leadership (5. Aufl.). Vahlen. • von der Oelsnitz, D. (2022). DeMUT: Leise Führung für eine laute Zeit. Vahlen.			



Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
The course grade requires active participation in the block sessions, particularly in the group presentation and individual contributions. The course grade can only be determined if these contributions are made during the seminar. Participation is therefore required for the course to be graded.			
Name of the course	SWS	Eventtype	Language
Strategic Business Ethics	4,0	Lecture/Exercise	english german

Title	Supply Chain Management		
Number	2220000000	Module version	V2
Shorttext		Language	english
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 / 5,0	Module owner	Prof. Dr. Thomas Spengler
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A prerequisite for this module is a basic knowledge of economics (at Bachelor's level), particularly in the areas of production and logistics management, as well as operations research and statistics.		
Expected performance/ Type of examination	1 Portfolio oder 1 Take-Home-Examen		
Course achievement	only for Organisation, Governance, Education instead of the exam: 1 Portfolio oder 1 Take-Home-Exame		
Contents			
The ‘Supply Chain Management’ module covers advanced concepts and methods for the design, planning and control of industrial supply chains. The scope of the module extends beyond individual companies to encompass the integrated analysis of material, information and financial flows along the entire value chain, from suppliers to end customers. The focus is on the efficient interaction of the stakeholders involved, as well as approaches to increasing the overall profitability of the supply chain. The module centres on fundamental concepts of supply chain management, their strategic significance, and approaches to achieving strategic coordination within the supply chain. Furthermore, dynamic effects in supply chains are analysed and measures to improve operational performance are discussed. Methodological priorities include the application of coordination mechanisms to align decentralised decisions and their evaluation in terms of the overall profitability of the supply chain. Furthermore, approaches to the design and optimisation of supply chain networks based on mathematical modelling are taught in order to establish sound decision-making foundations and systematically evaluate alternative courses of action.			
Objective qualification			
Upon successful completion of the module, students will be able to ... - understand the fundamental concepts of supply chain management, explain their strategic relevance, and identify ways to achieve strategic alignment - analyse dynamic effects in supply chains and apply measures to improve operational performance - apply coordination mechanisms and assess their impact on the overall profitability of the supply chain - design supply chain networks using mathematical modelling approaches - to contextualise and critically reflect on current industrial developments and research findings in the field - to apply the concepts learnt to practical case studies and to reflect on the content within the framework of interactive teaching formats			

Literature

- Chopra, S./Meindl, P. (2016): Supply Chain Management – Strategy, Planning, and Operation. Pearson
- Shapiro, Jeremy F. (2006): Modeling The Supply Chain, Duxbury/Thomson Learning
- Simchi-Levi, D.; Kaminsky, P. and Simchi-Levi, E. (2007): Designing and Managing the Supply Chain: Concepts, Strategies, and Case studies, McGraw-Hill/Irwin
- Stadtler, H. and Kilger, C. (2014): Supply Chain Management and Advanced Planning, Springer
- Thonemann, U. (2003): Supply Chain Champions, Gabler
- Thonemann, U. (2015): Operations Management, Pearson Studium

Further textbooks and recent 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.

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

The lecture is compulsory

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

Supply Chain Management

4,0

Lecture/Exercise

english

Literature

- Chopra, S./Meindl, P. (2016): Supply Chain Management – Strategy, Planning, and Operation. Pearson
- Shapiro, J. (2006): Modeling The Supply Chain, Duxbury/Thomson Learning
- Simchi-Levi, D./Kaminsky, P./Simchi-Levi, E. (2007): Designing and Managing the Supply Chain: Concepts, Strategies, and Case studies, McGraw-Hill/Irwin
- Stadtler, H./Kilger, C. (2007): Supply Chain Management and Advanced Planning, Springer

Exercise Supply Chain Management & Operations Management in the Automotive Industry

2,0

Exercise

english

Literature

Examples:

- Meyr, H. (2004): Supply chain planning in the German automotive industry, in: OR Spectrum, Vol. 26, No. 4, pp. 447-470 (online available)
- Brabazon, P. G.; MacCarthy, B. (2004): Virtual-build-to-order as a mass Customization order fulfilment model, in: Concurrent Engineering Research and Applications, Vol. 12, No. 2, pp. 155-165 (online available)
- Boysen et al. (2007): A classification of assembly line balancing problems, in: European Journal of Operational Research, Vol. 183, No. 2, pp. 674-693 (online available)
- Boyer, K.; Leong, G. K. (1996): Manufacturing flexibility at the plant level, in: Omega, Vol. 24, No. 5, pp. 495-510.
- Fleischmann, B. et al. (2006): Strategic Planning of BMWs Global Production Network, in: Interfaces, Vol. 36, No. 3, pp. 194-208

Title	Sustainability Transformation Management		
Number	2221000010	Module version	V1
Shorttext		Language	english
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 / 5,0	Module owner	Prof. Dr. Christof Backhaus
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Lecture: 1 exam (60 min) and Exercise: two oral presentations		
Course achievement	1 exam (60 min) and: two oral presentations (exercise - frequency of offer: every term) for Organisation, Governance, Education / MA Social Sciences instead of the examination additionally: 1 exam (60 min) and: two oral presentations (exercise - frequency of offer: every term)		
Contents			
Selected contents - depending on the course selection: • Historical developments and core concepts of sustainability • Business case and strategic relevance for companies • Transactional and strategic approaches in sustainability marketing • Consumer behavior, consumer reactions, and stakeholder management • In-depth study through application to a specific company example in the exercise			
Objective qualification			
Through this course, students acquire a comprehensive understanding of the concept of sustainability, including its environmental, social, and economic dimensions, as well as its relevance for business and society. They analyze the importance of sustainability for companies and marketing and are able to critically assess the strategic integration of sustainability initiatives. Furthermore, students are able to explain and evaluate consumers' perceptions of and responses to sustainability-oriented marketing approaches. They can identify key motives, drivers, and barriers of sustainable behavior from both a corporate and a consumer perspective and are able to conceptually frame transformation processes toward a sustainable economy, as well as develop and critically reflect on appropriate instruments for implementing and measuring the success of sustainability strategies.			
Literature			
• Ditlev-Simonsen, C. D. (2022). A Guide to Sustainable Corporate Responsibility: From Theory to Action. Springer Nature. • Hahn, R. (2022). Sustainability Management: Global Perspectives on Concepts, Instruments, and Stakeholders. Rüdiger Hahn. • Pufè, I. (2017). Nachhaltigkeit. utb. 3rd ed. • Lecture slides			

- Additional literature listed in the course materials for each chapter



Related courses			
Rules for the choice of courses			
The lecture and exercise Sustainability Transformation Management are compulsory.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Sustainability Transformation Management	2,0	Lecture	english
Exercise - Sustainability Transformation Management	2,0	Exercise	english

Title	Team and alliance management		
Number	2223000010	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 Management
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Dietrich von der Oelsnitz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A requirement for this module is a basic understanding of business administration, specifically in the areas of management and organization.		
Expected performance/ Type of examination	1 written exam (90 minutes) or 1 take-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 written exam (90 minutes) or 1 take-home exam		
Contents			
Depending on the chosen courses, practical and theoretical knowledge in the areas of organization and team management, as well as inter-organizational networks, are covered.			
Objective qualification			
After completing this module, students will have an in-depth understanding of the organization and processes within and between companies. They will learn how to systematically develop and maintain a company's knowledge base. Students will be able to explain the actions and behavior of organizational members and understand organizations as socio-technical systems.			
Literature			
• Oelsnitz, D. von der (2009): Die innovative Organisation, 2. Aufl., Stuttgart. • Schulte-Zurhausen, M. (2005): Organisation, 4. Aufl., München. • Schreyögg, G. (2008): Organisation, 5. Aufl., Wiesbaden. • Stock-Homburg, R. (2008): Personalmanagement, Wiesbaden. • Gemünden, H.G./Högl, M. (2005): Teamarbeit in innovativen Projekten, in: Högl, M./Gemünden, H.G. (Hrsg.): Management von Teams, 3. Aufl., Wiesbaden, S. 1-31.			



Related courses			
Rules for the choice of courses			
Lecture & exercise compulsory			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Team and Alliance Management	4,0	Lecture/Exercise	german
Literature			
This will be announced during the lecture.			

Title	Environmental and Technology Law		
Number	2216000000	Module version	V3
Shorttext		Language	english
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Rechtswissenschaften
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Anne Paschke
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Knowledge from the module Basics of Law is assumed.		
Expected performance/ Type of examination	1 exam (120 min) or 1 take-at-home exam		
Course achievement	for Organisation, Governance, Education / MA Social Sciences instead of the examination: 1 exam (120 min) or 1 take-at-home exam		
Contents			
The course covers the fundamentals of technology law and environmental law. Following an introduction to the historical and European and international legal principles of the aforementioned areas of law, the various aspects of these areas of law are examined in greater detail with reference to other fields such as natural sciences and economics. In each case, reference is made to the knowledge already acquired by the students. The environmental law lecture focuses in particular on construction and immission control law, recycling law, nature conservation law and climate protection law. The Technology Law lecture also addresses the law on industrial installations, product liability law, mobility law, product and device safety law, patent law, criminal law relating to technology, data protection law and the creation of technical standards.			
Objective qualification			
The courses teach the theoretical legal content listed below in order to enable graduates to independently identify the relevant legal standards in their respective fields, make subject-specific legal decisions taking into account the current legal situation, and present these decisions in writing and orally in a scientific and practice-oriented manner. Only an application-oriented, integrative consideration of legal requirements and technical processes enables legally compliant corporate/product/production design (compliance). After completing the Environmental and Technology Law module, students will be able to independently deal with specialist laws in environmental and technology law and identify relevant legal and technical standards. Technical case studies from other lectures or from students' internships will be taken up and jointly evaluated on the basis of the existing legal situation. This enables students to identify the relevant supervisory authorities and independently check whether their plant or machine requires official approval or whether it is subject to notification. In this context, the 'state of the art' as an important legal term is also brought to life with examples from technical practice in order to sensitise students to the need to take future developments into account. Furthermore, students learn about legal issues relating to mitigating the effects of climate change in order to better assess and implement their significance and consequences from an economic perspective. In addition, they learn about liability responsibilities and are able to identify liability and sanction risks in production processes.			

Literature

Legal Codes, each in their current edition:

- Umweltrecht dtv. Beck

Textbooks, each in the current edition:

- Ensthaler, Jürgen, Technikrecht: Rechtliche Grundlagen des Technologiemanagments
- Schlacke, Umweltrecht
- Rodi, Handbuch Klimaschutzrecht

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

Both events must be visited.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
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Environmental Law	2,0	Lecture	german
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Literature

This will be announced during the session.

Technology Law	2,0	Lecture	german
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Literature

This will be announced during the event.

Title	Business Ethics in Transformation: Responsibility, Decision-Making and Impact		
Number	2224000020	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Abteilung für Unternehmensethik, Nachhaltigkeit und Gesellschaftlichen Wandel
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Ann-Marie Nienaber
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Prerequisite for the module is a basic knowledge of business administration in the field of business ethics as well as in academic work, if applicable.		
Expected performance/ Type of examination	1 portfolio or 1 term paper or 1 presentation or 1 written exam (90 minutes) or 1 oral exam or 1 take-home exam		
Course achievement	For Organization, Governance, Education / MA Social Sciences instead of the exam: 1 portfolio or 1 term paper or 1 presentation or 1 written exam (90 minutes) or 1 oral exam or 1 take-home exam		
Contents			
This module provides students with both foundational and advanced knowledge of business ethics in the context of social and economic transformation processes. It focuses on ethical decision-making, organizational responsibility, and the assessment of a company's impact on society and the environment.			
Objective qualification			
The aim is to develop ethical judgement in order to be able to make responsible decisions in innovation and management processes. Current debates and practical examples encourage reflection on the contribution of organisations to value-oriented and sustainable change.			
Literature			
Specific references to literature on the respective topics will be presented and made available during the course of the seminar.			



Related courses			
Rules for the choice of courses			
Attendance is required			
Compulsory attendance			
The examination performance requires active participation in the block seminars, especially in the context of group presentations and individual contributions. An assessment of the examination performance is only possible if these contributions are made in the seminar. Participation is therefore necessary for reasons of assessability.			
Name of the course	SWS	Eventtype	Language
Business Ethics in Transformation: Responsibility, Decision-Making and Impact	3,0	Seminar	english german

Technology-oriented Management

Title	Waste and Resource Management		
Number	4398320	Module version	
Shorttext		Language	
Frequency of offer		Teaching unit	
Module duration	1	Institution	Abteilung Abfall- und Ressourcenwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Dr. Kai Münnich
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (90 Min.) or oral exam (approx. 30 Min.) (in the Master's programme in Social Sciences as a course achievement)		
Course achievement			
Contents			
Waste management concepts; acquisition logistics; plant and process technology (with focus on biological processes; methods for process control and monitoring; emission control; product development; secondary raw materials; methods for quality control of secondary raw materials; design principles, plant planning and design, and waste analytics.			
Objective qualification			
Students acquire in-depth knowledge of tasks and solution methods of municipal and industrial waste and resource management as well as material flow-related recycling management. The special focus is on biological treatment and recycling processes for municipal waste. Here, required work steps and methods for the implementation of management measures and plant technologies are learned. Evaluation methods for describing and assessing economic, ecological and social impacts are taught and applied. Special knowledge in the field of the use of regenerative energies from municipal waste is acquired. In this lecture, students will be able to use their acquired knowledge to evaluate waste management concepts and to perform rough measurements of selected process steps/aggregates			
Literature			
Detailed script, Powerpoint slides,			



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

Title	Digitalization in the Operation and Valuation of Real Estate		
Number	3341000030	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Tanja Kessel
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Facility Management: 1 written exam (60 min.) Value Assessment of Real Estate: 1 written exam (60 min.)		
Course achievement			
Contents			
In the lecture Facility Management, the focus is on the roles/functions, tasks/services and the operational organization form in the usage phase of real estate. In particular, digital processes, e.g., ticketing, fault reports, maintenance, are presented as part of a digital FM laboratory with in-depth insights into CAFM software and the resulting management tasks are derived. In the lecture Value Assessment of Real Estate, the various methods of value assessment in Germany and internationally are presented and applied using case studies. The basics of real estate market-related analyses are also taught.			
Objective qualification			
In Facility Management, students acquire in-depth knowledge of operator responsibility, roles, functions and processes in the operating phase for different types of use of real estate. In Value Assessment of Real Estate, students learn how to determine the market value of real estate using various calculation methods and are familiar with the parameters required for valuation.			
Literature			
Presentation slides of the lecture, exercises, bibliography			



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

	2,0	Lecture	german
	2,0	Block course	german

Title			
Number	1614710	Module version	
Shorttext		Language	english german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	
Hours per Week / ECTS	3 / 4,0	Module owner	Prof. Dr. Felix Rösel Prof. Dr. Anett Schallmey
Workload (h)	120		
Class attendance (h)	49 h	Self studying (h)	71 h
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
H. Patzelt, T. Brenner, Handbook of Bioentrepreneurship, Springer, 2008			
H. J. P. Schoemaker, A. F. Schoemaker, The three pillars of bioentrepreneurship, Nature Biotechnology, 1998, 16: 13-15			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
An Introduction to Bioentrepreneurship		Lecture/Exercise	english german

Title	Energy Economy and Market Integration of Renewables		
Number	2423460	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. Bernd Engel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 min) or oral exam (30 min)		
Course achievement			
Contents			
1. energy economics 2. energy policy 3. laws and subsidy systems 4. markets (electricity market 2.0, balancing power market) 5. direct marketing / balancing group management 6. virtual power plant 7. large-scale storage			
Objective qualification			
On completion of the module, students will have acquired knowledge of the energy industry in Germany. They will be able to evaluate and assess current developments in the markets. New technologies and research insights are integrated.			
Literature			
Marcel Linnemann: Energiewirtschaft für (Quer-)Einsteiger Tim Wawer: Elektrizitätswirtschaft			

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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

	2,0	Exercise	german
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Title	Energy Efficiency in Production Engineering		
Number	2522930	Module version	v2
Shorttext		Language	english
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			
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 20% of the respective grade.)		
Contents			
• Background and methods for the holistic planning, design and development of sustainable production systems • Definition of the term and origin of sustainability in production • Technologies and procedures for industrial data acquisition • Energetic evaluation of production processes on the basis of various key figures • Data analysis of production processes using Sankey diagrams in theory and practice • Analysis of production processes based on an (energy) value stream analysis • Analysis of the different levels of consideration of factories (production processes, technical building equipment, building envelope) and relevant material, energy and information flows • Guest lectures from industry on relevant topics of sustainable production systems • Gaining knowledge about energy flexibility in production • Practice-oriented application of various methods to increase energy efficiency in the IWF's learning factory			
Objective qualification			
The students... • ... explain the planning, design and development of sustainability-oriented production systems in different contexts • ... assess different strategies (e.g. efficiency strategy) and principles (e.g. avoidance principle) of sustainable development in defined use cases on a laboratory scale • ... evaluate existing production systems in economic, ecological and social dimensions • ... are able to illustrate the results of various efficiency strategies to non-experts and to apply relevant assumptions, restrictions and framework conditions correctly • ... design their own research questions within the team project, evaluate experiments and derive a presentation of the results of the research • ... organize themselves in a team project and gain experience in relevant soft skills such as teamwork, communication and presentation skills • ... analyze sustainability-oriented production systems within a given topic			

- ... are able to select relevant fields of action and measures for sustainable production

Literature

Vorlesungsskript "Energy Efficiency in Production Engineering" mit ausführlichen Quellenangaben für das Selbststudium

Herrmann, Christoph: Ganzheitliches Life Cycle Management, Berlin 2009

Dyckhoff, H. (2000): Umweltmanagement # Zehn Lektionen in umweltorientierter Unternehmensführung, Berlin: Springer-Verlag Berlin Heidelberg, 2000.

Günther, H.-O.; Tempelmeier, H. (2005): Produktion und Logistik. 6., verb. Aufl., [Hauptbd.], Berlin: Springer-Verlag Berlin Heidelberg, 2005.

Eversheim, W.; Schuh, G. (1999): Gestaltung von Produktionssystemen, VDI-Buch Nr. 3, Berlin: Springer-Verlag Berlin Heidelberg, 1999.

Remark

The course "Energy Efficiency in Production Engineering" is targeted in particular at students of mechanical engineering, industrial engineering, sustainable energy engineering, technology-oriented management, environmental engineering and other related courses.
This lecture is held in English.



Related courses

Rules for the choice of courses

Both courses have to be attended.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	english
	1,0	Team Project	english

Title	Energy Efficiency in Production Engineering with Laboratory		
Number	2522940	Module version	v2
Shorttext		Language	english
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	4 / 7,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	210		
Class attendance (h)	56	Self studying (h)	154
Compulsory requirements			
Expected performance/ Type of examination	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			
• Background and methods for the holistic planning, design and development of sustainable production systems • Definition of the term and origin of sustainability in production • Technologies and procedures for industrial data acquisition • Energetic evaluation of production processes on the basis of various key figures • Data analysis of production processes using Sankey diagrams in theory and practice • Analysis of production processes based on an (energy) value stream analysis • Analysis of the different levels of consideration of factories (production processes, technical building equipment, building envelope) and relevant material, energy and information flows • Guest lectures from industry on relevant topics of sustainable production systems • Gaining knowledge about energy flexibility in production • Practice-oriented application of various methods to increase energy efficiency in the IWF's learning factory • Evaluation of measures to increase energy flexibility through e.g. load profile analysis and energy portfolio			
Objective qualification			
The students... • ... explain the planning, design and development of sustainability-oriented production systems in different contexts • ... assess different strategies (e.g. efficiency strategy) and principles (e.g. avoidance principle) of sustainable development in defined use cases on a laboratory scale • ... evaluate existing production systems in economic, ecological and social dimensions • ... are able to illustrate the results of various efficiency strategies to non-experts and to apply relevant assumptions, restrictions and framework conditions correctly • ... design their own research questions within the team project, evaluate experiments and derive a presentation of the results of the research			

- ... organize themselves in a team project and gain experience in relevant soft skills such as teamwork, communication and presentation skills
- ... analyze sustainability-oriented production systems within a given topic
- ... are able to select relevant fields of action and measures for sustainable production

Through the lab, the students...

- ... become more confident with the topic of energy flexibility introduced in the lecture
- ... are able to use energy measuring devices independently
- ... understand the influence of volatile renewable energies and of environmental factors on production within a case study
- ... identify energy flexibilization potentials in production within a real example in the BatteryLab Factory

Literature

Vorlesungsskript "Energy Efficiency in Production Engineering" mit ausführlichen Quellenangaben für das Selbststudium

Herrmann, Christoph: Ganzheitliches Life Cycle Management, Berlin 2009

Dyckhoff, H. (2000): Umweltmanagement # Zehn Lektionen in umweltorientierter Unternehmensführung, Berlin: Springer-Verlag Berlin Heidelberg, 2000.

Günther, H.-O.; Tempelmeier, H. (2005): Produktion und Logistik. 6., verb. Aufl., [Hauptbd.], Berlin: Springer-Verlag Berlin Heidelberg, 2005.

Eversheim, W.; Schuh, G. (1999): Gestaltung von Produktionssystemen, VDI-Buch Nr. 3, Berlin: Springer-Verlag Berlin Heidelberg, 1999.

Remark

The course "Energy Efficiency in Production Engineering" is targeted in particular at students of mechanical engineering, industrial engineering, sustainable energy engineering, technology-oriented management, environmental engineering and other related courses.
This lecture is held in English.



Related courses

Rules for the choice of courses

All courses have to be attended.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	english
	1,0	Laboratory	english
	1,0	Team Project	english

Title	Development and Realization of Real Estate		
Number	3341000010	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	
Module duration	2	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Tanja Kessel
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Real Estate Project Development: 1 written exam (60 min.) Project Management in Construction: 1 oral exam+ (15 min.)		
Course achievement			
Contents			
Decisions in real estate project development are the trigger for planning and construction measures and have a considerable influence on the subsequent phases through to operation and demolition by defining different objectives. In the lecture Real Estate Project Development, the areas of development, revitalization and redevelopment are discussed in the field of tension between economic efficiency, ecological sustainability and social/sociocultural compatibility. Based on the determination of requirements and basic principles, in-depth insights into project development processes and fields of action are provided and development calculations are carried out. The impact of real estate on the SDGs is deepened through insights into the circular economy and sustainability assessment. The lecture Project Management in Construction shows the organizational, structural and methodological connections for successful project implementation. In addition to an effective client organization, various methods, concepts and tools for stakeholder and risk management, scheduling and cost planning and control as well as quality management are presented. While some of the students apply what they have learned in role plays, students of waterway engineering gain an in-depth insight into the processes and organization of the waterways and shipping administration as well as the technical and legal challenges of water transport construction projects.			
Objective qualification			
In the lecture Real Estate Project Development, students gain well-founded knowledge about real estate in the area of conflict between economy, ecology and society from the perspectives of the various stakeholders. They learn tools and methods to deal with opportunities and risks in this early planning phase and to arrive at a holistic and responsible decision. In the lecture Project Management in Construction, students acquire in-depth knowledge of the initiation, management and completion of projects in construction. They are taught operational methods and tools with which a construction project can be implemented and completed in a goal-oriented manner from an organizational, legal, technical, economical and scheduling perspective.			
Literature			
Presentation slides of the lecture, exercises, bibliography			
Remark			



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

Title	Factory Planning		
Number	2522960	Module version	v2
Shorttext		Language	german
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	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 20% of the respective grade.)		
Contents			
• Future of Factories • Constituting elements of a factory • Planning process • Choice of location • General building development • Building structure planning • Organizational structures of manufacturing • Material flow and material handling • Layout planning • Planning of technical building services (TBS) • Detailed planning of the production • Sustainable operation of the factory • Digitalization of the factory			
Objective qualification			
Students # • are able to describe and explain current trend, challenges and requirements of the factories using selected case studies # • are able to categorize different factory planning cases, factory types, factory strategies and factory levels on the basis of socio-technical dimensions and analyze the effects on the factory planning process # • are able to solve relevant planning and design tasks with reference to the VDI guideline 5200 # • are able to independently select suitable tools, methods and models based on standard procedures (z. e.g. according to the VDI factory planning reference process) # • are able to use methods and tools to design a factory structure and factory organization # • are able to derive the effects of changed conditions for existing factories by tuning and adapting			
Literature			

1. Wiendahl H-P, Reichardt J, Nyhuis P (2014): Handbuch Fabrikplanung: Konzept, Gestaltung und Umsetzung wandlungsfähiger Produktionsstätten. München: Carl Hanser
2. Schenk M, Wirth S, Müller E (2014): Fabrikplanung und Fabrikbetrieb: Methoden für die wandlungsfähige, vernetzte und ressourceneffiziente Fabrik. 2. Aufl. Berlin: Springer Vieweg



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	Factory Planning with Laboratory		
Number	2522970	Module version	v2
Shorttext		Language	german
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	5 / 7,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	210		
Class attendance (h)	70	Self studying (h)	140
Compulsory requirements			
Expected performance/ Type of examination	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			
• Future of Factories • Constituting elements of a factory • Planning process • Choice of location • General building development • Building structure panning • Organizational structures of manufacturing • Material flow and material handling • Layout planning • Planning of technical buidling services (TBS) • Detailed planning of the production • Sustainable operation of the factory • Digitalization of the factory • Introduction to virtual factory planning • Introduction to different digital planning tools • Applying planning tools in a practice setting			
Objective qualification			
Students # • are able to describe and explain current trend, challenges and requirements of the factories using selected case studies # • are able to categorize different factory planning cases, factory types, factory strategies and factory levels on the basis of socio-technical dimensions and analyze the effects on the factory planning process # • are able to solve relevant planning and design tasks with reference to the VDI guideline 5200 # • are able to independently select suitable tools, methods and models based on standard procedures (z. e.g. according to the VDI factory planning reference process) #			

- are able to use methods and tools to design a factory structure and factory organization #
- are able to derive the effects of changed conditions for existing factories by tuning and adapting #
- have acquired extended knowledge about decision-making contexts in companies. #
- have their decision-making competence is strengthened by taking on different roles and experimenting with alternatives in the business games. #
- are able to transfer the experiences from the business games to real situations from everyday business life.

Literature

1. Wiendahl H-P, Reichardt J, Nyhuis P (2014): Handbuch Fabrikplanung: Konzept, Gestaltung und Umsetzung wandlungsfähiger Produktionsstätten. München: Carl Hanser
2. Schenk M, Wirth S, Müller E (2014): Fabrikplanung und Fabrikbetrieb: Methoden für die wandlungsfähige, vernetzte und ressourceneffiziente Fabrik. 2. Aufl. Berlin: Springer Vieweg

**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
Factory planning lab	2,0	Laboratory	german

Title	Financing and Sustainable Management of Real Estate		
Number	3341000020	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	
Module duration	2	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Tanja Kessel
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Real Estate Management: 1 written exam (60 min.) ESG in Real Estate Practice: 1 written exam (60 min.)		
Course achievement			
Contents			
The Real Estate Management lecture focuses on the roles, primary objectives and strategies of the real estate activities and investments of different portfolio holders. Operational instruments for investment decisions and the financing of real estate are presented and explained using case studies. With the EU's Green Deal, real estate is subject to considerable influence from the financial sector in the areas of environmental, social and governance. This influence, the effects and correlations on the various life cycle phases of a property and on property valuation in the existing portfolio are presented to students in an in-depth analysis in the lecture ESG in Real Estate Practice.			
Objective qualification			
In the lecture Real Estate Management, students acquire in-depth knowledge of the sustainable management of real estate portfolios of different types of use and from the perspective of different portfolio holders. The focus is on questions of financing and investment decisions. For this, students acquire the skills to develop proposals for solutions and prepare decisions. The aim of the ESG in Real Estate Practice lecture is to provide students with well-founded knowledge and strategies for implementing ESG criteria (environmental, social, governance) along the real estate life cycle.			
Literature			
Presentation slides of the lecture, exercises, bibliography			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
ESG in Real Estate Practice	2,0	Lecture	german

Title	Research and Innovation Management		
Number	2522980	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	
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	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			
• Current trends in the funding of innovation • Risks and responsibility in research projects • Internationally networked research and funding landscape • Management and quality assurance in research • Strategy process and strategy audit • R&D project management and evaluation • Financial, budget and project calculation • Use and transfer of R&D results • Innovation Management • Patents and licences • Spin-offs • R&D ecosystem • Innovation ecosystem • Risks of research • Responsibility in science • ERA, DARPA and international research networks • R&D portfolio development and technology foresight			
Objective qualification			
Students can • comment on the methods of planning and evaluation of research • describe trends and indicators of European and international research and innovation systems • present the idea of research alliances • explain the exploitation paths of patenting and licensing • evaluate an R&D portfolio planning			
Literature			
Lothar Behlau. Forschungsmanagement: Ein praktischer Leitfaden. De Gruyter, 2017			

Business Model Generation: Ein Handbuch für Visionäre, Spielveränderer und Herausforderer. Campus Verlag GmbH, 2010



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

Title	Future Production Systems		
Number	2522770	Module version	
Shorttext		Language	english
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	Communication in written and spoken English		
Expected performance/ Type of examination	1 examination element: presentation (30 min) 1 course achievement: written elaboration		
Course achievement			
Contents			
• Manufacturing is experiencing constant change under the influence of various trends and dissemination of innovative technologies • Awareness is rising of the importance of concepts for sustainable production and social changes (e.g. demographic change, urbanisation) • The seminar fosters the understanding of the necessary changes of future production systems • It aims at an interdisciplinary understanding of factories and production systems and the handling of conflicting goals • Important skills, such as group work, presentation techniques and scientific writing, presentation and discussion in technical English, are imparted in the seminar			
Objective qualification			
Students • can discuss future trends in production, such as digitalisation in production, urban production or the sustainable design of production systems • learn to derive research questions based on future trends in production • design a fictitious scientific publication based on future trends in production • can describe and apply the process of a review • can present and argue their elaborated results within the frame of a fictitious conference situation using appropriate methodological skills • can apply methodological skills, such as time and project management • develop social skills through self-organised group work • develop self competences (e.g. time management)			
Literature			
1. Herrmann, C., Schmidt, C., Kurle, D., Blume, S., & Thiede, S. (2014). Sustainability in Manufacturing and Factories of the Future. International Journal of precision engineering and manufacturing - Green Technology, 1(4), 283-292.			

2. Herrmann, C., Blume, S., Kurle, D., Schmidt, C., & Thiede, S. (2015). The Positive Impact Factory#Transition from Eco-efficiency to Eco#effectiveness Strategies in Manufacturing. Procedia CIRP, 29, 19-27.
3. Weitere Literatur wird in der Vorlesung bekannt gegeben

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Seminar	english

Title	Industrial Quality Management		
Number	2511210	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Produktionsmesstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Rainer Tutsch
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)		
Course achievement			
Contents			
Quality management systems, Insight to quality management systems, Integrated management systems, Total Quality Management (TQM), Economy in quality management , Measurement systems and quality control system, Quality management in development and construction, Quality Function Deployment (QFD), Failure Mode and Effects Analysis (FMEA), Quality management in production engineering / operative quality planning, Quality management in acquisition, Quality management in fabrication, Statistical process control (SPC), Quality management at customers			
Objective qualification			
Students can explain the term quality and its relevance for a company on the basis of theoretical principles and practical examples. They can name several management systems. Furthermore, the students use suitable QM tools to illustrate the causes of problems and derive correlations from it. They can also describe various quality programs in Total Quality Management. Finally, students can analyze the economic efficiency of quality management systems using several calculation models. In addition, they can determine the quality of products using various measurement and testing methods and make a suitable selection of test parameters for this purpose. The students compare different QM methods in development and construction and distinguish between QM systems in procurement. They can explain QM tools used in production and draw a quality control chart. They are also able to define the importance of quality for the customer and evaluate it using methods for data acquisition and analysis like lifetime tests. Finally, the students can illustrate quality management systems along the supply chain.			
Literature			
• Pfeifer, T.: Qualitätsmanagement: Strategien, Methoden, Techniken. 3. Auflage. München: Hanser 2001 • Seghezzi, H.D.: Integriertes Qualitätsmanagement: der St. Galler Ansatz. 3. Auflage. München: Hanser 2007 • Masing, W.: Handbuch Qualitätsmanagement. 5. Auflage. München: Hanser 2001			



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	Infrastructure Management		
Number	3341000000	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	
Module duration	2	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Tanja Kessel
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Infrastructure and Project Financing: 1 written exam (60 min.) Management of Transportation Infrastructure Networks: 1 oral exam (15 min.)		
Course achievement			
Contents			
The lecture Infrastructure and Project Financing focuses on the transfer of knowledge about operational instruments as well as the role and function of financing in the entire life cycle of infrastructure networks, especially road networks. The conflicting priorities between the economical and efficient use of taxpayers' money and the (ecological) sustainability of construction and maintenance measures are highlighted. Special attention is paid to the different incentive mechanisms of the actors and financing participants as well as the different public and private understanding of financing and sustainable action in the context of the normative framework. In the lecture Management of Transport Infrastructure Networks, the connections between organizational and social structures as well as the influences of the various stakeholders on the orientation and implementation of network management tasks with a focus on transport infrastructure are shown. Based on this, various (ecological) sustainability and digitalization strategies of the three main modes of transport in maintenance management as well as methods and tools for application and evaluation are presented. Topics of the resilience of structures in climate change are discussed in the context of ecological sustainability assessment and the economical and efficient use of taxpayers' money.			
Objective qualification			
In the Infrastructure and Project Financing lecture, students learn about various financing structures in infrastructure management and are able to establish the role of financing in the life cycle and in the economic efficiency analysis of infrastructures. They acquire the skills to develop proposed solutions and prepare decisions. In the lecture Management of Transportation Infrastructure Networks, students acquire in-depth knowledge of strategic management activities throughout the life cycle of transportation infrastructure networks. Students acquire the skills to develop a holistic decision-making basis for responsible engineering action in the utilization phase as well as in the feedback to other life cycle phases.			
Literature			
Presentation slides of the lecture, exercises, bibliography			



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

Title	Life Cycle Assessment for Sustainable Engineering		
Number	2545020	Module version	v2
Shorttext		Language	english
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			
Recommended requirements	• Ideally, students have prior knowledge about matrix calculations (e.g. matrix multiplication) • Students know the empirical formulae of common substances (e.g. CO2, H2O		
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 20% of the respective grade.)		
Contents			
• Necessity for quantifying environmental impacts • Concept of life cycle thinking • Sensitization for problem shifting • Foundations and application of the life cycle assessment methodology • Structure of an LCA according to the ISO 14040/14044 • Advantages and disadvantages of the methodology, applications and configurations			
Objective qualification			
Students... • are able to conduct a Life Cycle Assessment (LCA) according to the ISO 14040/14044 standard • are able to analyze an existing LCA study regarding the strength of its results and potential weaknesses of the study • communicate LCA results to laypeople, and include relevant assumptions, limitations and boundary conditions in their communication • know the modeling choices which need to be made as part of a LCA, and what should inform their decisions regarding these choices • are able to identify, comprehend, refine and present relevant information regarding a given topic within the domain of LCA • can, provided with adequate data, use LCA software to produce meaningful LCA results • know how to organize themselves within a group project, which includes effective communication, sharing of workloads and the timely completion of tasks			
Literature			
• HAUSCHILD, Michael Z.; ROSENBAUM, Ralph K.; OLSEN, Stig Irvin. Life cycle assessment. Springer, 2018.			

- ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework



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

Title	Life Cycle Assessment for Sustainable Engineering with Laboratory		
Number	2545030	Module version	v3
Shorttext		Language	english
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 / 7,0	Module owner	Prof. Dr. Christoph Herrmann
Workload (h)	210		
Class attendance (h)	56	Self studying (h)	154
Compulsory requirements			
Recommended requirements	• Ideally, students have prior knowledge about matrix calculations (e.g. matrix multiplication) • Students know the empirical formulae of common substances (e.g. CO2, H2O)		
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			
• Necessity for quantifying environmental impacts • Concept of life cycle thinking • Sensitization for problem shifting • Foundations and application of the life cycle assessment methodology • Structure of an LCA according to the ISO 14040/14044 • Advantages and disadvantages of the methodology, applications and configurations • scientific programming, modelling and data analysis tools to perform more comprehensive Life Cycle Assessment (LCA) studies for emerging technologies such as e-mobility			
Objective qualification			
Students... • ... are able to conduct a Life Cycle Assessment (LCA) according to the ISO 14040/14044 standard • ... are able to analyze an existing LCA study regarding the strength of its results and potential weaknesses of the study • ... communicate LCA results to laypeople, and include relevant assumptions, limitations and boundary conditions in their communication • ... know the modeling choices which need to be made as part of a LCA, and what should inform their decisions regarding these choices • ... are able to identify, comprehend, refine and present relevant information regarding a given topic within the domain of LCA • ... can, provided with adequate data, use LCA software to produce meaningful LCA results • ... know how to organize themselves within a group project, which includes effective communication, sharing of workloads and the timely completion of tasks			

- ... can, provided with adequate data, develop LCA models and program routines for impact assessment as well as visualization of results

Literature

HAUSCHILD, Michael Z.; ROSENBAUM, Ralph K.; OLSEN, Stig Irvin. Life cycle assessment. Springer, 2018.

ISO 14040:2006 Environmental management — Life cycle assessment — Principles and framework

Remark

This lecture and the associated laboratory will be held in English.

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

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

Title	Health Infomation Systems B		
Number	4217000090	Module version	V1
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Thomas Deserno
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 graded work: Written exam (90 minutes) or oral exam (30 minutes) or term Paper or presentation or creation and documentation of computer programs or experimental work or portfolio or Take-Home-Exam.		
Course achievement			
Contents			
Objective qualification			
Literature			
- Winter,A.; Haux, R. et.al.: Health Information Systems: Architectures and Strategies. Springer Verlag, 2011. - IMIA Yearbook of Medical Informatics (erscheint jährlich) - weitere aktuelle Literatur wird im Rahmen der Vorlesung bekanntgegeben			

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

Health Information Systems B	2,0	Lecture	german
Literature			
- Winter, A.; Haux, R. et.al.: Health Information Systems: Architectures and Strategies. Springer Verlag, 2011. ISBN-13: 978-1849964401 - IMIA Yearbook of Medical Informatics (erscheint jährlich) - weitere aktuelle Literatur wird im Rahmen der Vorlesung bekanntgegeben			
	2,0	Exercise	german

Title	Economic Assessment and Procurement of Construction Services		
Number	4321090	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	6 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
Workload (h)	180		
Class attendance (h)	84	Self studying (h)	96
Compulsory requirements			
Expected performance/ Type of examination	Written exam (120 min) or oral exam (20 min) or Written exam (60 min) or oral exam (15 min) and Course Achievement (successfull participation simulation game)		
Course achievement			
Contents			
Public Tender and Contract Award: Starting with the service description as the link between architecture/planning/construction on the one hand and construction on the other, the importance of clear and complete tender documents is explained. After a brief overview of the procurement of design services, different procurement procedures (national and European) and the rules of legal protection for public procurement are explained from the perspective of the client and contractor for construction services, and a possible transferability to privately financed projects is discussed. Sustainability requirements for design and construction processes are also addressed. Considerations are also given on how to draft a contract that fully describes the performance objective and all the rights and obligations of the contracting parties. BIM-based Acquisition of Construction Projects (Role-Playing Game): The interactive and hands-on course presents and practises the essential steps of a tendering process. Students are divided into several teams and compete as (virtual) construction companies for a construction contract. The preparation of a tender based on a given specification is supported by the Building Information Modelling (BIM) methodology, after the basics of the methodology and the necessary software have been presented in self-developed tutorials. The construction companies and their indicative bids are presented by the respective teams to the potential clients (IBBs) in face-to-face meetings. In a second face-to-face meeting, additional information has to be integrated and the binding offers have to be negotiated in terms of financial and legal conditions before the contract is awarded to the best construction company.			
Objective qualification			
Students will acquire in-depth knowledge of the design of tender processes and specifications by the client, and of cost estimation and pricing by the contractor. Students will be familiar with the objectives and methods of costing as a planning task, as well as cost and performance accounting under the responsibility of executing companies. Different forms of planner and contractor deployment and remuneration models are considered. This will enable students to differentiate between the planner's or project manager's perspective (cost planning) and the contractor's perspective (cost accounting) and to understand the specific characteristics of each project phase. Students will also be able to take into account the constraints and specifications for the implementation of public sector projects and the specific implications for the tendering and awarding process and the drafting of contracts. In this context, students will also learn about the opportunities and consequences of integrating specific environmental and social requirements, including the import-			

ance of supply chains. Alternatively, students can either take the perspective of a construction company in a planning and role-playing exercise, and then use BIM methodology to actively accompany a procurement process in construction projects with regard to calculating the bid price and negotiating the legal framework.

Literature



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

Title	Local Public Transport - Operation and Vehicles		
Number	4306420	Module version	
Shorttext		Language	german
Frequency of offer		Teaching unit	Fakultät Architektur, Bauingenieurwesen und Umweltwissenschaften
Module duration		Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examina- tion			
Course achievement			
Contents			
Objective qualification			
Literature			
Reinhardt: Öffentlicher Personennahverkehr			

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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

Title	Organisation and Management of Construction and Business Processes		
Number	4321080	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Bauwirtschaft und Baubetrieb
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
Workload (h)	180		
Class attendance (h)	84	Self studying (h)	96
Compulsory requirements			
Expected performance/ Type of examination	Written exam (60 min) or Exam (30 min)		
Course achievement			
Contents			
Construction Business Management: The course presents and practises the three levels of business management and explores them in depth in a variety of scenarios with current references. While normative management explains the development of a vision and mission as well as the development of a corporate culture and corresponding goals, strategic management deals with fundamental questions and methods of strategy development as well as strategic tools. Operational management focuses on organisation and process management. Finally, problem-solving methods are presented. Construction Site Management: The course focuses on the typical responsibilities and tasks of construction management from the perspective of a contractor. The topics covered are based on the phases of construction management activities. Firstly, there are the preparatory considerations with clarification of the performance target and the agreed remuneration, as well as the project team and other parties involved. This is followed by the start-up phase, which involves scheduling and the procurement of goods and services. During implementation, processes need to be monitored and controlled for quality, time and cost. In this context, lean construction management methods are also presented. In the event of changes, the handling of additional offers and agreements is shown - accompanied by explanations on communication and documentation. Private Construction and Architectural Law: Contractual agreements form the basis for the provision of services in the course of the implementation of construction projects. After an explanation of the main features of public construction law and private construction contracts, special features of general terms and conditions are presented. This is followed by a discussion of the contractor's right to remuneration, distinguishing between contracts governed by the German Civil Code (BGB) and contracts governed by the German Construction Contract Procedures (VOB/B). This distinction also applies to the treatment of warranty rights, with acceptance being of particular importance and therefore treated separately. As further aspects of contract design and implementation, security and penalty clauses are also dealt with separately.			
Objective qualification			
Upon completion of the module, students will be able to take on company or site-specific management tasks in technical, organisational and economic terms for simple and medium-sized projects. On the one hand, students will learn to differentiate between the different perspectives and responsibilities of the client and contractor in the management of construction projects. On the other hand, students are familiarised with			

the different levels of construction management and learn how to use strategic tools and problem-solving methods. The structure of the courses takes into account the content previously developed in other modules, so that students have a particular systemic understanding. Alternatively, students will acquire legal skills for drafting and implementing contracts based on the provisions of the German Civil Code (BGB) and the German Construction Contract Procedures (VOB) for assessing the resulting rights and obligations or claims.

Literature



Related courses

Rules for the choice of courses

Compulsory attendance

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

Title	Production Planning and Control		
Number	2523060	Module version	
Shorttext		Language	english
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			
Expected performance/ Type of examination	1 Examination element: written exam (120 min)		
Course achievement			
Contents			
• Introduction to PPC • Organization and flexibility of production networks • Production Program Planning • Production requirements planning • In-house production planning and control • Methods of the PPC • External production planning and control • Order Management • PPC and ERP systems • Innovations in the PPC			
Objective qualification			
Students # are able to explain the fundamental procedure for implementing and using ERP systems # are able to derive the essential advantages and disadvantages of the various methods of PPS on the basis of practical application examples # are able to evaluate and select suitable methods for specific applications in industrial practice using the relevant criteria # are able to evaluate the potentials of industry 4.0, by demonstrating the influences of a digital order processing process on PPS methods # are able to analyse the processes in companies on the basis of the target values of the PPS using suitable methods and derive improvements			
Literature			
• Luczak, H.; Eversheim, W.: Produktionsplanung und -steuerung: Grundlagen, Gestaltung und Konzepte. 2. Auflage. Berlin: Springer 2001. • Kurbel, K.: Produktionsplanung und -steuerung im Enterprise Resource Planning und Supply Chain Management. 6. Auflage. München: Oldenbourg 2005. • Lödding, H.: Verfahren der Fertigungssteuerung. Berlin: Springer 2005.			



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			
Number	3329000000	Module version	
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	
Module duration		Institution	Institut für Planung des öffentlichen Verkehrs
Hours per Week / ECTS	4 / 6,0	Module owner	Alejandro Tirachini Hernández
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Exam (120 Min.)		
Course achievement			
Contents			
- Motivation: why public transport and history of public transport - Public transport planning: strategic, tactical and operational decisions - User costs and values of time in public transport - Single line design: Determination of frequency of service, type of vehicle - Single line design: stop/station design and density - Network design: general rules, simple models, complex models - Waiting time modelling and timetabling - Pricing and financing - Public transport ownership and regulation - Demand modelling, quality of service and user satisfaction - Future public transport			
Objective qualification			
The students acquire an in-depth understanding of planning processes in public transport systems. Upon successful completion, students will be able to: (1) apply methods for designing single public transport lines (including route alignment, stop location, frequency, and vehicle size determination), considering the concepts of value of time, user cost components (access, waiting, in-vehicle time, transfers), and operator cost, informed by empirical data; (2) formulate and solve fundamental frequency setting and optimal stop spacing problems; (3) evaluate public transport network structures based on density principles and solve basic network design problems under constraints; (4) analyse public transport timetabling problems using different objective functions; (5) critically assess fare systems and pricing principles using welfare economics and practical fare setting rules; (6) compare models of public transport organization and ownership including regulation; (7) utilize fundamental concepts of public transport demand modelling including mode choice.			

and (8) discuss topics pertaining to future developments such as automation and sustainability challenges in the public transport industry.

Literature

Präsentation, Artikel, Buchkapitel

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

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

Title			
Number	3329000000	Module version	V1
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	
Module duration		Institution	Institut für Planung des öffentlichen Verkehrs
Hours per Week / ECTS	4 / 6,0	Module owner	Alejandro Tirachini Hernández
Workload (h)	180h		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Exam (120 Min.)		
Course achievement			
Contents			
- Motivation: why public transport and history of public transport - Public transport planning: strategic, tactical and operational decisions - User costs and values of time in public transport - Single line design: Determination of frequency of service, type of vehicle - Single line design: stop/station design and density - Network design: general rules, simple models, complex models - Waiting time modelling and timetabling - Pricing and financing - Public transport ownership and regulation - Demand modelling, quality of service and user satisfaction - Future public transport			
Objective qualification			
The students acquire an in-depth understanding of planning processes in public transport systems. Upon successful completion, students will be able to: (1) apply methods for designing single public transport lines (including route alignment, stop location, frequency, and vehicle size determination), considering the concepts of value of time, user cost components (access, waiting, in-vehicle time, transfers), and operator cost, informed by empirical data; (2) formulate and solve fundamental frequency setting and optimal stop spacing problems; (3) evaluate public transport network structures based on density principles and solve basic network design problems under constraints; (4) analyse public transport timetabling problems using different objective functions; (5) critically assess fare systems and pricing principles using welfare economics and practical fare setting rules; (6) compare models of public transport organization and ownership including regulation; (7) utilize fundamental concepts of public transport demand modelling including mode choice.			

and (8) discuss topics pertaining to future developments such as automation and sustainability challenges in the public transport industry.

Literature

Präsentation, Artikel, Buchkapitel



Related courses

Rules for the choice of courses

Compulsory attendance

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

Title	Strategic Product Planning		
Number	2516380	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer 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	Basic understanding of the product development- and product emergence process; basic knowledge of established methods for product development.		
Expected performance/ Type of examination	1 examination element: written exam, 120 minutes or oral exam, 30 minutes		
Course achievement	1 course achivement: presentation of the case study results during the excursion		
Contents			
The lecture presents procedures and methods regarding strategic product planning sets the following priorities: - Core aspects of innovation - Core aspects of marketing - Marketing tools - Market-oriented planning of new products - Company and competition analysis - Analysis of Market and Competition - Quantitative and qualitative objectives - Strategies in product planning The learned topics will be used by the students to edit case studies. The editing of the case studies is supported by the presentation workshop with the topic "presenting without digital slides". Within the workshop first results of the case studies are used to prepare posters and then being presented within multiple sessions. The completion of the case studies is the field trip and the presentation of the results of the case studies.			
Objective qualification			
The students are capable of: - describing the quality and market-oriented product planning and development in their function and interdisciplinary processes - applying methods of corporate and business unit planning for the development of products to achieve high customer satisfaction, secure the future and increase efficiency and effectiveness - deriving measures for successful strategic product planning from the core topic, the product planning, and product development process.			
Literature			
Franke, Hans-J.: Kooperationsorientiertes Innovationsmanagement : Ergebnisse des BMBF-Verbundprojektes GINA, "Ganzheitliche Innovationsprozesse in modularen Unternehmensnetzwerken", Berlin, 2005 Ehrlenspiel, K.: Kostengünstig entwickeln und konstruieren : Kostenmanagement bei der integrierten Produktentwicklung. Berlin. Heidelberg 2007. Pahl.			

G./ Beitz, W.: Konstruktionslehre: 7. Auflage, Berlin, Heidelberg usw. 2007 Backhaus,
 K/ Voeth M.: Industriegütermarketing, 9. Aufl., München,
 2009 Belz, Chr.: Leistungssysteme zur Profilierung auswechselbarer Produkte, in: der Markt, Nr. 2 /1998,
 S.472-479. Belz,
 Chr./ Schögel, M./ Tomczak, T.: Innovation Driven Marketing: Vom Trend zur innovativen Marketinglösung,
 Wiesbaden 2007.
 Bleicher, K.: Das Konzept Integriertes Management: Visionen Missionen Programme, Frankfurt 2004.
 Kramer, F.: Innovative Produktpolitik: Strategie, Planung, Entwicklung, Durchsetzung; Berlin, Heidelberg,
 New York, 1987. Kramer, F./ Kramer,
 Ma.: Lean Management: Verschwendung erkennen und vermeiden - durch konsequente Ausschaltung
 nicht wertschöpfender Tätigkeiten, Band 4, in: Schriftenreihe des betriebswirtschaftlichen Ausschusses der
 Wirtschaftsverbände EBM und SV, Hagen/Düsseldorf 1994.
 Kramer F./ Kramer, Ma.: Modulare Unternehmensführung 1: Kundenzufriedenheit und Unternehmenser-
 folg, Berlin, Heidelberg, New York 1994.
 Schögel, M.: Kooperationsfähigkeiten im Marketing # Eine empirische Untersuchung, Wiesbaden 2006.

Remark

The module is divided into the following sections: lecture (2 semester hours per week/SWS), case studies (0,5 SWS), presentation workshop (0,5 SWS), and an excursion (1 SWS). To successfully complete the module, it is strongly advised to visit all of the dates. Enrollment will take place in an information event that will take place in the summer semester earlier.

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

Lecture, presentation workshop, field trip and case studies must be taken respectively edited

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
	1,0	Excursion	german
	1,0	Project	german
	1,0	Seminar	german

Title	Systemic Principles of Construction Project Delivery		
Number	4321020	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Bauwirtschaft und Baubetrieb
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
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 (20 min)		
Course achievement			
Contents			
Developments and Mechanisms in the Construction: Industry First, the characteristics of the construction market and construction production are explained and justified on the basis of the specific structures of the construction market. Responsibilities and interfaces are discussed in more detail on the basis of different roles, focusing on the respective contribution of different actors to the planning and implementation of construction production. In this context, the role of the public sector in the implementation of construction projects as a commissioning and licensing authority is also examined in more detail. The specific current and future challenges of the construction industry will be addressed in particular through selected aspects of the three dimensions of sustainability and the philosophy of lean management. Based on this, the basic requirements for the planning and execution process will be derived from contractual and regulatory constraints as a starting point for further courses and modules. Project Delivery Systems: At the start of a project, in the initiation phase, essential constraints and requirements are defined. Building on this, the German construction market offers various guiding principles for project management. These are presented with their specific characteristics - supplemented by insights into international models - and examined from different perspectives. From the unit-price contract with sole proprietors to the general contractor and partnering model to integrated project management, responsibilities, rights and obligations are defined and the appropriate projects or project types are assessed. The focus is on assessing opportunities and risks through early integration of execution expertise into the planning process and the importance of collaboration between project stakeholders. Particular attention is paid to the remuneration model, risk allocation and dispute resolution procedures.			
Objective qualification			
Students will have an in-depth knowledge of the structures of the construction industry and the organisation of planning and execution processes. They will be familiar with the basic requirements for the implementation of construction projects based on the demands of particular interests and social or regulatory expectations for the sustainability of construction production. Particular attention will be paid to explaining the interaction of the various participants against the background of their respective responsibilities for the preparation and implementation of the construction production process, so that students are enabled to think in their respective roles and to recognise the emerging interfaces. In this context, students will be able to identify suitable models of project management in construction from different perspectives and evaluate their impact on responsibilities and opportunities for efficient and goal-oriented implementation of the planning			

and execution phases. Due to the range of models presented, students will be familiar with both conventional models and alternative models of project management based on increased levels of collaboration.

Literature



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	Lecture/Exercise	german

Title	Transport Policy		
Number	3329000010	Module version	
Shorttext		Language	english
Frequency of offer	only in the summer term	Teaching unit	
Module duration	1	Institution	Institut für Planung des öffentlichen Verkehrs
Hours per Week / ECTS	4 / 6,0	Module owner	Alejandro Tirachini Hernández
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			
- Motivation: why transport policy - Reasons for public sector intervention on the transport sector - Transport externalities - Transport policy instruments: •Supply side: provision of infrastructure and services •Supply side: pricing (taxes, subsidies, fare setting) •Demand side: demand management tools •Policy packages - Social effects of transport policy (e.g., social inclusion, transport poverty) - Regional perspectives on transport policy			
Objective qualification			
The students acquire an in-depth understanding of the guiding principles behind transport policy decisions. Upon successful completion, students will be able to: (1) understand the reasons behind transport policy and the need for policy interventions on the transport sector, (2) analyse transport externalities as a reason for policy intervention, (3) examine the main types of transport policy instruments that are applied in different parts of the world, (4) predict the effects of specific transport policies in future scenarios.			
Literature			
Presentation, article, book chapter (See lecture)			



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

Technology

Title	Airline-Operation		
Number	2518140	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Flugantriebe und Strömungsmaschinen
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Jens Friedrichs
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			
• Air-Transport System and Business-Models • Regulations and Airworthiness (Germany, EU, US) • Airline network # Technical aspects • Airline network # Logistical aspects • Components, QEC & LRU (Cost models and reliability, maintenance and stock planning)			
Objective qualification			
Students can apply technical and business management knowledge for the selection and use of different engine models. They know the typical operating models of airlines and can set up and analyse typical real operating models. The essential international agreements and air traffic laws are understood and operating models can be assessed under aviation law. The requirements for maintenance models for engines and equipment can be applied in the sense of evaluating and planning maintenance strategies and spare parts stocking. Students can carry out condition-based operational monitoring using modern tools. Students can use the correlations and sensitivities of aircraft performance and derating for mission planning to analyse and evaluate new missions and equipment.			
Literature			



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	Alternative, electro and hybrid drives		
Number	2534060	Module version	
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Fahrzeugtechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Roman Henze
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)		
Course achievement			
Contents			
• Historical overview of alternative powertrains • Legal and political frameworks for powertrain development • Primary energy sources and fuels • Hybrid and electric drivetrains • Components of hybrid and electric drivetrains • Fuel cell electric vehicles • Comparison of drivetrain concepts • Outlook towards future powertrain development trends			
Objective qualification			
After completion of the module, students are able to evaluate alternative drive concepts as well as their design and conception. Students are able to discuss the historical, legal, economic and ecological boundary conditions for alternative, electric and hybrid drives on the basis of a comprehensive foundation. The students are able to assess different measures for improving efficiency and thus reducing fuel consumption on the basis of the elements of energy consumption as well as their knowledge about the influences of powertrain and vehicle parameters. The students can enumerate exemplary field conditions for the use of alternative and electrified vehicles and derive the resulting requirements for the powertrain. The students are independently able to classify electric and hybrid vehicles and their components with regard to their structure and functions, to integrate them into new vehicle concepts and to compare them on the basis of efficiency, performance, cost and installation space criteria. In addition, the students will be able to describe the transmissions integrated in HEV and BEV, their specifics and requirements as well as the requirements for chassis and brakes in vehicles with electrified drives using examples. Furthermore, the students are able to classify and evaluate electric motors, power electronics, energy sources and storage systems based on appropriate criteria.			
Literature			
• TSCHÖKE, H.: Die Elektrifizierung des Antriebsstrangs -Grundlagen -vom Mikro-Hybrid zum vollelektrischen Antrieb, Springer Verlag, 2019 • NAUNHEIMER, H.: Fahrzeuggetriebe #Grundlagen, Auswahl, Auslegung und Konstruktion, Springer Verlag, 2019 • HOFMANN, P.: Hybridfahrzeuge, Springer Verlag, 2014 • KAMPKER, A.: Elektromobilität. Springer Verlag, 2018			

- KREMSE, A.: Elektrische Maschinen und Antriebe #Grundlagen, Motoren und Anwendungen, Springer Verlag, 2017
- KLELL, M.: Wasserstoff in der Fahrzeugtechnik #Erzeugung, Speicherung, Anwendung, Springer Verlag, 2018
- REIF, K.: Basiswissen Hybridantriebe und alternative Kraftstoffe, Springer Verlag, 2018
- AVL: Engine and Environment, Proceedings, AVL, 2018
- ZACH, F.: Leistungselektronik, Springer Verlag Wien, 2010
- GEHRINGER, B.: 39. Internationales Wiener Motorensymposium, Proceedings, VDI Fortschritt-Berichte, 2018
- BINDER, A.: Elektrische Maschinen und Antriebe #Grundlagen, Betriebsverhalten, Springer Verlag, 2017
- NELSON, V.: Introduction to Renewable Energy, CRC Press, 2015
- DENTON, T.: Electric and Hybrid Vehicles, CRC Press, 2016
- STAN, C.: Alternative Antriebe für Automobile: Hybridsysteme, Brennstoffzellen, alternative Energieträger, Springer Verlag, 2012
- VOGEL, M.: Kompendium Li-Ionen Batterien. Grundlagen, Bewertungskriterien, Gesetze und Normen, VDE Verband der Elektrotechnik, 2015
- LIEBL, J.: Energiemanagement im Kraftfahrzeug, Springer Verlag, 2014 ITS
- NIDERSACHSEN: Hybrid and Electric Vehicles, Proceedings, ITS, 2018
- BABIEL, G.: Bordnetze und Powermanagement, Springer Verlag, 2019



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

Title	Automation Engineering		
Number	2539000020	Module version	
Shorttext		Language	english
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. Jürgen Pannek
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Control Theory or Fundamentals of Control Engineering		
Expected performance/ Type of examination	1 examination element: written exam+ (90 min) or oral exam+ (30 min)		
Course achievement	1 course achievement: Creation and documentation of a computer or software program (on application, the result of the course achievement can account for up to 20% of the grade of the written exam+)		
Contents			
Lecture/Tutorial: • Aim of automation engineering • Basics, tasks and methods of automation • Coupling and hierarchies of systems • Information and information management • Control, modularization and standardization in automation • Digitalization for industrial internet, industrial cloud and CPS • Basics of knowledge management, industrial big data and decision support			
Objective qualification			
After having completed the module automation engineering, students are able to reproduce and explain extensive basic and methodological knowledge of automation systems as well as their components (process computer, actuators, sensors, HMI). First of all, this contains that the students can explain the classification, the control and the coupling of technical processes exemplarily. They are also able to analyze information in technical processes and in signals, including signal detection and signal conversion, based on simple case examples. In addition, the students can describe basic computer structures in automation technology as well as the basics of the representation and processing of information in process computer systems in principle. Therefore, they can explain the mechanisms of process control for real-time capability and the task concept of operating systems exemplarily. They are also able to fundamentally categorize organizational, distribution and communication structures of automation systems based on simple case examples. In addition, students can reproduce basic knowledge concerning the means of description Petri Nets and are able to apply that means independently in order to model processes.			
Literature			
• Lunze, J.: Automatisierungstechnik. 5. Auflage. DeGruyter (2020) • Plenk, V.: Grundlagen der Automatisierungstechnik kompakt. Springer (2019)			

- Lai, C.: Intelligent Manufacturing, Springer (2022)
- LangmannN, C.; Turi, D.: Robotic process automation – Digitalisierung und Automatisierung von Prozessen, Springer (2020)
- Stjepandic, J.; Sommer, M.; Denkena, B.: DigiTwin: An approach for production process optimization in a built environment, Springer (2022)



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

Title	Railway Operation		
Number	4310610	Module version	
Shorttext		Language	german
Frequency of offer		Teaching unit	
Module duration	1	Institution	Institut für Eisenbahnwesen und Verkehrssicherung
Hours per Week / ECTS	5 / 6,0	Module owner	Prof. Dr. Jörn Pachl
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination	Written exam (60 Min.) or oral exam (approx. 30 Min.)		
Course achievement	Termpaper (approx. 30 h workload)		
Contents			
• Basic operating terms and definitions • Capacity research (capacity evaluation, analytical methods, simulation) • Timetabling (traffic diagrams, time elements, running time calculation, planning of conflict-free train paths, cyclic timetables) • Train path management (market structure, train path pricing, facility prices, station stop prices, train path requesting and assigning procedure) • Traffic control (employees in traffic control, train movements in normal and degraded mode operations, shunting) • Marshalling yards (purpose and structure of a marshalling yard, sorting procedure, hump dynamics, retarders)			
Objective qualification			
The students get profound knowledge on planning, management and control of train traffic. As employees of railway infrastructure companies or consulting firms, they are able to evaluate the operational capacity of the railway infrastructure, to select appropriate operational procedures, and to develop timetable concepts. They can take job positions in timetabling train path management and in supervision of train traffic control. They can also work in teams for the operational planning of construction and maintenance works. The students are familiar with the application of IT tools for capacity research and timetabling. They have the ability to evaluate the operational performance of railway lines and nodes under consideration of the constraints resulting from the infrastructure, and from signalling and vehicle constraints.			
Literature			
• Pachl, J.: Systemtechnik des Schienenverkehrs. 9. Aufl., • Vieweg Springer, Wiesbaden 2018, in der LV verteilte Materialien			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	5,0	Lecture/Exercise	german

Title	Construction Methods and Strategies		
Number	4321000	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Bauwirtschaft und Baubetrieb
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
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 (20 min)		
Course achievement			

Contents**Methodical Approach for Construction Method Selection:**

After introductory remarks on the importance of construction process decisions and relevant production factors, as well as ideas on the basics of risk management, various construction process engineering concepts of in-situ production are presented. In addition to equipment-intensive processes (including special civil engineering and demolition measures, including possibilities for reuse), labour-intensive processes in the shell and extension phases of construction and civil engineering are also covered. Building on this, options for pre-production (on-site/off-site) and automation will be presented, with particular emphasis on additive manufacturing (3D printing). Process comparisons will be carried out in different scenarios and their impact on production factors, resilience of the processes to framework conditions and other criteria (including occupational safety) will be discussed.

Construction Safety and Health:

Students will learn how statutory accident insurance works and basic aspects of health and safety at work. After an introduction to the organisation of health and safety at work, different regulations for different construction activities (excavation, earthworks, building construction) are presented. The handling of hazardous substances and the design of workplaces and traffic routes are also discussed. An introduction to risk assessment and the use of personal protective equipment is provided for practical application. On successful completion of the course, you will have the opportunity to take part in a multi-day course to become a health and safety coordinator (not part of a university course; limited number of participants).

Objective qualification

Students will gain in-depth knowledge of specific issues in construction process engineering. They know the underlying processes and principles as well as the resources required for their implementation. Of particular importance are methodological comparisons of construction method variants, taking into account relevant health and safety regulations and relevant technical risks. Students will be able to make engineering considerations and decisions in the planning of construction production, and then implement and control the processes operationally. Students will also be able to make links with other sustainability objectives (including the environmental impact of processes and the requirements of the circular economy) in order to make decisions on the basis of holistic considerations and to optimise processes in terms of the best possible resource efficiency (including the reuse/recycling of building materials). This also includes the possibility of shifting construction processes to stationary (pre)production. Through intensive instruction in the fundamen-

tals of occupational safety, students will acquire a sound knowledge of accident prevention and will be able to deal responsibly with related issues of liability and the organisation of construction processes.

Literature**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

Title			
Number	1614730	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	
Workload (h)	180 h		
Class attendance (h)	56 h	Self studying (h)	124 h
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Teil Biochemie: -Berg, Tymoczko, Stryer: Biochemie, Springer Spektrum -Voet, Voet, Pratt: Lehrbuch der Biochemie, Wiley Teil Zellbiologie: - H. Lodish, Molecular Cell Biology, Palgrave Macmillan, 6. Auflage, 2007- B. Alberts, Molecular Biology of the Cell, Taylor & Francis, 5. Auflage, 2007			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Fundamentals of Cell Biology (Bio-ZB 01, Bt-BP 08)	2,0	Lecture	german

Fundamentals of Biochemistry (Bio-MB 01, Bt-BP 11)	2,0	Lecture	german
Literature			
Berg, Tymoczko, Stryer: Biochemie, Springer Spektrum			

Title	Bioinformatics and Biostatistics 1		
Number	4217000030	Module version	
Shorttext		Language	english german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Tim Kacprowski
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	Programming 1, Programming 2, Algorithms and Data Structures.		
Expected performance/ Type of examination	1 examination requirement: written exam (90 min) or oral examination (20 min) or written exam+ or take-home exam.		
Course achievement	1 course achievement: at least 50% of the homework assignments must be passed.		
Contents			
• Fundamentals of molecular biology • Microarrays • Sequencing methods (genomics, transcriptomics) • Sequence assembly / alignment / mapping • Hidden Markov models • Statistical testing • Regression • Principal component analysis • Genome-wide association studies • Differential expression analysis • Gene set enrichment analysis			
Objective qualification			
After completing this module, students understand fundamental concepts of molecular biology and are familiar with experimental methods for determining genome sequences and transcript abundances. They are able to independently solve classical bioinformatics problems such as sequence alignment and are familiar with statistical methods for investigating relationships between the genome or transcriptome and phenotypes.			
Literature			



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

Title	Bioinformatics and Biostatistics 2		
Number	4217000040	Module version	
Shorttext		Language	english german
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Tim Kacprowski
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			



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

Title	Computational Methods in Bionics - Optimization		
Number	2514020	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	
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	Basic knowledge of differential calculus, basic understanding of biological and physical connections.		
Expected performance/ Type of examination	1 examination element: oral exam (30 min)		
Course achievement			
Contents			
• Bionics as a science (definition, idea, goals, qualifications, structures) • Social Systems (the biological foundation of social communities, system dynamics, agents, swarms) • Biological principles of the evolution (history, terms, biological principle) • Conventional methods of optimization (indirect methods, direct methods) • Bionic methods of optimization (evolutionary algorithms, examples: evolution strategies, example: genetic algorithms, evolutionary programming, simulated annealing, particle swarm optimization) • Neuronal networks (biological principle of neuronal networks, pattern recognition, regulation)			
Objective qualification			
The students are capable of: - describing bionic as an engineering science method - naming and describing the principles of biological mechanisms - applying descriptions of social systems and behavior towards economic-technical simulation systems - systemizing methods of optimization in the form of indirect, direct and bionic methods based on examples - describing and explaining the bionic methods of optimization through the biological example, in an information technological manner - name and explain the structure and usage of neuronal networks - applying the studied principles of the approaches of bionics towards computational methods and being able to point them out in examples			
Literature			
• Nachtigall, W.: Bionik, Springer-Verlag, Berlin (1998) • Beyer, H.-G.: The Theory of Evolution Strategies, Springer-Verlag, Berlin, Heidelberg (2001) • Forrester, J. R.: Urban Dynamics, Pegasus Communications, Waltham (1969) • Rechenberg, I.: Evolutionsstrategie '94, Frommann-Holzboog-Verlag, Stuttgart (1994) • Rojas, R.: Theorie der neuronalen Netze, Springer-Verlag Berlin (1996) • Schwefel, H.-P.: Evolution and Optimum Seeking, Verlag Wiley & Sons, New York (1995)			
Remark			
The lecture will be read in English if necessary.			



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	Data Warehousing and Data Mining Techniques		
Number	4214590	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 Informationssysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Wolf-Tilo Balke
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	graded work: written exam(90 minutes) or oral exam (30 minutes) or Take-Home-Exam.		
Course achievement	non-graded work: 50% of the exercises must be passed		
Contents			
This module will give a broad overview over all methods that are necessary for building and using data warehouses in large-scale applications. Besides typical techniques for warehouse design, indexing, and online analytical processing (OLAP), also advanced data mining techniques, such as classification, clustering, frequent item set mining, and association rules are covered in the lecture. In particular, - Statistical methods in databases - Knowledge discovery and mining of local structures - Frequent Item Set Mining and Association Rules - Hierarchical and partitioning clustering algorithms - (Linear) classification and support vector machines - Architecture of data warehouses (ROLAP, MOLAP,...) - Multi-dimensional data models (star, snowflake) - Extraction, data transformation and cleaning - Techniques for online analytical processing (OLAP) - Storage- and Index structures for data warehouses			
Objective qualification			
On completion of this module, students know the basic designs, theoretical foundations, and practical applications of data warehouses and have a good overview of typical data mining techniques employed in data warehouses. Also, they have deep understanding of suitable data structures and the respective algorithms. This enables students to identify and recognize typical data warehouse problems in common business cases. They are able to assess and analyze these problems, and based on their results and their technical proficiency with common tools, techniques, and concepts, they are able to assess and develop requirements and designs for suitable data warehouse solutions and data analysis. Furthermore, the students are aware of typical challenges arising from the introduction of data warehouse solutions, and are have an understanding of the impact of these solutions on a company's workflows.			
Literature			
- William H. Inmon: Building the Data Warehouse. Wiley & Sons. ISBN 10: 0-7645-9944-5 - Ralph Kimball, Margy Ross: The Data Warehouse Toolkit. Wiley & Sons. ISBN 10: 0-471-0024-7			

- Andreas Bauer, Holger Günzel: Data Warehouse Systeme. dpunkt Verlag. ISBN 10: 3-89864-251-8



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Data Warehousing and Data Mining Techniques	2,0	Lecture	english german
Literature			
- William H. Inmon: Building the Data Warehouse. Wiley & Sons. ISBN 10: 0-7645-9944-5 - Ralph Kimball, Margy Ross: The Data Warehouse Toolkit. Wiley & Sons. ISBN 10: 0-471-0024-7 - Andreas Bauer, Holger Günzel: Data Warehouse Systeme. dpunkt Verlag. ISBN 10: 3-89864-251-8			
	1,0	Exercise	english german

Title	Landfill Technology and Remediation of Contaminated Sites		
Number	4398330	Module version	
Shorttext		Language	
Frequency of offer		Teaching unit	
Module duration	1	Institution	Abteilung Abfall- und Ressourcenwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Dr. Kai Münnich
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 (approx. 30 Min.)		
Course achievement			
Contents			
[Landfill Mining, Landfill Construction and Geotechnique of Wastes (VÜ)] Fundamentals of waste mechanics und the hydarulic behaviour of wastes; interaction between the different parameters; constructive elements of landfills; emissions from landfills and their monitoring; longterm behaviour of landfills; position and after-use of landfills; Landfills in emerging and developing countries; legal basis. [Investigation and Remediation of Contaminated Sites (VÜ)] Contaminants in soil and groundwater; procedures for exploration; control of soil air; sampling of soil, soil air and groundwater; evaluation and assessment of analytical results; techniques for in-site and on-/off-sites remediation; procedures for groundwater treatment; biological, thermal and physical treatment of soils; after-use of contaminated sites; landfill mining.			
Objective qualification			
Students acquire in-depth knowledge of the construction and operation of landfills for municipal solid waste (MSW). The aspects of the position of the landfill in the waste management, the legal framework, the site search, the technical installations up to the aftercare, the monitoring and the landfill mining are considered. Furthermore, they gain detailed knowledge about the mechanical properties of waste as well as the long-term behavior in terms of water and gas emissions. Overall, there is a focus on the situation in emerging and developing countries. This will enable students to understand and evaluate the major dynamic processes of a landfill and to size the required structural components. Students gain in-depth knowledge of the identification and remediation of contaminated sites. The basic aspects concerning possible pollutants, sources of input and exploration of the soil and groundwater are considered. The possible techniques for remediation of contaminated sites (biological, chemical and physical) are learned. The special case of remediation of old MSW dumps is elaborated in detail. This will enable students to assess a suspected contaminated site and select an appropriate remediation technique for the specific case.			
Literature			

Powerpoint slides
Remark



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

Title			
Number	1614720	Module version	
Shorttext		Language	german
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Dieter Jahn
Workload (h)	150 h		
Class attendance (h)	42 h	Self studying (h)	108 h
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Fuchs, G. (Hrsg.), Allgemeine Mikrobiologie, Thieme, 11. Aufl. 2022, ISBN 978-3-1324-3477-6, doi: 10.1055/b0000000100 (digital im Uninetz)			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Introduction to Microbiology (Bio-MI 01, BT-BP 09)	3,0	Lecture	german

Title	Electric Power Systems Engineering		
Number	2423550	Module version	
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	Fakultät für Elektrotechnik, Informationstechnik, Physik
Module duration	1	Institution	elenia Institut für Hochspannungstechnik und Energiesysteme
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	oral examination (30 minutes) or presentation (20 minutes plus scientific talk with examination character)		
Course achievement			
Contents			
• Discussion of power system overvoltages • Calculation of electric fields • Statistical analysis of ionization and breakdown phenomena • Calculation of the breakdown of gases (SF6), liquids (insulating oil), solids, and composite materials, as well as the breakdown characteristics of long air gaps • Description of insulation systems currently used in high-voltage engineering, including air insulation and insulators in overhead power transmission lines, gas-insulated substation (GIS) and cables, oil-paper insulation in power transformers, paper-oil insulation in high-voltage cables, and polymer insulation in cables • Examination of contemporary practices in insulation coordination in association with the International Electrotechnical Commission (IEC) definition and the latest standards.			
Objective qualification			
The students have fundamental knowledge of Power Systems and special or in-depth expertise for High-Voltage Systems Engineering. They learn methods with the help of discipline experiments and simulations and interpret / evaluate texts and data from Power Systems. They are able to make scientifically sound judgments within the scope of High-Voltage and formulate research problems. The students are able to select an adequate level of abstraction for a given research problem and work on that level. They can assess the scientific value of High-Voltage research and can formulate development or application problems. For Power Systems Engineering they have a systematic approach characterized by the application and development of theories, models and coherent interpretations and they can use scientific theories / model concepts. They reflect critically on their own way of thinking, their decisions and actions and are able to think logically (recognize			

fallacies and deceptions) and critically interpret scientific data (origin, completeness, relevance, etc.) and formulate a wellfounded opinion.

They can communicate to others in writing and orally the results of the scientific work in the given examples and behave professionally (in the sense of reliability, commitment, correctness, precise work, perseverance, independence, etc.).

The students work task-related and target-oriented in the learning group and deal with group-dynamic processes. They analyze social, economic or cultural consequences of new developments in High-Voltage Transmission.

Literature

- High Voltage Engineering Farouk A.M. Rizk, Giao N. Trinh CRC Press 2014
- High Voltage Engineering: Fundamentals - Technology - Applications Küchler, Andreas VDI-Buch 2018



Related courses

Rules for the choice of courses

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Lecture	english
Literature			
High Voltage Engineering Farouk A.M. Rizk, Giao N. Trinh CRC Press 2014 High Voltage Engineering: Fundamentals - Technology - Applications Küchler, Andreas VDI-Buch 2018			
	2,0	Exercise	english

Title			
Number	1614740	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Andre Fleißner
Workload (h)	180 h		
Class attendance (h)		Self studying (h)	
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
-Griffiths, Miller, Suzuki, Lewontin, Gelbart; Introduction to Genetic Analysis; Freeman & Co.Klug, Cummings, Spencer; Genetik; Pearson Studium.			
-Janning, Knust; Genetik; Thieme Verlag.			
-Mühlhardt; Der Experimentator: Molekularbiologie/Genomics ; Spektrum Verlag.			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Fundamentals of Genetics 1 - Classic Genetics (Bio-GE 01, Bt-BP 10)	2,0	Lecture	german
Fundamentals of Genetics 2 - Molecular Genetics (Bio-GE 02, Bt-BP 10)	2,0	Lecture	german

Tutorial for the lecture “Fundamentals of Genetics” for biotechnologists (Bt-BP 10)		Exercise	german
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Title	Managing Industrial Software Developments		
Number	4220420	Module version	V2
Shorttext		Language	english
Frequency of offer	only in the summer term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Softwaretechnik und Fahrzeuginformatik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Ina Schaefer
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	graded work: oral exam, 30 minutes, or written exam, 90 minutes or Take-Home-Exam.		
Course achievement			
Contents			
- Industrial Information Management - Product Software - General conditions for SW production in a company - tasks of project management - SW development projects - Process models - Planning and execution of development projects - Software quality and assessment - Company knowledge and maturity-models - Example application from the area of parallel computer software			
Objective qualification			
After completing the module, students have an overview of professional industrial management of development projects using software development as an example. They have basic knowledge of project-, requirements-, quality-, and configuration- management, as well as the organizational interaction of large industrial structures. They know the most important process-, quality- and maturity- models and can apply them. Building on the fundamentals, the application in everyday industrial life is demonstrated using illustrative examples.			
Literature			
- Hindel, B.; Hörmann, K.; Müller, M.; Schmied, J.: „Basiswissen Software-Projektmanagement“; dpunkt Verlag, Heidelberg (2004) - Messnarz, R.; Tully, C.: „Better Software Practice for Business Benefit – Principles and Experience“; IEEE Computer Society, Los Alamitos (1999) - Wallmüller, E.: „Software-Qualitätsmanagement in der Praxis“; Hanser Verlag; München u.a. (2001)			



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

Title	Industrial Robots		
Number	2522120	Module version	
Shorttext		Language	german
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. Klaus Dröder
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Basic knowledge of engineering mechanics, vector and matrix calculus, differential calculus and control engineering		
Expected performance/ Type of examination	1 examination element: written exam (120 min) or oral exam (30 min)		
Course achievement			
Contents			
• Introduction: History, groups of robots, fields of apply • Structure-development: degrees of freedom, joints, serial and parallel structures, structure of a robot • Programming: Types of programming, languages of programming (especially KRL) • Kinematic: Elementary-transformation, kinematic robot-model, types of calculation, singularities • Dynamic and bearing-control: dynamic robot model, calculation of forces and moments, types of bearing-control • Control: Creation of movement, structure, sensor integration			
Objective qualification			
Students • have the ability to differentiate between serial and parallel structures and to divide the robot into main and secondary axes. • are able to analyze workspaces and designs and will be able to evaluate them with regard to application criteria. • will be able to explain components of the robot. • are able to explain and calculate kinematic and dynamic models of different robots. • are able to name the control approaches and device-related structures required for the control system, and to apply textual and graphic-interactive programming forms.			
Literature			
• Lenarcic, J.; Parenti V.: Advances in Robot Kinematics 2018. Springer, Berlin, 2018 • Appleton, E.; Williams, D. J.: Industrieroboter: Anwendungen. VCH: Weinheim, New York, Basel, Cambridge, 1991 • Knoll, A.; Christaller, T.: Robotik. Fischer, Frankfurt, November 2003 • Siciliano, B.; Khatib, O.: Springer Handbook of Robotics, Springer Verlag, Berlin, 2008 • Volmer, J.: Industrieroboter - Funktion und Gestaltung. Verl. Technik: Berlin, 1992 • Weber, W.: Industrieroboter. Carl Hanser Verlag: München, Wien, 2019			



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	Industrial Robots with Laboratory		
Number	2522560	Module version	
Shorttext		Language	german
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	4 / 7,0	Module owner	Prof. Dr. Klaus Dröder
Workload (h)	210		
Class attendance (h)	56	Self studying (h)	154
Compulsory requirements			
Recommended requirements	Requirements: Basic knowledge of engineering mechanics, vector and matrix calculus, differential calculus and control engineering		
Expected performance/ Type of examination	1 examination element: written exam (120 min) or oral exam (30 min)		
Course achievement	1 course achivement: protocol of the laboratory experiments		
Contents			
• Introduction: History, groups of robots, fields of apply • Structure-development: degrees of freedom, joints, serial and parallel structures, structure of a robot • Programming: Types of programming, languages of programming (especially KRL) • Kinematic: Elementary-transformation, kinematic robot-model, types of calculation, singularities • Dynamic and bearing-control: dynamic robot model, calculation of forces and moments, types of bearing-control • Control: Creation of movement, structure, sensor integration			
Objective qualification			
Students... • have the ability to differentiate between serial and parallel structures and to divide the robot into main and secondary axes. • are able to analyze workspaces and designs and will be able to evaluate them with regard to application criteria. • will be able to explain components of the robot. • are able to explain and calculate kinematic and dynamic models of different robots. • are able to name the control approaches and device-related structures required for the control system, and to apply textual and graphic-interactive programming forms. • are able to identify structure-specific problems and develop solution strategies. • can place themselves in a group, contribute to the solution and present the results.			
Literature			
• Lenarcic, J.; Parenti V.: Advances in Robot Kinematics 2018. Springer, Berlin, 2018 • Appleton, E.; Williams, D. J.: Industrieroboter: Anwendungen. VCH: Weinheim, New York, Basel, Cambridge, 1991 • Knoll, A.; Christaller, T.: Robotik. Fischer, Frankfurt, November 2003 • Siciliano, B.; Khatib, O.: Springer Handbook of Robotics, Springer Verlag, Berlin, 2008 • Volmer, J.: Industrieroboter - Funktion und Gestaltung. Verl. Technik: Berlin, 1992			

- Weber, W.: Industrieroboter. Carl Hanser Verlag: München, Wien, 2019



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
	2,0	Laboratory	german

Title	Innovative Energy Systems		
Number	2423600	Module version	
Shorttext		Language	
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. Bernd Engel
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	oral exam (30 min) or written exam (90 min)		
Course achievement			
Contents			
1. Development of Energy Supply and Climate Targets 2. Conventional Power Plants 3. Renewable Energies 4. Novel generation systems 5. Power-to-X and Sector Coupling (Transport, Heat) 6. Storage (Battery, Hydrogen) 7. Island Grids 8. Prosumer Households			
Objective qualification			
After completing the module, students will be able to describe the conventional and sustainable provision of electrical energy as well as associated current and future developments on the basis of basic knowledge. In addition to the provision of electrical energy, students will be able to identify various approaches to sector coupling (transport, heat) and possibilities for storing energy (battery storage, hydrogen, etc.). This module enables students to explain future requirements and changes in the energy system and to list possible advantages and disadvantages. Measures and goals in the context of potential transformations (energy transition, mobility transition, etc.) can be classified and assessed in the overall context of a sustainable energy supply.			
Literature			
Quaschnig, Volker: Regenerative Energiesysteme: Technologie – Berechnung – Simulation. München 2015. Hanser Verlag. Kaltschmitt, Martin: Erneuerbare Energien: Systemtechnik, Wirtschaftlichkeit, Umweltaspekte. Berlin 2013. Springer Vieweg. Heuck, Klaus; Dettmann, Klaus-Dieter; Schulz, Detlef: Elektrische Energieversorgung: Erzeugung, Übertragung und Verteilung elektrischer Energie für Studium und Praxis. Wiesbaden 2013. Springer Vieweg.			

Schwab, Adolf J.: Elektroenergiesysteme: Erzeugung, Übertragung und Verteilung elektrischer Energie. Berlin 2015. Springer Vieweg.



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
Literature			
Die Energiefrage Bedarf und Potentiale, Nutzung, Risiken und Kosten, K. Heinloth, Vieweg			
	2,0	Exercise	german

Title	Integrated Production Planning in Construction		
Number	4321070	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	4 / 6,0	Module owner	Prof. Dr. Patrick Schwerdtner
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 (20 min)		
Course achievement			
Contents			
Lean Construction Management: After learning the basics of construction production planning, with a focus on scheduling and resource planning, students are introduced to the methods of lean (construction) management. The difficulties and trade-offs involved in planning and optimising construction production are illustrated, always taking into account the (sub)project objectives. Of particular importance are the project-specific influencing factors, which significantly determine the planned course of construction production and must be taken into account during planning. In this context, the special importance of dealing with interfaces is also made clear. Exercises and team-oriented workshops will be used to explain cycle planning and the last planner method using practical construction scenarios. The face-to-face meetings will take place on the Digital Construction Site to create a real connection and to discuss the possibilities and limitations of digital solutions. Construction Logistics: Based on the model of a 'mobile factory', construction logistics tasks in the context of supply, production and waste disposal in the different phases and stages of a construction project are first explained - including their significance from a sustainability perspective (including increasing resource efficiency), Based on this, various construction logistics models are presented (including the department store concept) Digital solutions based on the BIM methodology are also presented The application of various principles of lean construction management leads to an examination of relevant parameters for the planning and control of construction logistics This also includes the determination and visualisation of resource requirements based on an overlay of the quantity take-off and a schedule On this basis, the necessary construction site equipment is analysed in detail, including the dimensioning of the key elements The in-depth exercises are based on real scenarios from construction practice.			
Objective qualification			
Based on the philosophy and principles of Lean Construction, students will be able to carry out construction production planning taking into account construction logistics requirements. Students will have mastered the basics of scheduling and cycle planning and will be able to determine the resources required. To this end, students will be able to identify different requirements of construction processes and create a project breakdown structure as a basis for scheduling. In addition to the technological interdependencies to be considered, students will gain in-depth knowledge of the accompanying consideration of logistical constraints. By learning the conceptual principles of supply, production and disposal logistics, students will be able to plan and optimise construction production holistically and identify potential bottlenecks in the relevant production factors at an early stage. Furthermore, students will be able to assess the specific importance of sup-			

ply chains in the supply of building materials and products to construction production and in reuse and recycling in the context of disposal. To this end, students will be familiar with relevant regulatory requirements and current solutions in the DIY market.

Literature



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

Title	Practical Lab Training and Dimensioning of Treatment Plants		
Number	4398280	Module version	V1
Shorttext		Language	
Frequency of offer		Teaching unit	
Module duration	1	Institution	Institut für Siedlungs- wasserwirtschaft
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Thomas Dockhorn
Workload (h)			
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements	Prerequisite is prior participation in the module "Wastewater and Sludge Treatment"		
Recommended requirements	Students are expected to have a thorough knowledge of treatment processes for wastewater and sludge treatment in order to participate in this class.		
Expected performance/ Type of examination	The portfolio covers a detailed handout for each class, showing lab results and scientific discussion of the results or dimensioning drafts and scientific evaluation of the draft. Portfolios are design in independent teams under tuition of the lecturer. Lab results and scientific background will be presented to the class participants and the lab tutors in a final 30-minute seminar presentation. Grading will be based on participation during the lab days and on the quality of the presentation and on the corresponding student handout. Deregistration from the exam is possible up to wo weeks before the scheduled class participation. Dates for class presentations are scheduled in the first class meeting. The class Dimensioning and Design of Treatment Plants has a compulsory attendance of 16 hours (first class meeting, final class meeting). If students are absent with valid excuse (e.g. illness, child care etc.) individual solutions can be found for being able to complete the class successfully and still reach educational objectives of the class. Periods of absence may not exceed 15% of compulsory attendance, in order to reach educational objectives of the class. Practical Lab Training has a compulsory attendance of 40 hours (first class meeting, lab days, final class meeting). If students are absent with valid excuse (e.g. illness, child care etc.) individual solutions can be found for being able to complete the class successfully and still reach educational objectives of the class. Periods of absence may not exceed 15% of compulsory attendance, in order to reach educational objectives of the class.		
Course achievement			
Contents			
[Dimensioning and Design of Treatment Plants (S)] During the class, participants will work independently in student teams and will dimension the most important components of a wastewater treatment plant. Using the information and knowledge acquired in the prior classes on wastewater and sludge treatment as well as given dimensioning data, the students will design a wastewater treatment plant. Every other week meetings with the instructor and/or tutor will take place in order to discuss problems encountered during the work process. At the end of the semester each team will present its project to the class and discuss it with the participants and turn in a written report on the project work.			

[Practical Lab Training on Wastewater Treatment (Ü)]

During the practical lab training, tutored lab experiments will be conducted in relation to current research projects of the institute (e.g. degradation experiments, precipitation/flocculation, respiration experiments, microscopic experiments, monitoring of experimental set-ups). Several tutored lab days will be arranged for conducting the experiments. Lab results and scientific background will be presented to the class participants in a final 30-minute seminar presentation. Grading will be based on participation during the lab days and on the quality of the presentation and on the corresponding student handout.

Objective qualification

Students are able to work independently in a research lab for wastewater and sludge treatment and discuss environmental engineering questions at a scientific level. They are able to independently acquire additional knowledge in the field of environmental engineering and can find solutions for wastewater problems at various levels. They are able to skillfully present their solutions to the public. A special focus in this seminar is on doing practical lab work, practicing teamwork, acquiring debate techniques and rhetorical skills and learning how to discuss controversial questions in a scientific setting.

Literature

Technical literature and additional information are available at the institute's library.

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

Prior successful completion of the module 'Wastewater and Sludge Treatment' is pre-requisite for participating in this module. Students from other universities must have sufficient basic knowledge in the field of wastewater and sludge treatment.

Compulsory attendance

The class Dimensioning and Design of Treatment Plants has a compulsory attendance of 16 hours (first class meeting, final class meeting). If students are absent with valid excuse (e.g. illness, child care etc.) individual solutions can be found for being able to complete the class successfully and still reach educational objectives of the class. Periods of absence may not exceed 15% of compulsory attendance, in order to reach educational objectives of the class.

Practical Lab Training has a compulsory attendance of 40 hours (first class meeting, lab days, final class meeting). If students are absent with valid excuse (e.g. illness, child care etc.) individual solutions can be found for being able to complete the class successfully and still reach educational objectives of the class. Periods of absence may not exceed 15% of compulsory attendance, in order to reach educational objectives of the class.

Name of the course	SWS	Eventtype	Language
	2,0	Seminar	german
	2,0	Internship	german

Title			
Number	1614750	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	
Workload (h)	180 h		
Class attendance (h)	56 h	Self studying (h)	124 h
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Teil "Grundlagen der Mikrobiologie" -Jahn, M., Jahn, D. (Hrsg.), Brock Mikrobiologie kompakt, Pearson, 2015, ISBN 978-3-86326-726-1 (Unibibliothek oder digital im Uninetz) Fuchs, G. (Hrsg.), Allgemeine Mikrobiologie, Thieme, 11. Aufl. 2022, ISBN 978-3-1324-3477-6, doi: 10.1055/b000000100 (digital im Uninetz) Teil "Molekulare Biotechnologie" H. Lodish, Molecular Cell Biology, Palgrave Macmillan, 6. Auflage, 2007B. Alberts, Molecular Biology of the Cell, Taylor & Francis, 5. Auflage, 2007			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Fundamentals of Microbiology (Bio-MI 01, Bt-BP 09)	2,0	Lecture	german

Molecular Biotechnology: Introduction (Bio-MB 04, Bt-BP 15, CM-A-4)	2,0	Lecture	german
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Title	Multimedia Databases		
Number	4214610	Module version	V2
Shorttext		Language	german
Frequency of offer	irregular	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Informationssysteme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Wolf-Tilo Balke
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 graded work: Written exam, 90 minutes, or oral exam, approx. 30 minutes, or Take-Home-Exam.		
Course achievement	1 non-graded work: 50% of the exercises must be passed		
Contents			
- General structure of multimedia databases - Advanced document types, multimedia documents - Image-content search, low-level and high-level features - High-dimensional indexing, inverted files, R-, M- and X-trees - Search in audio files, acoustic features, e.g. pitch recognition - Music retrieval, Hidden Markov Models, Query by Humming, etc. - Video retrieval, segmentation and shot detection - Video similarity, video signatures, abstracting and summaries			
Objective qualification			
Upon completion of this module, students will have basic knowledge in the field of multimedia databases.			
Literature			
- Ingo Schmitt: Ähnlichkeitssuche in Multimedia-Datenbanken. Oldenbourg Wissenschaftsverlag, 2005. - Vittorio Castelli, Lawrence D. Bergman: Image Databases. Wiley & Sons, 2002. - Ralf Steinmetz: Multimedia-Technologie: Grundlagen, Komponenten und Systeme. Springer Verlag, 1999. - Setrag Khoshafian, Brad Baker: Multimedia and Imaging Databases. Morgan Kaufmann, 1996.			

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Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	3,0	Lecture/Exercise	english german
	1,0	Exercise	english

Title	Advanced methods to product development		
Number	2516040	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer 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	Basic understanding of the product development process and the product creation process, basic knowledge of the common methods for product development, (the participation on the modules #Grundlagen der Produktentwicklung und Konstruktion# is advised)		
Expected performance/ Type of examination	1 examination element: written exam (90 min) or oral exam (30 min)		
Course achievement			
Contents			
• Function- and design principles for finding solutions • Bionics, the theory of inventive problem solving (TRIZ) • Methods for systematic evaluation and selection of solutions (e.g. utility analysis) • Methods of quality-oriented design (e.g. fault tree analysis, FMEA) • Methodical reduction of disruptive effects • Processing of complaints • Methods for identifying and reducing costs during product development			
Objective qualification			
The students are able to: • apply general and specific methods and working methods to different problems in product development • to name in-depth knowledge of variation and analogy and to apply it using the example of selected methods • to name and apply in-depth knowledge for the evaluation and selection of solutions and quality and safety-conscious design			
Literature			
• Altschuller, G. S.: Erfinden - Wege zur Lösung technischer Probleme. 2. Auflage, Verlag Technik, 1998 • Orloff, M. A.: Grundlagen der klassischen TRIZ - Ein praktisches Lehrbuch des erfinderischen Denkens für Ingenieure. Springer-Verlag, 2002 • Breiing, A., Knosala, R.: Bewerten technischer Systeme - theoretische und methodische Grundlagen bewertungstechnischer Entscheidungshilfen. Springer-Verlag, 1997 • Pahl, G., Beitz, W., Feldhusen, J., Grote. K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicher Produktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 2007 • Nachtigall, W.: Bionik als Wissenschaft: Erkennen - Abstrahieren - Umsetzen. Springer-Verlag, 2010 • Nachtigall, W.: Biologisches Design - Systematischer Katalog für Bionisches Gestalten. Springer-Verlag, 2005			

- Ehrlenspiel, K., Kiewert, A., Lindemann, U.: Kostengünstig entwickeln und Konstruieren - Kostenmanagement bei der integrierten Produktentwicklung. Springer-Verlag, 2007



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

Title	Advanced Methods to Product Development and Laboratory		
Number	2516280	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Konstruktionstechnik
Hours per Week / ECTS	4 / 7,0	Module owner	Prof. Dr. Thomas Vietor
Workload (h)	210		
Class attendance (h)	56	Self studying (h)	154
Compulsory requirements			
Recommended requirements	Basic understanding of the product development process and the product creation process, basic knowledge of the common methods for product development, (the participation on the modules #Grundlagen der Produktentwicklung und Konstruktion# is advised)		
Expected performance/ Type of examination	1 examination element: written exam (90 min) or oral exam (30 min)		
Course achievement	1 course achivement: laboratory report and presentation		
Contents			
• Function- and design principles for finding solutions • Bionics, the theory of inventive problem solving (TRIZ) • Methods for systematic evaluation and selection of solutions (e.g. utility analysis) • Methods of quality-oriented design (e.g. fault tree analysis, FMEA) • Methodical reduction of disruptive effects • Processing of complaints • Methods for identifying and reducing costs during product development			
Objective qualification			
The students are able to: • apply general and specific methods and working methods to different problems in product development • to name in-depth knowledge of variation and analogy and to apply it using the example of selected methods • to name and apply in-depth knowledge for the evaluation and selection of solutions and for quality and safety-conscious design • to practically apply in-depth methods of system development using the example of the structure and function of an e-cargo bike. • to map requirements, functions, and system structure with the help of diagrams of the modelling techniques UML and SysML.			
Literature			
• Altschuller, G. S.: Erfinden - Wege zur Lösung technischer Probleme. 2. Auflage, Verlag Technik, 1998 • Orloff, M. A.: Grundlagen der klassischen TRIZ - Ein praktisches Lehrbuch des erfinderischen Denkens für Ingenieure. Springer-Verlag, 2002 • Breiing, A., Knosala, R.: Bewerten technischer Systeme - theoretische und methodische Grundlagen bewertungstechnischer Entscheidungshilfen. Springer-Verlag, 1997			

- Pahl, G., Beitz, W., Feldhusen, J., Grote, K.-H.: Pahl/Beitz Konstruktionslehre - Grundlagen erfolgreicher Produktentwicklung, Methoden und Anwendung. 7. Auflage, Springer-Verlag, 2007
- Nachtigall, W.: Bionik als Wissenschaft: Erkennen - Abstrahieren - Umsetzen. Springer-Verlag, 2010
- Nachtigall, W.: Biologisches Design - Systematischer Katalog für Bionisches Gestalten. Springer-Verlag, 2005
- Ehrlenspiel, K., Kiewert, A., Lindemann, U.: Kostengünstig entwickeln und Konstruieren - Kostenmanagement bei der integrierten Produktentwicklung. Springer-Verlag, 2007



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

Title	Numerical Methods		
Number	2423590	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Elektrotechnik, Informationstechnik, Physik
Module duration	1	Institution	elenia Institut für Hochspannungstechnik und Energiesysteme
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 min) or oral examination (30 min), documentation of computer programs as independent work		
Course achievement			
Contents			
Objective qualification			
Literature			
Numerik symmetrischer Matrizen, H.R.Schwarz, Teubner Verlag Matrizen, R. Zurmühl, Springer			



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

Title	Local Public Transport - Planning of Infrastructure		
Number	4306410	Module version	
Shorttext		Language	german
Frequency of offer		Teaching unit	Fakultät Architektur, Bauingenieurwesen und Umweltwissenschaften
Module duration		Institution	
Hours per Week / ECTS	4 / 6,0	Module owner	
Workload (h)	180		
Class attendance (h)	56	Self studying (h)	124
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
-Reinhardt: Öffentlicher Personennahverkehr -Pachl: Systemtechnik des Schienenverkehrs -Naumann: Leit- und Sicherungstechnik im Bahnbetrieb			



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

Title	Production Technologies for Electromobility		
Number	2522540	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. Klaus Dröder
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	Students know the fundamental relationships between electrical circuits		
Expected performance/ Type of examination	1 Examination element: Written exam (120 min)		
Course achievement			
Contents			
• Introduction to electric mobility • Forms of electric mobility • Overview of production technology • Principles of production technology • Focus of research and development of production technology • Production of vehicles • Comparison of the electric power unit and the combustion engine • Types of electric vehicles • Production of electric cars (Focus lightweight construction / power unit) • Demands and challenges in the production of battery systems • Functionalities and types of battery cells • Components and hierarchy of high volt systems • Production of battery cells Production of battery modules and #systems • Production of electric engine • Focus on assembly systems for HV components • Safety and Protection • Lightweight construction for the casing of a battery system • Design of a battery system and associated production system			
Objective qualification			
Students are able to # • differentiate the specific components of an electric car from the components of a conventional car # • deduce the effects of new components on the supply chains of the OEM and the automotive suppliers # • plan basic production processes for the electric drivetrain taken into consideration the challenges in production technologies for electric vehicles # • identify potentials for optimisation of assembly and disassembly of traction batteries # • assign tasks in assembly according tot he qualification of the employees #			

- name new production technologies for lightweight construction and the electric power unit, assign them to the correct position in the process chain, identify safety relevant tasks and take risk-reducing measures #
- work in multi-disciplinary teams

Literature

- Braess, Hans-Hermann; Seiffert, Ulrich (Hg.) (2013): Vieweg Handbuch Kraftfahrzeugtechnik. 7., aktual. Aufl. 2013. Wiesbaden, s.l.: Springer Fachmedien Wiesbaden Dyckhoff,
- Harald; Spengler, Thomas S. (2010): Produktionswirtschaft. Eine Einführung. 3., überarb. und erw. Aufl. Berlin: Springer Friedrich,
- Horst E. (Hg.) (2013): Leichtbau in der Fahrzeugtechnik. Wiesbaden, s.l.: Springer Fachmedien Wiesbaden Kampker,
- Achim; Vallée, Dirk; Schnettler, Armin (2013): Elektromobilität. Grundlagen einer Zukunftstechnologie. Berlin, Heidelberg: Springer Klein,
- Bernd (2013): Leichtbau-Konstruktion. Berechnungsgrundlagen und Gestaltung. 10., überarb. u. erw. Aufl. 2013. Wiesbaden, s.l.: Springer Fachmedien Wiesbaden.
- Korthauer, Reiner (Hg.) (2013): Handbuch Lithium-Ionen-Batterien. Berlin, Heidelberg, s.l.: Springer Berlin Heidelberg.
- Ponn, Josef; Lindemann, Udo (2011): Konzeptentwicklung und Gestaltung technischer Produkte. Systematisch von Anforderungen zu Konzepten und Gestaltungsformen. 2. Aufl. Berlin, Heidelberg: Springer-Verlag Berlin Heidelberg (VDI-Buch).
- Siebenpfeiffer, Wolfgang (Hg.) (2013): Energieeffiziente Antriebstechnologien. Hybridisierung - Downsizing - Software und IT. Dordrecht: Springer Wallentowitz,
- Henning; Freialdenhoven, Arndt (2011): Strategien zur Elektrifizierung des Antriebsstranges. Technologien, Märkte und Implikationen. 2., überarbeitete Auflage. Wiesbaden: Vieweg+Teubner Verlag / Springer Fachmedien Wiesbaden GmbH Wiesbaden



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	Production Technology for Automotive Engineering		
Number	2522330	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. Klaus Dröder
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			
Contents			
• Basics of the composite technology (design, manufacturing) • Forming manufacturing processes (compression and tension forming) • Machining and ablating processes (especially of Al and St) • Joining methods (welding, soldering, bonding) • Heat treatment of Al and St • Coating process (corrosion protection) • Basics of automation and assembly technology			
Objective qualification			
The Students			
• will be able to explain the technical processes and common procedures used in the automotive industry • can derive relevant content from manufacturing technology, joining and bonding technology, coating technology and multi-material lightweight design as well as the automation and assembly technology as a result of the examples taken from automotive manufacturing • get to know the complete technical production aspects of modern automotive engineering by dealing additionally with facilities and their components • are able to select appropriate manufacturing processes and evaluate process parameters depending on the respective application at the end of the course			
Literature			
Lecture notes, further information will be announced in the lecture.			



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

Title	Quality Assurance and Optimization		
Number	2411220	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. Oleksandr Dobrovolskiy
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	Written exam (45 min); written exam (120 min) only in case of large numbers of participants		
Course achievement			
Contents			
Introduction to the measurement process Systematic and random measurement uncertainties/errors Noise and noise analysis Determination of measurement uncertainty according to GUM Fundamentals of applied statistics: distribution functions, estimation theory, hypothesis tests, error propagation Equalisation calculation, regression analysis Statistical design of experiments Quality management			
Objective qualification			
After completing the module, students will have an overview of the fundamentals of quality management and process optimisation. Thanks to the practical knowledge acquired, students will be able to solve simple optimisation tasks using statistical design of experiments.			
Literature			
- E. Schrüfer: Elektrische Messtechnik (Hanser Verlag 2007), ISBN 978-3446409040 - W. Mendenhall: Statistics for Engineering and the Sciences (Prentice Hall 1991), ISBN 978-0023805523 - O. Hein: Statistische Verfahren der Ingenieurpraxis (B.I.-Wissenschaftsverlag 1978), ISBN 978-3411001194 - N. L. Johnson and F. C. Leone: Statistics and Experimental Design, Vol. 1+2 (John Wiley & Sons 1977), ISBN 978-0471017561 und 978-0471017578 - Hartmann, Lezki und Schäfer, Statistische Versuchsplanung und -auswertung in der Stoffwirtschaft, VEB Deutscher Verlag für Grundstoffindustrie, Leipzig 1974, im Bibliotheksbestand - B. Pesch: Bestimmung der Messunsicherheit nach GUM (Books on Demand GmbH, 2004), ISBN 978-3833010392 - G. Linß: Qualitätsmanagement für Ingenieure (Hanser Fachbuchverlag Leipzig 2005), ISBN 978-3446228214			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
Literature			
• E. Schröder: Elektrische Messtechnik (Hanser Verlag)# W. Mendenhall: Statistics for Engineering and the Sciences (Prentice Hall) • O. Hein: Statistische Verfahren der Ingenieurpraxis (B.I.-Wissenschaftsverlag) • N. L. Johnson and F. C. Leone: Statistics and Experimental Design, Vol. 1+2 (John Wiley & Sons) • Hartmann, Lezki und Schäfer, Statistische Versuchsplanung und -auswertung in der Stoffwirtschaft, VEB Deutscher Verlag für Grundstoffindustrie, Leipzig • B. Pesch: Bestimmung der Messunsicherheit nach GUM (Books on Demand GmbH) • G. Linß: Qualitätsmanagement für Ingenieure (Fachbuchverlag Leipzig)			
	2,0	Exercise	german
Literature			
• E. Schröder: Elektrische Messtechnik (Hanser Verlag)# W. Mendenhall: Statistics for Engineering and the Sciences (Prentice Hall) • O. Hein: Statistische Verfahren der Ingenieurpraxis (B.I.-Wissenschaftsverlag) • N. L. Johnson and F. C. Leone: Statistics and Experimental Design, Vol. 1+2 (John Wiley & Sons) • Hartmann, Lezki und Schäfer, Statistische Versuchsplanung und -auswertung in der Stoffwirtschaft, VEB Deutscher Verlag für Grundstoffindustrie, Leipzig • B. Pesch: Bestimmung der Messunsicherheit nach GUM (Books on Demand GmbH) • G. Linß: Qualitätsmanagement für Ingenieure (Fachbuchverlag Leipzig)			

Title	Renewable Energy Technologies		
Number	2520170	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Energie- und Systemverfahrenstechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Daniel Schröder
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)		
Course achievement			
Contents			
<i>Lecture:</i> • Overview of forms and extent of renewable energies • Geothermal energy Biomass and fuel cells Biogas • Thermal solar energy for space heating and hot water production • Solar heat power stations • Photovoltaics • Windpower plants • Water-power plants <i>Exercise:</i> • Calculation of examples			
Objective qualification			
The students can name the basic technologies for renewable energy conversion and storage and are able to draft their combination to systems. They are able to calculate the theoretical efficiencies for the most significant technologies and thus are able to compare them. They know the typical efficiencies of various systems and on this basis they are able to evaluate present systems. Further, they know the major characteristic advantages and disadvantages of the technologies and are able to develop measures for improvement on this basis. Besides, they are able to design simple systems. They can analyze the integration of renewable energy technologies into the electrical energy supply system and are able to evaluate the systems in the context of current and future challenges.			
Literature			
• Winter, Nitsch: Wasserstoff als Energieträger, Springer, ISBN: 3-540-15865-0 • Bührke, Wengenmayer: Erneuerbare Energie, Wiley-VCH 2007, ISBN-10: 3-527-40727-8 • Stoy: Wunschenenergie Sonne, ISBN: 3-87200-611-8; • Kaltschmitt, Hartmann: Energie aus Biomasse, Springer, ISBN: 3-540-64853-4 • Insti, W. et al.: Wasserstoff, die Energie für alle Zeiten, Udo Pfriemer Verlag 1980, ISBN: 3-7906-0092-X			



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	Relational database systems 2		
Number	4214570	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 Informations-systeme
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Wolf-Tilo Balke
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	1 graded work: Written exam (90 minutes) or oral exam (30 minutes) or Take-Home-Exam.		
Course achievement	1 Coursework: 50% of the exercises must be passed		
Contents			
- Advanced ER modelling - Object-oriented modelling - Implementation, physical organisation, index structures - Sequence control of parallel transactions, commit and lock protocols - DB recovery and associated algorithms - Triggers and active databases - Normal form theory, functional dependencies			
Objective qualification			
After completing this module, students will have in-depth knowledge in the field of relational databases.			
Literature			
- Ramez Elmasr, Shamkant Navathe: Fundamentals of Database Systems. Addison Wesley. ISBN 10: 032141506X. - Avi Silberschatz, Henry F. Korth, S. Sudarshan: Database Systems Concepts. McGraw Hill. ISBN 10: 0072958863. - Hector Garcia-Molina, Jeffrey Ullman, Jennifer Widom: Database Systems. Prentice Hall. ISBN 10: 0130319953. - Alfons Kemper, André Eickler: Datenbanksysteme. Oldenbourg Wissenschaftsverlag. ISBN 10: 3486576909.			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Relational database systems 2	3,0	Lecture/Exercise	german
Literature			
wird in der Vorlesung bekanntgegeben			

Title	Solar Cells		
Number	2413310	Module version	
Shorttext		Language	english
Frequency of offer	every 2 years in the winter term	Teaching unit	Fakultät für Elektrotechnik, Informationstechnik, Physik
Module duration	1	Institution	Institut für Halbleitertechnik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Stefanie Kroker
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Expected performance/ Type of examination	Oral exam (30 min) or <i>Klausur</i> +		
Course achievement			
Contents			
The module proves an overview on photovoltaic generation of energy with its physical basics to fabrication of solarcells and application in modules and solar plants. • Politics of renewable energies • Physical basics of photovoltaic generation of electricity (sun radiation, absorption of radiation by semi-conductors, p-n-junction, I-U-characteristics) • Fabrication and structure of monocrystalline and multi-crystalline Solar cells • Thin film solar cells, organic cells, dye cells • Comparison of the different solar cell concepts • Dimensioning of solar plants • Applications			
Objective qualification			
The students can describe the principles of photovoltaic generation of electricity in solar cells. They can characterize solar cells to optimize their efficiency and configure simple photovoltaic devices using their characteristic parameters and geographic factors.			
Literature			
• Lecture slides and short script • H.-G. Wagemann, A. Schmidt: Grundl. d. optoelektron. Halbleiterbauelemente; Teubner Stuttgart 1998 ISBN: 3-519-03240-6 • H.-G. Wagemann, H. Eschrich: Grundl. d. photovoltaischen Energieumwandlung; Teubner Stuttgart 1994 ISBN: 3-519-03218-X			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
Literature			
Vorlesungsfolien H.-G. Wagemann, H. Eschrich: Grundlagen der photovoltaischen Energiewandlung; Teubner Studienbücher, Stuttgart 1994			
	1,0	Exercise	german

Title	Reliability Engineering		
Number	2539100	Module version	
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	Institut für Akustik und Dynamik
Hours per Week / ECTS	3 / 5,0	Module owner	Prof. Dr. Sabine Langer
Workload (h)	150		
Class attendance (h)	42	Self studying (h)	108
Compulsory requirements			
Recommended requirements	No special qualifications are required for the participation in this module.		
Expected performance/ Type of examination	1 Examination element: written exam, 90 minutes or oral exam, 30 minutes		
Course achievement			
Contents			
- Reliability terminology - concepts and rules of probability theory - statistical reliability measures - lifetime and state distribution functions - system reliability - Markov chains - maintainability			
Objective qualification			
After having completed the module, students will be able to derive system reliability models based on common means of description, methods and tools as well as making reliability design decisions based on those models. The students can formulate and name elementary definitions of reliability, probability theory, important distribution functions of component states and life times as well as statistical measures used in system reliability. Furthermore, students are able to calculate probabilities for determining the reliability of single/multi-component systems. On the basis of case studies, they can evaluate the effects of reliability assessment, fault-tolerant structures as well as reserve and maintenance strategies. Moreover, they can apply Markov chains to incorporate the aspects of maintenance into these computations. The students understand the different concepts of maintainability on the basis of selected examples.			
Literature			
- Bertsche, Bernd; Lechner, Gisbert; Zuverlässigkeit im Fahrzeug- und Maschinenbau - Ermittlung von Bauteil- und System-Zuverlässigkeiten Springer-Verlag, 2004 - Meyna, A.; Pauli, B.; Taschenbuch der Zuverlässigkeits- und Sicherheitstechnik, Hanser, 2003 - Ericson, Clifton A.; Hazard Analysis Techniques for System Safety, Wiley & Sons, 2005			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
	2,0	Lecture	german
Literature			
Skript mit ca. 120 Seiten Ergänzende Literatur wird zu Beginn der Vorlesung vorgeschlagen.			
	1,0	Exercise	german

Title	Drinking Water Treatment, Water Chemistry and Wastewater Discharge		
Number	4398290	Module version	
Shorttext		Language	
Frequency of offer		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			
[Drinking Water Treatment] The class introduces basic processes of drinking water treatment, legal regulations and drinking water standards. It presents treatment processes such as decarbonisation, flocculation, filtration, removal of iron and manganese, calcium carbonate equilibrium, processes for water softening, removal of organic compounds and water disinfection. The class also discusses world-wide problems concerning drinking water supply and treatment. [Discharge of Municipal Wastewater (VÜ)] The course presents a general introduction on various aspects of sewer systems. The class consists of three theoretical class meetings and two field trips. Class meetings cover the topics sewer net hydraulics, dimensioning of sewers, sewer inspection, pipes, pipe materials, separate and combined sewer systems. The field trips present the practical aspects such as manhole entry, sewer construction zones and an Oker boat tour in regard to drinking water aspects. [Water Chemistry and Water Analytics (VÜ)] The class covers basics of organic chemistry, characteristics of water, calculation and application examples for solubility and precipitation reactions, acid base equilibrium, sampling and sample preparation for environmental engineering questions, special chemical parameters for water and wastewater (sum parameters, rapid testing, standard analytics) and special instruments for water analytics (atomic absorption spectrometry, mass spectrometry, chromatography)			
Objective qualification			
[Drinking Water Treatment] Students gain general knowledge of all questions concerning drinking water production, supply and treatment. They are able to dimension drinking water treatment plants. They understand world-wide concerns in regard to drinking water supply and treatment. They are able to critically discuss various treatment options and find adequate solutions taking into consideration social, scientific and ethical concerns. [Discharge of Municipal Wastewater] Students gain advanced knowledge of modern sewer systems and are able to analyse and understand hydraulic, topographic and operational correlations in a sewer system. They are able to design new			

sewer systems and evaluate existing systems. They are able to critically discuss problems of wastewater discharge and find adequate solutions taking into consideration environmental, scientific and ethical concerns.

[Water Chemistry and Water Analytics]

Students will gain essential knowledge of general and inorganic chemistry and relevant problems in water chemistry. They will be able to understand the fundamental behavior of chemical elements and compounds, to solve stoichiometric calculations, to understand biochemical and chemical problems in water and wastewater treatment and find solutions for these problems.

Literature

Comprehensive lecture notes for 'Drinking Water Treatment' and 'Water Chemistry and Water Analytics' are available for download. Power point presentations for 'Water Chemistry' are also available for download. Technical literature and additional information for the class 'Discharge of Municipal Wastewater' is presented during the class.



Related courses

Rules for the choice of courses

Two out of the three offered classes must be selected. The course Water Chemistry and Analysis cannot be chosen in the Master's programme in Environmental Engineering.

Compulsory attendance

The class 'Discharge of Municipal Wastewater' has compulsory attendance (first class meeting, theoretical lectures, field trips). Participation in the theoretical lessons is pre-requisite to understand the problems presented in the field trips. If students are absent with valid excuse (e.g. illness, child care etc.) individual solutions can be found for being able to complete the class successfully and still reach educational objectives of the class. Periods of absence may not exceed 15% of compulsory attendance, in order to reach educational objectives of the class

Name of the course	SWS	Eventtype	Language
	2,0	Lecture/Exercise	german
Water Chemistry and Water Analytics	2,0	Lecture/Exercise	german
Drinking Water Treatment	2,0	Lecture/Exercise	german

Title	Traffic Management		
Number	3319000010	Module version	
Shorttext		Language	
Frequency of offer	only in the summer 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+ (90 Min.) or oral examination (ca. 30 Min.) Two assignments can be completed in advance which, if passed, count for 25% of the final grade for the module. The application for an written exam+ must be submitted by the student at the start of the examination. Further information on deadlines for the submission of term papers is provided in the courses of the module.		
Course achievement			
Contents			
- Functional and organisational system architectures for the management of road traffic facilities - Traffic flow theory as the basis for determining the traffic situation and evaluating measures - Recording, processing and analysing traffic data (practical course) - Design and traffic engineering dimensioning of road traffic facilities - Procedures and methods of traffic control for road network, road sections and junctions within (urban roads) and outside built-up areas (motorways) - Procedures for determining the traffic situation and quality management - Insights into practice through guest lectures and excursions			
Objective qualification			
Students gain a comprehensive overview of the responsibilities, tasks and objectives of the management of road traffic facilities inside and outside built-up areas. In this context, system architectures for traffic management in Germany are introduced in their functional and organisational forms. Students learn the basics of traffic data analysis and traffic flow theory in order to be able to competently deal with the tasks of traffic management and, building on this, to apply state-of-the art methods for the dimensioning of road traffic facilities and the various methods of traffic control in accordance with the regulations applicable in Germany. This gives students the skills to develop and evaluate measures that make sense from a traffic flow perspective and are ecologically and economically suitable. Taking into account the existing traffic infrastructure, they will be able to dimension road traffic systems on urban roads and motorways that meet the standards of German guidelines and equip them with the necessary traffic engineering systems (operation).			
Literature			



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

Title	Transportation Planning		
Number	4318020	Module version	
Shorttext		Language	german
Frequency of offer		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 (90 Min.) or oral exam (30 Min.)		
Course achievement	Homework assignment		
Contents			
[Verkehrsplanung (VÜ)] - Introduction to transport planning - Planning Methodology - Behavioural traffic surveys - Planning of transport networks - Planning of measures in public transport (external lecturer from the field) - Decision models - Traffic models (traffic generation, traffic distribution, traffic allocation) - Impact models and evaluation procedures - Traffic safety			
Objective qualification			
The students gain an overview of the characteristics of mobility, the socio-economic significance of transport that can be derived from this and the resulting legal anchoring of spatial and transport planning. Based on the understanding of the problems and tasks of transport planning, the planning methodology and the instruments of transport network planning in public transport and individual transport are introduced. In this context, the students get to know the requirements of the German guidelines in transport planning and can apply them to planning tasks. Through the in-depth examination of the theory and practice of transport demand modelling, the students are enabled to carry out own planning studies and to quantitatively evaluate planning alternatives. They are thus qualified to make reliable recommendations for the development of the transport infrastructure.			
Literature			
vgl. Vorlesung			



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

Methods

Title	Advanced Multivariate Data Analysis		
Number	2201000010	Module version	
Shorttext		Language	english
Frequency of offer	only in the winter term	Teaching unit	
Module duration	1	Institution	Institut für Marketing und Innovation
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. David Woi-setschläger
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Recommended requirements	A basic understanding of multivariate methods is a prerequisite for this module.		
Expected performance/ Type of examination	1 written exam (120 mins) or 1 portfolio or 1 take-home exam		
Course achievement	1 written exam (120 mins) or 1 portfolio or 1 take-home exam		
Module grade composition	The portfolio assessment is based on a 50-50 split between the written exam and the practical exercises.		
Contents			
• Regression Analysis • Logistic and Non-Linear Regression • Time Series Analysis • Confirmatory Factor Analysis • Experiments • Structural Equation Models • Multi-Level Analysis			
Objective qualification			
After completing this course, students will have advanced knowledge of multivariate data analysis methods in economics. They will be able to carry out and interpret multivariate data analyses using the open source software R.			
Literature			
• Homburg, C., Klarmann, M., & Vomberg, A. (Eds.). (2022). Handbook of Market Research (1st ed.). Springer. https://doi.org/10.1007/978-3-319-57413-4 • Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2023). Multivariate Analysis: An Application-Oriented Introduction (2nd ed.). Springer. https://doi.org/10.1007/978-3-658-40411-6 • Backhaus, K., Erichson, B., Plinke, W., & Weiber, R. (2015). Fortgeschrittene Multivariate Analysemethoden: Eine anwendungsorientierte Einführung (3rd ed.). Springer.https://doi.org/10.1007/978-3-662-46087-0			
Further reading (PDF documents, lecture notes available for download)			



Related courses			
Rules for the choice of courses			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Advanced Multivariate Data Analysis	4,0	Lecture/Exercise	english

Title	Entrepreneurship for Engineers		
Number	2537280	Module version	
Shorttext		Language	
Frequency of offer	every term	Teaching unit	Fakultät für Maschinenbau
Module duration	1	Institution	
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Reza Asghari
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements	Requirements for "TechnologyBusiness Model Creation": Successful participation in the "Technology Entrepreneurship" event/lecture		
Expected performance/ Type of examination	Writing paper		
Course achievement	Presentation: The participants have to generate a business model for a research project in teams #especially within the area of production technology and systems technology. Furthermore they have to present the milestones in the plenary session. Moreover they have to record their results by writing a research paper. The research project will be given by the chair. The institutes will present the research projects in the plenary session.		
Contents			
The economical relevance of innovative technology companies is explained in context of knowledge economy after an introduction in the topic Entrepreneurship. Furthermore the role and function of technology based start-ups as initiator and supporter innovations are analyzed. In addition an involvement with the topic #Business model# and Business model innovation takes place: especially the components of a business model are defined and systematized. Afterwards elements and methods are presented to generate business models. So students have to generate own business ideas and business models with their acquired skills. As part of the course we cooperate with several institutes and research establishments; especially with the institute for Connecting and Welding, Technologies surface engineering, micro mechanics, institute for Factory operation and Business Research. The participants have the opportunity to deal with the utilization of future-oriented research projects and to draft suitable business models on a basis within Business Model Canvas.			
Objective qualification			
At the beginning of the course, theoretical content is taught in the lecture Technology Entrepreneurship (winter semester). In the following summer semester, the students are asked to apply the acquired knowledge as teams in the seminar Technology Business Model Creation by generating their own business ideas based on scientific and technological research results and to put them into practice. (self-regulated learning). After completing the module, students have knowledge and understanding of technology-oriented companies in the entrepreneurship environment. They have developed a basic knowledge regarding the analysis and application of business models in the field of e-entrepreneurship, high-tech entrepreneurship and knowledge-oriented business start-ups. The students are able to independently analyze, evaluate and optimize subject-specific issues and to present these in writing and orally in a scientific and practice-oriented manner by discussing the relevant specialist literature. The students have developed their communication skills through discussions on general and current topics related to entrepreneurship and have trained their cooperation and teamwork skills through group work. The students are able to identify and develop a business idea and set up a business model.			
Literature			
Faltin, Günter: Kopf schlägt Kapital. 2010. Berlin			

Faltin, Günter: Wir sind das Kapital, 2015, Berlin
 Fueglistaller/Volery et al.: Entrepreneurship, 5. Auflage, 2020
 Grichnik, D. et al.: Entrepreneurship, 2. Auflage, 2017
 Keese, Christoph: Silicon Valley # Was aus dem mächtigsten Tal der Welt auf uns zukommt, 2014
 Matzler, K./Bailom, F. u.a., Digital Disruption, 2016, München
 Röpke, Jochen: Der lernende Unternehmer, 2004, Marburg
 Gassmann, O./Frankenberger, K./Csik, M.: Geschäftsmodelle Entwickeln, 2017
 Vorlesungsfolien: Die Vorlesungsmaterialien werden in Stud.IP zum Download bereitgestellt.



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

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	Innovations		
Number	2299350	Module version	
Shorttext		Language	german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Institut für Wirtschafts-informatik - Abteilung Service-Informationssysteme
Hours per Week / ECTS	4 / 5,0	Module owner	Prof. Dr. Susanne Robra-Bissantz
Workload (h)	150		
Class attendance (h)	56	Self studying (h)	94
Compulsory requirements			
Expected performance/ Type of examination	1 portfolio examination (20 min)		
Course achievement			
Contents			
Selected content - depending on the event selection: Innovation management Open Innovation Technology Push and Market Pull Cooperative creativity Integrative conception and realisation Business model and business plan			
Objective qualification			
Students are familiar with innovation management approaches and methods in this area (creation, conception, implementation). They can identify and abstract innovation management problems in technical contexts and develop solutions independently in a team. They communicate these solutions, discuss them in the group and apply them.			
Literature			
will be announced at the beginning of the event.			

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

Title	Management of Industrial Enterprises		
Number	2299690	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	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 examina-tion	1 portfolio examination		
Course achievement			
Contents			
Knowledge of the business and legal relationships involved in managing a company based on practical cases: Internal management of a company on the basis of legal rules Financing instruments of a company in the international trading business Credit insurance for distribution contracts Limits of entrepreneurial freedom: corporate governance, supervisory board and works council responsibilities			
Objective qualification			
Students understand the business and legal interrelationships involved in managing a technology company. Practical examples and courses enable students to put what they have learnt into practice.			
Literature			
Macharzina, Klaus/Wolf, Joachim, Unternehmensführung, Das internationale Managementwissen ? Konzepte ? Methoden ? Praxis, 7. vollständig überarbeitete und erweiterte Auflage 2010 2010, Gabler Verlag; Marschollek, Günter;Arbeitsrecht 19., neu bearbeitete Auflage 2012 2012, Alpmann und Schmidt; Schaub, Günter Arbeitsrechtshandbuch 14. neu bearbeitete Auflage 2011 2011, C.H. Beck			

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Related courses			
Rules for the choice of courses			
Students have to choose 2 courses.			
Colloquia are voluntary.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language
Applied Game Theory	2,0	Lecture	german
International Economics	2,0	Lecture	german
Literature			
Paul R. Krugman, Maurice Obstfeld und Marc J. Melitz. Internationale Wirtschaft: Theorie und Politik der Außenwirtschaft, Pearson 11. aktualisierte Auflage, 2019.			
Methods of Data Science for Business	1,0	Lecture	english
	1,0	Colloquium	english
Entrepreneurial Acting in a Technology Group of Companies - based on German and International Law	2,0	Lecture	german
Literature			
• Macharzina, Klaus/Wolf, Joachim, Unternehmensführung - Das internationale Managementwissen – Konzepte – Methoden – Praxis, 7. vollständig überarbeitete und erweiterte Auflage 2010, Gabler Verlag • Marschollek, Günter, Arbeitsrecht, 19., neu bearbeitete Auflage 2012, Alpmann und Schmidt • Schaub, Günter, Arbeitsrechtshandbuch, 14. neu bearbeitete Auflage 2011, C.H. Beck • Wolf, Rosanna, Die Kunst, Menschen zu führen, 5. Auflage 2010, Rowohlt Taschenbuch Verlag • Jacques Pateau, Die seltsame Alchemie in der Zusammenarbeit von Deutschen und Franzosen, 1999, Campus Verlag			
Technology & Sustainability Risk Management	2,0	Lecture	german
	3,0	Lecture	german

Title	Introduction to Psychology		
Number	17119930	Module version	2025
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	Institut für Psychologie
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Mark Vollrath
Workload (h)	180		
Class attendance (h)	60	Self studying (h)	120
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Wird in den Veranstaltungen bekannt gegeben.			



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
Literature			
Wird in der Lehrveranstaltung bekannt gegeben.			

Title	Introduction to Psychology		
Number	17119920	Module version	2025
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	Institut für Psychologie
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Mark Vollrath
Workload (h)	180		
Class attendance (h)	60	Self studying (h)	120
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Wird in den Veranstaltungen bekannt gegeben.			



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

Title	Introduction to Psychology		
Number	17119940	Module version	2025
Shorttext		Language	german
Frequency of offer	only in the summer term	Teaching unit	Fakultät für Lebenswissenschaften
Module duration	1 Semester	Institution	Institut für Psychologie
Hours per Week / ECTS	4 / 6,0	Module owner	Prof. Dr. Mark Vollrath
Workload (h)	180		
Class attendance (h)	60	Self studying (h)	120
Compulsory requirements			
Expected performance/ Type of examination			
Course achievement			
Contents			
Objective qualification			
Literature			
Wird in den Veranstaltungen bekannt gegeben.			



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

Title	Strategic Technology Management		
Number	2299440	Module version	
Shorttext		Language	german
Frequency of offer	irregular	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	1 Klausur (90 min)		
Course achievement	1 Referat		
Contents			
Selected content - depending on the course selection: - Subject and process of strategic technology and innovation management - Strategic analysis and planning tools (e.g. technology and innovation field portfolio) - Technology- and market-orientated corporate strategies - R&D management - Success factors of innovation projects - Interface management - Innovation management and organisational corporate change			
Objective qualification			
Students acquire the ability to analyse strategic problems of technology and innovation management in technology-intensive companies and to develop and implement solutions based on this.			
Literature			
- Albers, Sönke/Gassmann, Oliver (Hrsg.): Handbuch Technologie- und Innovationsmanagement, 2. Aufl., Wiesbaden 2011: Gabler; - Gerpott, Torsten J.: Strategisches Technologie- und Innovationsmanagement, 2. Aufl., Stuttgart 2005: Schäffer-Poeschel; - Gerybadze, Alexander: Technologie- und Innovationsmanagement, München 2004: Vahlen.			



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

Key Skills

Title	Orientation and Key Qualifications		
Number	2299000140	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	/ 8,0	Module owner	Studiendekan der Wirt-schaftswissenschaften
Workload (h)	90 bis 240		
Class attendance (h)	112	Self studying (h)	128
Compulsory requirements			
Expected performance/ Type of examina-tion			
Course achievement	The examination modalities depend on the selected courses and can be found in the information on the respective lectures.		
Contents			
Orientation: Typical content - depending on students, current topics and lectures: - Approaches of a technology management - Innovation management in technology companies - Communication and cooperation - Technology push and Market pull - Products and services - Industries and business models Key qualifications: Various in the elective events of the overall program			
Objective qualification			
Orientation: Students are sensitized to the interface between management and technology. They are fami-liar with problems in this field and can identify them on their own. They have a very basic but moti-vating knowledge of the subject area and have developed an idea about the direction of their fur-ther studies through their own research, presentation and discussion. Key qualifications: 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 con-texts (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

Depending on the chosen topic of the presentation. Will be announced at the beginning of the course.

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

Up to 8 credit points can be achieved in this module.

At least 3 CP must be acquired in this module, but a maximum of 8 CP, depending on the modules selected in the area of technology. Together, the two areas must add up to 28 CP.

Compulsory attendance

Name of the course	SWS	Eventtype	Language
	2,0	Series of lectures	german

Scientific Work

Title	Scientific Working - Seminar		
Number	2299000150	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	2	Institution	Department Wirtschafts- wissenschaften
Hours per Week / ECTS	9 / 12,0	Module owner	Studiendekan der Wirt- schaftswissenschaften
Workload (h)	360		
Class attendance (h)	126	Self studying (h)	234
Compulsory requirements			
Expected performance/ Type of examina- tion	1 small term paper (4 CP) + 1 project paper (8 CP) or 1 small term paper (4 CP) + 1 large term paper (8 CP) or 3 small term papers (4 CP each)		
Course achievement			
Contents			
The content of the seminar depends on the topic to be dealt with.			
Objective qualification			
The qualification objectives of the module are: 1. to learn how to work independently in an academic context and 2. to represent, defend and question scientific work professionally and thereby learn scientific dis- course.			
Literature			
Depending on the chosen course and the specific task			



Related courses			
Rules for the choice of courses			
There are courses to be completed within the framework of 12 CP.			
A maximum of 8 CP may be acquired per chair. Depending on the specifications of the chairs, knowledge of the respective orientation and/or specialization is required.			
Compulsory attendance			
Name of the course	SWS	Eventtype	Language

Master-Seminar Economics 1	3,0	Seminar	german
Master-Seminar Management Control and Business Accounting	3,0	Seminar	german
Master-Seminar Decision Support	3,0	Seminar	english german
Literature			
The literature varies depending on the chosen topic.			
	3,0	Seminar	german
Literature			
Wird in der Veranstaltung bekannt gegeben.			
Master-Seminar Services Management	3,0	Seminar	german
Literature			
Wird in der Veranstaltung bekannt gegeben.			
	3,0	Seminar	german
Master-Seminar Marketing and Customer Analytics	3,0	Seminar	german
Literature			
Wird in der Veranstaltung bekannt gegeben.			
	3,0	Project	german
Master-Seminar Service Information Systems	3,0	Seminar	german
Research Project Information Management	3,0	Project	german
Master-Seminar Management and Organisation Science	3,0	Seminar	english german
Master-Seminar Data-Driven Enterprise	3,0	Seminar	german
Master-Seminar Decision Support	3,0	Seminar	english german
Literature			
themenabhängig			
Master-Seminar Business Ethics	3,0	Seminar	english german

Master's Thesis

Title	Master's Thesis		
Number	2299000160	Module version	
Shorttext		Language	english german
Frequency of offer	every term	Teaching unit	Carl-Friedrich-Gauß-Fakultät
Module duration	1	Institution	Department Wirtschafts-wissenschaften
Hours per Week / ECTS	0 / 30,0	Module owner	Studiendekan der Wirt-schaftswissenschaften
Workload (h)	900		
Class attendance (h)	30	Self studying (h)	870
Compulsory requirements			
Expected performance/ Type of examina-tion	1 written assignment		
Course achievement			
Contents			
An in-depth academic study of a topic in the field of economics or technology-oriented management, which must address a relevant issue within the broader field of technology-oriented management.			
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 compre-hensive analyses, and are able to structure their work and present their findings. They apply rese-arch methods and present their findings both in a written paper and orally.			
Literature			
depending on the concrete task			



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

