Module Handbook
Industrial Engineering and Management M.Sc.

SPO 2015

Summer term 2025

Date: 31/03/2025

KIT DEPARTMENT OF ECONOMICS AND MANAGEMENT

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1 General Information

1.1 Study program details

KIT-Department	KIT Department of Economics and Management
Academic Degree	Master of Science (M.Sc.)
Examination Regulations Version	2015
Regular terms	4 terms
Maximum terms	7 terms
Credits	120
Language	German/English
Grade calculation	Weighted average by credits
Additional Information	Link to study program www.wiwi.kit.edu/studiengangWiingMSc.php Department https://www.wiwi.kit.edu/index.php Business unit Studium und Lehre https://www.sle.kit.edu/vorstudium/master-wirtschaftsingenieurwesen.php

1.2 Content

The four-semester, interdisciplinary Master of Industrial Engineering and Management at KIT aims for a qualification, both broad and research-focused, in the following five thematic core fields: Business Administration, Economics, Informatics, Operations Research, and Engineering.

A shared aspect of the core fields is that they put special emphasize on learning and applying quantitative methods; these are the mathematical techniques of theoretical and empirical analysis. The course of study is designed in order to provide the students with a wide horizon and versatile problem-solving skills for their professional lives. They should be able to familiarise quickly with the specific methods of their field of work, particularly with the formally sophisticated methods. This should give them a considerable degree of flexibility in their professional career.

In order to ensure the quantitative focus of the course of study, special consideration is given to ensure that successful applicants have obtained a profound knowledge of mathematics and statistics as well as sufficient basic knowledge of most of the other core subjects in their preceding Bachelor's studies.

The wide range of the qualification is ensured by the rule that at least one module worth 9 credit points (usually comprising two lectures with tutorials) must be completed for each of the five specified thematic core subjects. A second module must be completed for both Business Administration and Engineering. In two additional modules, focuses can be developed in a selected core subject or in statistics. Law or sociology can be chosen for one of these modules as well. At least two seminars and the Master's thesis develop the skills to compose and present independent pieces of research. The possibility of an international exchange is provided through ERASMUS+ programs and bilateral direct cooperation programs.

In Business Administration and Economics, a variety of theoretical approaches are applied as well as all commonly applied methods of empirical analysis: from the collection and analysis of field data to laboratory experiments and computer-aided simulations.

The Business Administration courses comprise accounting, finance economy, business management, information engineering and management, industrial production, and marketing. The Economics courses comprise microeconomic and macroeconomic theories, industrial economics and network economics, public finance and economic policy, as well as political economy. In Operations Research, the advanced methods and models of continuous, discrete, stochastic, and dynamic optimisation are taught and algorithmically applied. Informatics focuses on specialised theoretical fundamentals as well as on advanced practical methods for applying information and communication technologies in economy, management, and society.

The program in classical Engineering takes advantage of numerous specialisation options within the KIT faculties of mechanical engineering, civil engineering, electrical engineering, and informatics as well as chemical engineering and process engineering.

This sound, scientific education provides graduates with the ability to describe and interpret characteristics, terminologies, doctrines, and limits in the thematic core subjects and electives, as well as reflect the current state of research and further develop it selectively.

Their broad knowledge base allows them to think in an interdisciplinary manner and to consider issues from different perspectives. They are also familiar with the limits and with the areas of overlap of the various disciplines. They are prepared for applying complex mathematical and computer-based methods in practice. They are able to take a nuanced approach to a wide range of problems, information, and current requirements as well as analyse, compare, and evaluate them using suitable methods and concepts – also within a team. They can exchange views with expert representatives at a scientific level and take on responsibility, even within an international team. They are particularly qualified for jobs in industry, the service sector, or public administration, as well as for a continued research career (doctoral study).

Special features of the degree program

- Anchoring of the program at the KIT Department of Economics and Management
- Individual curriculum design
- Wide range of specialisations possible, e.g. in data science, energy management, entrepreneurship, microsystems technology, marketing
- High proportion of computer science
- Faculty-internal "International Relations Office" to support stays abroad
- Possibility of a German-French double master's degree. Application is required during the Bachelor's degree course.
- Partner network with companies for company contacts and internships during your studies
- Integration into the EUCOR university network enables participation in courses at the universities of Freiburg, Basel, Strasbourg, Colmar and Mulhouse
- KIT start-up incubator

1.3 Qualification Goals

Graduates of the interdisciplinary Master's program in Industrial Engineering have advanced and in-depth knowledge in business administration, economics, computer science, operations research and engineering. This mainly has its focus on business administration and engineering. The areas of specialization depend on individual interests. Additional knowledge in statistics, law or sociology is also offered depending on one's interests.
They have generalized or specialized expertise in the different disciplines.

The graduates are in a position to define, describe and interpret the specifics, limits, terminologies and doctrines in these subjects, reproduce the current state of research and selectively use this as a basis for further development.

Their extensive know-how enables them to think across the various disciplines and approach issues from different angles. They are able to select and combine appropriate courses of action for research-related topics. They can then transfer and apply
these to specific problems. They can separately analyze extensive problems such as information and current challenges and review, compare and evaluate
these using appropriate methods and concepts. They evaluate the complexity and risks, identify improvement potentials and choose sustainable solution processes and
improvement methods. This puts them in a position where they are able to make responsible and science-based decisions.

They are able to come up with innovative ideas and apply them accordingly. They can oversee these approaches either independently or in teams. They are able to explain and discuss their decisions. They can independently interpret, validate and illustrate the obtained results.

The interdisciplinary use of knowledge also takes account of social, scientific and ethical insights. The graduates can communicate with expert representatives on a scientific level and assume prominent responsibility in a team.

Karlsruhe's industrial engineers are characterized by their interdisciplinary thinking as well as their innovation and management capability. They are particularly qualified for industrial occupations, service sector or in public administration as well as a downstream scientific career (PhD).

Key qualifications

The Industrial Engineering and Management program is characterized by an exceptional degree of interdisciplinary. With the combination of subjects from business administration, economics, computer science, operations research, mathematics as well as engineering and natural sciences, the integration of knowledge from different disciplines is an inherent part of the program.

Interdisciplinary approaches and thinking in contexts are promoted naturally. In addition, the seminars and practical courses of the Master's degree program, in which students practice the highly qualified scientific processing and presentation of special subject areas, contribute significantly to the promotion of important key qualifications.

The key qualifications taught throughout the entire degree program can be assigned to the following areas:

Basic skills (soft skills):

- Teamwork, social communication and creativity techniques
- Presentation preparation and presentation techniques
- Logical and systematic argumentation and writing
- Structured problem solving and communication

Practical orientation (enabling skills)

- Competence to act in a professional context
- Project management skills
- Basic knowledge of business administration
- English as a technical language

Orientation knowledge

- Imparting interdisciplinary knowledge
- Institutional knowledge of economic and legal systems
- Knowledge of international organizations
- Media, technology and innovation

The integrative teaching of key qualifications takes place in particular as part of a series of compulsory courses within the Master's programs, namely

- the seminar module
- Accompanying Master's thesis
- modules Business administration, economics, informatics.

In addition to the integrative teaching of key qualifications, the additive acquisition of key qualifications amounting to at least three credit points is provided for in the seminar module. All SQ courses offered by the HOC, the ZAK and language courses offered by the Language Center can be taken.

The SQ courses offered by the institutions can be found in the KIT VVZ under

- House of Competence (HOC) - Courses for all students >[Specializations]
- Studium Generale and Key Qualifications and Additional Qualifications (ZAK) >[Key Qualifications at the ZAK]
- Courses at the Language Center >[Language courses]

Further information on the concept and content of the SQ courses can be found on the respective homepage- to the courses offered by the HOC: http://www.hoc.kit.edu/lehrangebot- Key qualifications at ZAK: http://www.zak.kit.edu/sq.

1.4 Employment Prospects

As a graduate of the Master's degree course in Industrial Engineering and Management, you will be characterized by your interdisciplinary way of thinking as well as your strong innovative and management skills. This qualifies you in particular as a manager in industry, the service sector or IT companies, where you can work in consulting, controlling, marketing, logistics and many other areas in which both economic and technical knowledge is required. There is also the possibility of founding your own start-up with a creative and innovative business idea. Or you can opt for an academic career and tackle a doctorate as the next stage of your career.

1.5 Acceptance Criterias

The program offers 168 study places and admission is restricted. Admission takes place in the first semester and for the higher semester in the winter and summer semesters.

German or EU nationals
1. **Firstsemester:** 15 July for the winter semester, 15 January for the summer semester
Second semester: 15 July for the winter semester, 15 January for the summer semester

Citizens from non-EU countries
1st semester: 15 July for the winter semester, 15 January for the summer semester.**First semester:** 15 July for the winter semester, 15 January for the summer semester
Second semester: 15 July for the winter semester, 15 January for the summer semester

1.6 Studies and Examination Regulations

The legal basis for the degree program and the examinations in the degree program is the

Study and Examination Regulations of the Karlsruhe Institute of Technology (KIT) for the Master's degree program in Industrial Engineering and Management

1.7 Organizational issues

Dates and events:

Current information on the degree programs as well as dates for information events and examinations can be found on the KIT department website (https://www.wiwi.kit.edu).

Recognition of achievements according to § 19 SPO

1. Achievements within the university system

   According to § 19 of the Study and Examination Regulations, study and examination achievements that have been completed in study programs at state or state-recognized universities and vocational academies in the Federal Republic of Germany or at foreign state or state-recognized universities can be recognized upon application by the student.

2. Achievements outside the higher education system

   Knowledge acquired outside the higher education system can also be recognized. A common example is the recognition of one or more internships through proof of relevant vocational training.
   For detailed information on the recognition process and the link to the application forms, please refer to the website of the KIT department.

Frequently asked questions

Answers to frequently asked questions from A for "thesis" to Z for "second repetition" can be found in our Hints A-Z.

2 Study plan

The Master's degree program in Industrial Engineering and Management (M.Sc.) has 4 terms and consists of 120 credits (CP) including Master's thesis. The master programme further deepens or complements the scientific qualifications acquired in the bachelor programme. The students should be made capable of independently applying scientific knowledge and methods and evaluate their implications and scope concerning solutions of complex scientific and social problems.

Furthermore, the student has to attend two seminars with a minimum of six CP within the seminar module. In addition to the key skills gained in the seminars (3 CP), the student has to acquire additional key skills totalling at least 3 credits.

Term	Credits	Business Administration	Economics	Informatics	Operations Research	Engineering	Electives	Master Thesis
1	29	**BUS** 9 CP	**ECON** 9 CP	**INFO** 9 CP	**OR** 9 CP	**ENG** 9 CP	**Seminar Module** 9 CP	
2	29						**Elect. Module 1** 9 CP	
3	32	**BUS** 9 CP				**ENG** 9 CP	**Elect. Module 2** 9 CP	
4	30							**Master Thesis** 30 CP
	120							

Figure 2: Structure of the Master Programme SPO2015 (Recommendation)

Figure 2 shows the structure of the subjects and the credits allocated to the subjects. The student has to choose two elective modules of the following disciplines: Business science, economics, informatics, operations research, engineering science, statistics, law and sociology. In principle, both elective modules are also available in one discipline. Thereby it is it is only allowed to choose either one module in law or in sociology.

It is left to the student's individual curriculum (taking into account the examination and module regulations), in which terms the chosen modules will be started and completed. However, it is highly recommended to complete all courses and seminars before beginning the Master's thesis.

3 Field of study structure

Mandatory	
Master's Thesis	30 CR
Business Administration	18 CR
Economics	9 CR
Informatics	9 CR
Operations Research	9 CR
Engineering Sciences	18 CR
Compulsory Elective Modules	27 CR

3.1 Master's Thesis

Credits
30

Mandatory		
M-WIWI-101650	Module Master's Thesis	30 CR

3.2 Business Administration

Credits
18

Business Administration (Election: 2 items)		
M-WIWI-105659	Advanced Machine Learning and Data Science	9 CR
M-WIWI-101410	Business & Service Engineering	9 CR
M-WIWI-105714	Consumer Research	9 CR
M-WIWI-101498	Management Accounting	9 CR
M-WIWI-101510	Cross-Functional Management Accounting	9 CR
M-WIWI-103117	Data Science: Data-Driven Information Systems	9 CR
M-WIWI-103118	Data Science: Data-Driven User Modeling	9 CR
M-WIWI-101647	Data Science: Evidence-based Marketing	9 CR
M-WIWI-105661	Data Science: Intelligent, Adaptive, and Learning Information Services	9 CR
M-WIWI-105032	Data Science for Finance	9 CR
M-WIWI-104080	Designing Interactive Information Systems	9 CR
M-WIWI-106258	Digital Marketing	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-101409	Electronic Markets	9 CR
M-WIWI-101451	Energy Economics and Energy Markets	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101488	Entrepreneurship (EnTechnon)	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-105894	Foundations for Advanced Financial -Quant and -Machine Learning Research	9 CR
M-WIWI-105923	Incentives, Interactivity & Decisions in Organizations	9 CR
M-WIWI-101471	Industrial Production II	9 CR
M-WIWI-101412	Industrial Production III	9 CR
M-WIWI-101411	Information Engineering	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-101507	Innovation Management	9 CR
M-WIWI-105312	Marketing and Sales Management	9 CR
M-WIWI-101446	Market Engineering	9 CR
M-WIWI-106660	Modeling the Dynamics of Financial Markets	9 CR
M-WIWI-101506	Service Analytics	9 CR
M-WIWI-101503	Service Design Thinking	9 CR
M-WIWI-102754	Service Economics and Management	9 CR
M-WIWI-102806	Service Innovation, Design & Engineering	9 CR
M-WIWI-101448	Service Management	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-105010	Student Innovation Lab (SIL) 1	9 CR

3.3 Economics

Credits
9

Economics (Election: 1 item)		
M-WIWI-101453	Applied Strategic Decisions	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-107010	Economics in a Connected World neu	9 CR
M-WIWI-107011	Economics of Innovation and Growth neu	9 CR
M-WIWI-101505	Experimental Economics	9 CR
M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101406	Network Economics	9 CR
M-WIWI-101638	Econometrics and Statistics I	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-101468	Environmental Economics	9 CR
M-WIWI-101511	Advanced Topics in Public Finance	9 CR
M-WIWI-101485	Transport Infrastructure Policy and Regional Development	9 CR

3.4 Informatics

Credits
9

Informatics (Election: 1 item)		
M-WIWI-101472	Informatics	9 CR

3.5 Operations Research

Credits
9

Operations Research (Election: 1 item)		
M-WIWI-101473	Mathematical Programming	9 CR
M-WIWI-102832	Operations Research in Supply Chain Management	9 CR
M-WIWI-102805	Service Operations	9 CR
M-WIWI-103289	Stochastic Optimization	9 CR

3.6 Engineering Sciences

Credits
18

Engineering Sciences (Election: at least 18 credits)		
M-MACH-101298	Automated Manufacturing Systems	9 CR
M-WIWI-101404	Extracurricular Module in Engineering	9 CR
M-MACH-101274	Rail System Technology	9 CR
M-MACH-101290	BioMEMS	9 CR
M-BGU-105592	Digitalization in Facility Management	9 CR
M-MACH-101296	Energy and Process Technology I	9 CR
M-MACH-101297	Energy and Process Technology II	9 CR
M-BGU-100998	Design, Construction, Operation and Maintenance of Highways	9 CR
M-ETIT-101164	Generation and Transmission of Renewable Power	9 CR
M-BGU-106453	Facility Management in Hospitals for Industrial Engineering	9 CR
M-MACH-101264	Handling Characteristics of Motor Vehicles	9 CR
M-MACH-101265	Vehicle Development	9 CR
M-MACH-101266	Automotive Engineering	9 CR
M-MACH-101276	Manufacturing Technology	9 CR
M-MACH-101282	Global Production and Logistics	9 CR
M-BGU-101064	Fundamentals of Transportation	9 CR
M-CIWVT-101120	Principles of Food Process Engineering	9 CR
M-ETIT-101163	High-Voltage Technology	9 CR
M-MACH-102626	Major Field: Integrated Product Development	18 CR
M-MACH-101272	Integrated Production Planning	9 CR
M-MACH-105968	Artificial Intelligence in Production	9 CR
M-BGU-101884	Lean Management in Construction	9 CR
M-MACH-105298	Logistics and Supply Chain Management	9 CR
M-MACH-101278	Material Flow in Networked Logistic Systems	9 CR
M-MACH-101291	Microfabrication	9 CR
M-MACH-101292	Microoptics	9 CR
M-MACH-101287	Microsystem Technology	9 CR
M-MACH-101267	Mobile Machines	9 CR
M-MACH-106496	Modern Mobility on Rails and Roads	9 CR
M-MACH-101294	Nanotechnology	9 CR
M-WIWI-104837	Natural Hazards and Risk Management	9 CR
M-MACH-101295	Optoelectronics and Optical Communication	9 CR
M-MACH-106590	Production Engineering	9 CR
M-BGU-101888	Project Management in Construction	9 CR
M-ETIT-101157	Control Engineering II	9 CR
M-ETIT-101158	Sensor Technology I	9 CR
M-BGU-101066	Safety, Computing and Law in Highway Engineering	9 CR
M-MACH-101268	Specific Topics in Materials Science	9 CR
M-BGU-100999	Highway Engineering	9 CR
M-MACH-105455	Strategic Design of Modern Production Systems	9 CR
M-MACH-107129	The Circular Factory neu	9 CR
M-BGU-104448	Urban Water Technologies	9 CR
M-MACH-101275	Combustion Engines I	9 CR
M-MACH-101303	Combustion Engines II	9 CR
M-BGU-101110	Process Engineering in Construction	9 CR
M-BGU-101065	Transportation Modelling and Traffic Management	9 CR
M-CIWVT-101119	Specialization in Food Process Engineering	9 CR
M-MACH-104888	Advanced Module Logistics	9 CR
M-MACH-101281	Virtual Engineering B	9 CR

M-CIWVT-101121	Water Chemistry and Water Technology I	9 CR
M-CIWVT-101122	Water Chemistry and Water Technology II	9 CR
M-MACH-101286	Machine Tools and Industrial Handling	9 CR

3.7 Compulsory Elective Modules

Credits
27

Election notes
Within the scope of the elective compulsory area, one **seminar module** (independent of subject) is to be taken over two seminars and further key qualification courses and elective modules amounting to 18 Credits. The elective modules can be chosen from Business Administration, Economics, Informatics, Operations Research, Engineering Sciences, Statistics, Law or Sociology. In principle, the elective modules can also be completed in one subject. However, the subjects Law and Sociology may only have one module in total.

Mandatory		
M-WIWI-101808	Seminar Module	9 CR
Business Administration (Election: at most 18 credits)		
M-WIWI-105659	Advanced Machine Learning and Data Science	9 CR
M-WIWI-101410	Business & Service Engineering	9 CR
M-WIWI-105714	Consumer Research	9 CR
M-WIWI-101498	Management Accounting	9 CR
M-WIWI-101510	Cross-Functional Management Accounting	9 CR
M-WIWI-103117	Data Science: Data-Driven Information Systems	9 CR
M-WIWI-103118	Data Science: Data-Driven User Modeling	9 CR
M-WIWI-101647	Data Science: Evidence-based Marketing	9 CR
M-WIWI-105661	Data Science: Intelligent, Adaptive, and Learning Information Services	9 CR
M-WIWI-105032	Data Science for Finance	9 CR
M-WIWI-104080	Designing Interactive Information Systems	9 CR
M-WIWI-106258	Digital Marketing	9 CR
M-WIWI-102808	Digital Service Systems in Industry	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-101409	Electronic Markets	9 CR
M-WIWI-101451	Energy Economics and Energy Markets	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101488	Entrepreneurship (EnTechnon)	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-105894	Foundations for Advanced Financial -Quant and -Machine Learning Research	9 CR
M-WIWI-105923	Incentives, Interactivity & Decisions in Organizations	9 CR
M-WIWI-101471	Industrial Production II	9 CR
M-WIWI-101412	Industrial Production III	9 CR
M-WIWI-101411	Information Engineering	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-101507	Innovation Management	9 CR
M-WIWI-101446	Market Engineering	9 CR
M-WIWI-105312	Marketing and Sales Management	9 CR
M-WIWI-106660	Modeling the Dynamics of Financial Markets	9 CR
M-WIWI-101506	Service Analytics	9 CR
M-WIWI-101503	Service Design Thinking	9 CR
M-WIWI-102806	Service Innovation, Design & Engineering	9 CR
M-WIWI-101448	Service Management	9 CR
M-WIWI-102754	Service Economics and Management	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-105010	Student Innovation Lab (SIL) 1	9 CR
M-WIWI-105011	Student Innovation Lab (SIL) 2	9 CR
Economics (Election: at most 18 credits)		
M-WIWI-101453	Applied Strategic Decisions	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-107010	Economics in a Connected World neu	9 CR
M-WIWI-107011	Economics of Innovation and Growth neu	9 CR
M-WIWI-101505	Experimental Economics	9 CR
M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101406	Network Economics	9 CR

M-WIWI-101638	Econometrics and Statistics I	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-101468	Environmental Economics	9 CR
M-WIWI-101485	Transport Infrastructure Policy and Regional Development	9 CR
M-WIWI-101511	Advanced Topics in Public Finance	9 CR
Informatics (Election: at most 18 credits)		
M-WIWI-101628	Emphasis in Informatics	9 CR
M-WIWI-101630	Electives in Informatics	9 CR
Operations Research (Election: at most 18 credits)		
M-WIWI-101473	Mathematical Programming	9 CR
M-WIWI-102832	Operations Research in Supply Chain Management	9 CR
M-WIWI-102805	Service Operations	9 CR
M-WIWI-103289	Stochastic Optimization	9 CR
Engineering Sciences (Election: at most 18 credits)		
M-WIWI-101404	Extracurricular Module in Engineering	9 CR
M-MACH-101298	Automated Manufacturing Systems	9 CR
M-MACH-101274	Rail System Technology	9 CR
M-MACH-101290	BioMEMS	9 CR
M-BGU-105592	Digitalization in Facility Management	9 CR
M-MACH-101296	Energy and Process Technology I	9 CR
M-MACH-101297	Energy and Process Technology II	9 CR
M-BGU-100998	Design, Construction, Operation and Maintenance of Highways	9 CR
M-ETIT-101164	Generation and Transmission of Renewable Power	9 CR
M-BGU-106453	Facility Management in Hospitals for Industrial Engineering	9 CR
M-MACH-101264	Handling Characteristics of Motor Vehicles	9 CR
M-MACH-101265	Vehicle Development	9 CR
M-MACH-101266	Automotive Engineering	9 CR
M-MACH-101276	Manufacturing Technology	9 CR
M-MACH-101282	Global Production and Logistics	9 CR
M-BGU-101064	Fundamentals of Transportation	9 CR
M-CIWVT-101120	Principles of Food Process Engineering	9 CR
M-ETIT-101163	High-Voltage Technology	9 CR
M-MACH-101272	Integrated Production Planning	9 CR
M-MACH-102626	Major Field: Integrated Product Development	18 CR
M-MACH-105968	Artificial Intelligence in Production	9 CR
M-BGU-101884	Lean Management in Construction	9 CR
M-MACH-105298	Logistics and Supply Chain Management	9 CR
M-MACH-101278	Material Flow in Networked Logistic Systems	9 CR
M-MACH-101291	Microfabrication	9 CR
M-MACH-101292	Microoptics	9 CR
M-MACH-101287	Microsystem Technology	9 CR
M-MACH-101267	Mobile Machines	9 CR
M-MACH-106496	Modern Mobility on Rails and Roads	9 CR
M-MACH-101294	Nanotechnology	9 CR
M-WIWI-104837	Natural Hazards and Risk Management	9 CR
M-MACH-101295	Optoelectronics and Optical Communication	9 CR
M-MACH-106590	Production Engineering	9 CR
M-BGU-101888	Project Management in Construction	9 CR
M-ETIT-101157	Control Engineering II	9 CR
M-ETIT-101158	Sensor Technology I	9 CR

M-BGU-101066	Safety, Computing and Law in Highway Engineering	9 CR
M-MACH-101268	Specific Topics in Materials Science	9 CR
M-BGU-100999	Highway Engineering	9 CR
M-MACH-105455	Strategic Design of Modern Production Systems	9 CR
M-MACH-107129	The Circular Factory neu	9 CR
M-BGU-104448	Urban Water Technologies	9 CR
M-MACH-101275	Combustion Engines I	9 CR
M-MACH-101303	Combustion Engines II	9 CR
M-BGU-101110	Process Engineering in Construction	9 CR
M-BGU-101065	Transportation Modelling and Traffic Management	9 CR
M-CIWVT-101119	Specialization in Food Process Engineering	9 CR
M-MACH-104888	Advanced Module Logistics	9 CR
M-MACH-101281	Virtual Engineering B	9 CR
M-CIWVT-101121	Water Chemistry and Water Technology I	9 CR
M-CIWVT-101122	Water Chemistry and Water Technology II	9 CR
M-MACH-101286	Machine Tools and Industrial Handling	9 CR
Statistics (Election: at most 18 credits)		
M-WIWI-101637	Analytics and Statistics	9 CR
M-WIWI-101638	Econometrics and Statistics I	9 CR
M-WIWI-101639	Econometrics and Statistics II	9 CR
Law or Sociology (Election: at most 9 credits)		
M-INFO-106754	Public Economic and Technology Law	9 CR
M-INFO-101215	Intellectual Property Law	9 CR
M-INFO-101216	Private Business Law	9 CR
M-GEISTSOZ-101169	Sociology	9 CR
M-INFO-101191	Commercial Law	9 CR

4 Modules

M 4.1 Module: Advanced Machine Learning and Data Science [M-WIWI-105659]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	3

Mandatory			
T-WIWI-111305	Advanced Machine Learning and Data Science	9 CR	Ulrich

Competence Certificate
The assessment is carried out in an alternative form.The final grade is evaluated based on the intermediate presentations during the project, the quality of the implementation, the final written thesis and a final presentation.

Prerequisites
None

Competence Goal
After a successful project, the students can:

- select and apply modern machine learning methods to solve a data science problem;
- organize themselves in a team in a goal-oriented manner and bring an extensive software project in the field of data science and machine learning to success;
- deepen their data science and machine learning skills
- solve a finance problem with the help of data science and machine learning algorithm.

Content
The course is targeted at students with a major in Data Science and/or Machine Learning and/or Quantitative Finance. It offers students the opportunity to develop hands-on knowledge on new developments in the intersection of quantitative financial markets, data science and machine learning. The result of the project should not only be a final thesis, but the implementation of methods or development of an algorithm in machine learning and data science. Typically, problems and data are taken from current research and innovations in the field of quantitative asset and risk management.

Workload
Total effort for 9 credit points: approx. 270 hours are divided into the following parts: Communication:Exchange during the project: 30 h, Final presentation: 10 h; Implementation and thesis: Preparation before development (Problem analysis and solution design): 70 h, Solution implementation: 110 h, Tests and quality assurance: 50 h.

Recommendation
None

M 4.2 Module: Advanced Module Logistics [M-MACH-104888]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	9

Specialization module logistics (Election:)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-MACH-113950	Dimensioning of Material Flow Systems in Production and Logistics	4 CR	Furmans
T-MACH-112113	Dynamic Systems of Technical Logistics	6 CR	Mittwollen
T-MACH-112114	Dynamic Systems of Technical Logistics - Project	4 CR	Mittwollen
T-MACH-105151	Energy Efficient Intralogistic Systems	4 CR	Kramer, Schönung
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Spieckermann
T-MACH-111003	Global Logistics	4 CR	Furmans
T-MACH-113701	Industrial Mobile Robotics Lab	4 CR	Furmans
T-MACH-105187	IT-Fundamentals of Logistics	4 CR	Thomas
T-MACH-105174	Warehousing and Distribution Systems	4 CR	Furmans
T-MACH-105171	Safety Engineering	4 CR	Kany

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of 9 credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
One of the modules M-MACH-106995 or M-MACH-105298 must be completed.

Competence Goal
The student aquires

- well-founded knowledge and method knowledge in the main topics of logistics,
- ability for modeling logistic systems with adequate accuracy by using simple models,
- ability to evaluate logistic systems and to identify cause-and-effects-chains within logistic systems.

Content
The Advanced Module Logistics provides a comprehensive and well-founded basics for the main topics of logistics. The module allows students to focus on various topics within the field of logistics.

Workload
270 hours

Learning type
Lecture, tutorial.

4.3 Module: Advanced Topics in Public Finance [M-WIWI-101511]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Electives (Election: between 1 and 2 items)			
T-WIWI-108711	Basics of German Company Tax Law and Tax Planning	4,5 CR	Gutekunst, Wigger
T-WIWI-102740	Public Management	4,5 CR	Wigger
Supplementary Courses (Election: between 0 and 1 items)			
T-WIWI-111304	Fundamentals of National and International Group Taxation	4,5 CR	Wigger
T-WIWI-102739	Public Revenues	4,5 CR	Wigger

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the courses "Public Management" or "Basics of German Company Tax Law and Tax Planning" is mandatory in the module and must be successfully examined.

Competence Goal
The student

- understands the theory and politics of taxation
- has knowledge in the area of public debt.
- understands efficiency problems of public organizations.
- is able to work on fiscal problems.

Content
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs.

In the course of the lectures within this module the students achieve knowledge in the areas of public revenues, national and international law of taxation and theory of public sector organizations.

Annotation
The course T-WIWI-102790 "Specific Aspects in Taxation" will no longer be offered in the module as of winter semester 2018/2019.

Students who successfully passed the exam in „Public Management“ before the introduction of the module “Advanced Topics in Public Finance” in winter term 2014/15 are allowed to take both courses “Public Revenues” and “Specific Aspects in Taxation".

Workload
Total workload for 9 credit points: approx. 270 hours.

Attendance time: approx. 90 hours

Preparation and follow-up: approx. 135 hours

Exam and exam preparation: approx. 45 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation

Basic knowledge in the area of public finance and public management is required.

M 4.4 Module: Advanced Topics in Strategy and Management [M-WIWI-103119]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	1

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-106188	Workshop Current Topics in Strategy and Management	3 CR	Lindstädt
T-WIWI-106189	Workshop Business Wargaming – Analyzing Strategic Interactions	3 CR	Lindstädt
T-WIWI-106190	Strategy and Management Theory: Developments and "Classics"	3 CR	Lindstädt

Competence Certificate
The control of success takes place in the form of partial examinations (according to §4(2), 1-3 SPO) on the courses of the module, amounting to a total of 9 LP. The performance review is described for each course of this module. The overall grade of the module is formed from the LP-weighted grades of the partial examinations and truncated after the first decimal place.

Prerequisites
None

Competence Goal
Upon completion of the module, students will be able to,

- independently analyze strategic issues in a structured manner using appropriate models and frames of reference from management theory and derive recommendations.
- Convincingly present their position by means of a well thought-out argumentation in structured discussions.
- independently deal with a current, research-oriented issue from strategic management.
- draw his/her own conclusions from the little structured information by incorporating his/her interdisciplinary knowledge and selectively develop the current research results.
- apply and discuss theoretical contents of management theory to real situations by intensively dealing with a variety of practice-relevant case studies.

Content
In terms of content, three focal points will be set. First, strategic issues are discussed and analyzed on the basis of jointly selected case studies. Secondly, the students deal intensively with the topic of business wargaming in a workshop and analyze strategic interactions. Thirdly, topics of strategy and management theory will be elaborated in a written paper.

Annotation
The module is admission restricted. Upon successful admission to a course, the student is guaranteed the opportunity to complete the module. Examinations are offered at least every other semester so that the entire module can be completed in two semesters.

Workload
Total effort for 9 credit points: approx. 270 hours. The exact distribution is done according to the credit points of the courses of the module. The workload for courses with 3 credits is approx. 90h.

4.5 Module: Analytics and Statistics [M-WIWI-101637]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (Statistics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Mandatory			
T-WIWI-103123	Advanced Statistics	4,5 CR	Grothe
Supplementary Courses (Election: between 4,5 and 5 credits)			
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course "*Advanced Statistics*" is compulsory.

Competence Goal
A Student

- Deepens the knowledge of descriptive and inferential statistics.
- Deals with simulation methods.
- Learns basic and advanced methods of statistical analysis of multivariate and high-dimensional data.

Content

- Deriving estimates and testing hypotheses
- Stochastic processes
- Multivariate statistics, copulas
- Dependence measures
- Dimension reduction
- High-dimensional methods
- Prediction

Annotation
The planned lectures and courses for the next three years are announced online.

Workload
The total workload for this module is approximately 270 hours.

4.6 Module: Applied Strategic Decisions [M-WIWI-101453]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	6

Mandatory			
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Supplementary Courses (Election: between 4,5 and 5 credits)			
T-WIWI-113469	Advanced Corporate Finance	4,5 CR	Ruckes
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course "Advanced Game Theory" is obligatory. Exception: The course "Introduction to Game Theory" was completed. Even those who have already successfully proven "Advanced Game Theory" in another master module can take the module. In this case you can choose freely from the rest of the offer. However, this choice can only be made by the examination office of the Department of Economics and Management.

Competence Goal
Students

- can model and analyze complex situations of strategic interaction using advanced game theoretic concepts;
- are provided with essential and advanced game theoretic solution concepts on a rigorous level and can apply them to understand real-life problems;
- learn about the experimental method, ranging from designing an economic experiment to data analysis.

Content
The module provides solid skills in game theory and offers a broad range of game theoretic applications. To improve the understanding of theoretical concepts, it pays attention to empirical evidence as well.

Annotation
The course *Predictive Mechanism and Market Design* is not offered each year.

Workload
The total workload for this module is approximately 270 hours. The exact distribution is made according to the credit points of the courses of the module.

Recommendation
Basic knowledge in game theory is assumed.

M 4.7 Module: Artificial Intelligence in Production [M-MACH-105968]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	1

Mandatory			
T-MACH-112115	Artificial Intelligence in Production	5 CR	Fleischer
T-MACH-112121	Seminar Application of Artificial Intelligence in Production	4 CR	Fleischer

Competence Certificate
T-MACH-112115 - Written Exam (90 min)

T-MACH-112121 - Alternative test achievement (graded)

Prerequisites
none

Competence Goal
The Students understand

- the relevance for the application of artificial intelligence in production and know the main drivers and challenges.
- the CRISP-DM process for implementing AI projects in production.
- the most important methods within the CRISP-DM phases and can theoretically select and practically apply them holistically based on practical issues.

Content
The module AI in Production is designed to teach students the practical, holistic integration of machine learning methods in production. The course is oriented towards the phases of the CRISP-DM process with the aim of developing a deep understanding of the necessary steps and content-related aspects (methods) within the individual phases. In addition to teaching the practical aspects of integrating the most important machine learning methods, the focus is primarily on the necessary steps for data generation and data preparation as well as the implementation and validation of the methods in an industrial environment. The focus of the module is on the practical teaching of the contents, based on production engineering issues. The necessary theoretical basics are taught in the course "Lecture AI in Production". In the course "Project internship Application of AI in Production", practice-relevant architectures of machine learning are used to solve current practical problems in the production environment. The implementation here is also oriented to the phases of the CRISP-DM.

Module grade calculation
The overall grade for the module is calculated from the LP-weighted grades of the partial examinations and cut off after the first decimal place.

Workload
Artificial Intelligence in Production
MACH:
regular attendance: 31,5 hours
self-study: 88,5 hours
WING:
regular attendance: 31,5 hours
self-study: 118,5 hours

Seminar Application of Artificial Intelligence in Production
regular attendance: 21 hours
self-study: 99 hours

Learning type
Lecture, Seminar

M 4.8 Module: Automated Manufacturing Systems [M-MACH-101298]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Mandatory			
T-MACH-114049	Basics of Production Automation	5 CR	Fleischer
T-MACH-113999	Seminar Development of Automated Production Systems	4 CR	Fleischer

Competence Certificate
see individual courses

Prerequisites
none

Competence Goal
The students...

- are able to name and describe the automation tasks in production plants and the components required for implementation.
- can select components from the areas of 'handling technique, 'industrial robots', 'sensor technology' and 'control & drive technology' for a given application.
- are able to compare different concepts of robotics and select the appropriate one for a given application.
- can assess the automation of production plants implemented on the basis of the examples given and apply them to new problems.
- know the process of planning automated production plants.
- can apply the theoretical knowledge they have acquired in practice.
- are able to develop a solution concept for an automation task, project it and implement the main features of it.

Content
The lecture provides an overview of the structure and functioning of automated production systems. The functioning and application of fundamental elements for the realisation of automated production systems are taught. These include:

- Drive and control technology
- Handling technology for handling workpieces and tools
- Industrial robots
- Quality assurance in automated production plants
- Structures and design of manufacturing and assembly systems
- Introduction to project planning of automated production plants

An interdisciplinary consideration of these sub-areas reveals interfaces to Industry 4.0 approaches. The theoretical foundations are supplemented by practical application examples and live demonstrations in the Karlsruhe Research Factory. Within exercises, the contents of the lecture are deepened and applied to specific problems and tasks.

The seminar Application of Production Automation focuses on the practical implementation of automation tasks. In small groups, solutions to automation problems are developed and basic functionalities are implemented in the Karlsruhe Research Factory. The results of this work are presented in a final presentation.

Workload
The work load is about 270 hours, corresponding to 9 credit points.

Learning type
Lectures, exercise, excursion

M 4.9 Module: Automotive Engineering [M-MACH-101266]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	6

Automotive Engineering (Election: at least 9 credits)			
T-MACH-102203	Automotive Engineering I	6 CR	Gauterin, Gießler
T-MACH-112126	Data-Driven Algorithms in Vehicle Technology	4 CR	Scheubner
T-MACH-102093	Fluid Power Systems	5 CR	Geimer
T-MACH-100092	Automotive Engineering I	6 CR	Gießler
T-MACH-102117	Automotive Engineering II	3 CR	Gießler
T-MACH-102116	Fundamentals for Design of Motor-Vehicle Bodies I	1,5 CR	Bardehle
T-MACH-102119	Fundamentals for Design of Motor-Vehicle Bodies II	1,5 CR	Bardehle
T-MACH-110796	Python Algorithms for Vehicle Technology	4 CR	Rhode
T-MACH-102156	Project Workshop: Automotive Engineering	4,5 CR	Frey, Gießler
T-MACH-111820	Control of Mobile Machines – Prerequisites	0 CR	Becker, Geimer
T-MACH-111821	Control of Mobile Machines	4 CR	Becker, Geimer

Competence Certificate
The assessment is carried out as partial exams.

The partial exams consists of a written exam (90 to 120 minutes) or an oral exam (duration 30 to 40 minutes).

Prerequisites
None

Competence Goal
The student

- knows the most important components of a vehicle,
- knows and understands the functioning and the interaction of the individual components,
- knows the basics of dimensioning the components.

Content
In the module Automotive Engineering the basics are taught, which are important for the development, the design, the production and the operation of vehicles. Particularly the primary important aggregates like engine, gear, drive train, chasis and auxiliary equipment are explained, but also all technical equipment, which make the operation safer and easier. Additionally the interior equipment is examined, which shall provide a preferably comfortable, optimum ambience to the user.

In the module Automotive Engineering the focus is on passenger cars and commercial vehicles, which are designed for road applications.

Workload
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

Recommendation
Knowledge of the content of the courses *Engineering Mechanics I* [2161238] and *Engineering Mechanics II* [1262276] is helpful.

Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.

4.10 Module: BioMEMS [M-MACH-101290]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Mandatory			
T-MACH-100966	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I	3 CR	Guber
BioMEMS (Election: at least 6 credits)			
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-MACH-102165	Selected Topics on Optics and Microoptics for Mechanical Engineers	3 CR	Heckele, Mappes
T-MACH-100967	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II	3 CR	Guber
T-MACH-100968	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III	3 CR	Guber
T-MACH-101910	Microactuators	3 CR	Kohl
T-MACH-102176	Current Topics on BioMEMS	4 CR	Guber
T-MACH-111807	Introduction to Bionics	3 CR	Hölscher
T-MACH-108312	Introduction to Microsystem Technology - Practical Course	4 CR	Last

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
The student

- has basic as well as extensive knowledge about different fields of applications of BioMEMS
- understands continuative aspects of the related subjects optics and microoptics, micro actuators, replications techniques and bionics

Content
Operations through small orifices, a pill which will take pictures on its way through your body or lab results right at the point of care - the need for easier and faster ways to help people is an important factor in research. The module BioMEMS (Bio(medical)-Micro-Electro-Mechanical-Systems) describes the application of microtechnology in the field of Life-Science, medical applications and Biotechnology and will teach you the necessary skills to understand and develop biological and medical devices.

The BioMEMS lectures will cover the fields of minimal invasive surgery, lab-on-chip systems, NOTES-Technology (Natural Orifice Transluminal Endoscopic Surgery), as well as endoscopic surgery and stent technology.

Additionally to the BioMEMS lectures you can specialize in various related fields like fabrication, actuation, optics and bionics. The course Replication processes will teach you some cost efficient and fast ways to produce parts for medical or biological devices. In the course Microactuation it is discussed how to receive movements in micrometer scale in a microsystem, this could be e.g. to drive micro pumps or micro valves. The necessary tools for optical measurement and methods of analysis to gain high resolution pictures are also part of this module. To deepen your knowledge and to get a hands-on experience this module contains a one week lab course. In the lecture bionics you can see how biological effects can be transferred into technical products.

Workload
270 hours

Learning type
Lectures

M 4.11 Module: Business & Service Engineering [M-WIWI-101410]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz
T-WIWI-113724	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student should

- learn to develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- learn to restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.
- improve his statistics skills and apply them to appropriate cases
- learn to elaborate solutions in a team

Content
This module addresses the challenges of creating new kinds of products, processes, services, and markets from a service perspective in the context of new developed information and communication technologies and the globalization process. The module describes service competition as a business strategy in the long term that leads to the design of business processes, business models, forms of organization, markets, and competition. This will be shown by actual examples from personalized services, recommender services and social networks.

Annotation
All practical Seminars offered at the IM can be chosen for *Special Topics in Information Systems*. Please update yourself on www.iism.kit.edu/im/lehre .

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload
The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours, for courses with 5 credits approx. 150 hours.

The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

Recommendation
None

M 4.12 Module: Collective Decision Making [M-WIWI-101504]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	4

Compulsory Elective Courses (Election:)			
T-WIWI-102740	Public Management	4,5 CR	Wigger
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- are able to model and assess problems in public economics and to analyze them with respect to positive and normative aspects,
- understand individual incentives and social outcomes of different institutional designs,
- are familiar with the functioning and design of democratic elections and can analyze them with respect to their individual incentives.

Content
The focus of the module is on mechanisms for public decision making including voting and the aggregation of preferences and judgements.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

M 4.13 Module: Combustion Engines I [M-MACH-101275]

Responsible: Prof. Dr. Thomas Koch
Dr.-Ing. Heiko Kubach

Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each winter term	1 term	4	5

Wahlpflicht (Election: between 1 and 2 items)			
T-MACH-111550	CO2-Neutral Combustion Engines and their Fuels I	5 CR	Koch
T-MACH-111585	Hydrogen and reFuels - Energy Conversion in Combustion Engines	4 CR	Kubach

Competence Certificate
The module examination contains of two oral examinations. The module score results from the two scores weighted according to the ECTS.

Prerequisites
None

Competence Goal
The student can name and explain the working princile of combustion engines. He is able to analyse and evaluate the combustion process. He is able to evaluate influences of gas exchange, mixture formation, fuels and exhaust gas aftertreatment on the combustion performance. He can solve basic research problems in the field of engine development.

The student can name all important influences on the combustion process. He can analyse and evaluate the engine process considering efficiency, emissions and potential.

Content
Working Principle og ICE

Characteristic Parameters

Characteristic parameters

Engine parts

Crank drive

Fuels

Gasolien engine operation modes

Diesel engine operation modes

Emissions

Fundamentals of ICE combustion

Thermodynamics of ICE

Flow field

Wall heat losses

Combsution in Gasoline and Diesel engines

Heat release calculation

Waste heat recovery

CO2-free engine technology

Workload
regular attendance: 62 hours
self-study: 208 hours

4.14 Module: Combustion Engines II [M-MACH-101303]

Responsible: Dr.-Ing. Heiko Kubach
Julia Reichel

Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	4

Mandatory			
T-MACH-111560	CO2-Neutral Combustion Engines and their Fuels II	5 CR	Koch
Verbrennungsmotoren II (Election: at least 4 credits)			
T-MACH-105173	Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines	4 CR	Gohl
T-MACH-105649	Boosting of Combustion Engines	4 CR	Kech, Kubach
T-MACH-105184	Fuels and Lubricants for Combustion Engines	4 CR	Kehrwald, Kubach
T-MACH-110817	Development of Hybrid Drivetrains	4 CR	Koch
T-MACH-110816	Large Diesel and Gas Engines for Ship Propulsions	4 CR	Kubach
T-MACH-105044	Fundamentals of Catalytic Exhaust Gas Aftertreatment	4 CR	Deutschmann, Grunwaldt, Kubach, Lox
T-MACH-105167	Analysis Tools for Combustion Diagnostics	4 CR	Pfeil
T-MACH-105169	Engine Measurement Techniques	4 CR	Bernhardt
T-MACH-111578	Sustainable Vehicle Drivetrains	4 CR	Koch, Toedter
T-MACH-105985	Ignition Systems	4 CR	Toedter

Competence Certificate
The assessment consists of an oral exam (60 min) taking place in the recess period (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Reexaminations are offered at every ordinary examination date.

Prerequisites
It is only possible to choose this module in combination with the module *Combustion Engines I*. The module is passed only after the final partial exam of *Combustion Engines I* is additionally passed.

The course *Combustion Engines II* [2134131] has to be attended.

Competence Goal
See courses.

Content
Compulsory:

Supercharging and air management

Engine mapsEmissions and Exhaust gas aftertreatment

Transient engine operationECU application

Electrification and alternative powertrains

Elective:

Fuels and lubricants for ICE

Fundamentals of catalytic EGA

Analysis tools for combustion diagnostics

Engine measurement techniques

Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines

Workload
regular attendance: 62 h

self-study: 208 h

Learning type
Lecture, Tutorial

M 4.15 Module: Commercial Law [M-INFO-101191]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: Compulsory Elective Modules (Law or Sociology)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	3 terms	German	4	3

Mandatory			
T-INFO-102013	Exercises in Civil Law	9 CR	Matz

4.16 Module: Consumer Research [M-WIWI-105714]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	6

Compulsory Elective Courses (Election:)			
T-WIWI-113471	Bayesian Statistics for Analyzing Data	4,5 CR	Scheibehenne
T-WIWI-113095	Behavioral Lab Exercise	4,5 CR	Nieken, Scheibehenne
T-WIWI-114186	Collective Intelligence in Human Judgment and Decision Making	4,5 CR	Scheibehenne
T-WIWI-114185	Computational Modelling of Judgments, Decisions and Cognition	4,5 CR	Scheibehenne
T-WIWI-111100	Current Directions in Consumer Psychology	4,5 CR	Scheibehenne
T-WIWI-114174	Economic Decision Making	4,5 CR	Scheibehenne
T-WIWI-111109	KD^{2}Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-107720	Market Research	4,5 CR	Klarmann

Competence Certificate
The assessment is based on partial exams within the classes offered in this module. Please check the descriptions of the classes for details.

The overall grade of the module is the arithmetic mean of the grades for each course weighted by the number of credits and truncated after the first decimal.

Prerequisites
Willingness to actively engage with the topic.

Competence Goal

- Understand human judgment and decision making in an economic context
- Learn how to plan, program, conduct, statistically analyze, visualize, model, and report behavioral experiments
- Critically evaluate scientific findings in the aftermath of the replication crisis

Content
This module provides students with in-depth knowledge about consumer research at the intersection between Marketing, Psychology, and Cognitive Science. The module consists of classes that look into how individuals and groups make judgments and decisions and what factors influences their behavior (e.g. the lecture on judgment and decision making). Because most findings in this area of research rely on behavioral experiments, this module also focuses on methodological skills. This includes classes on how to plan and design behavioral experiments, conduct and report meaningful statistical analyses, and develop computational cognitive models. The module also includes classes about reproducibility and transparency in the behavioral sciences. The module is a pre-requisite for writing a Master thesis at the KIT Cognition and Consumer Behavior lab.

Workload
The total workload for this module is approximately 270 hours.

Recommendation
Interest in behavioral research.

4.17 Module: Control Engineering II [M-ETIT-101157]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Dr.-Ing. Mathias Kluwe

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	3

Mandatory			
T-ETIT-100666	Control of Linear Multivariable Systems	6 CR	Kluwe
T-ETIT-100980	Nonlinear Control Systems	3 CR	Kluwe

Competence Certificate
The assessment is carried out as partial written exams of the single courses of this module (T-ETIT-100980 and T-ETIT-100666).

Prerequisites
none

Module grade calculation
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Recommendation
For this module a basic knowledge in system theory and control engineering is assumed. These subjects can be found in the course *System Dynamics and Control Engineering* (M-ETIT-102181) which is recommended to have been attended beforehand.

4.18 Module: Cross-Functional Management Accounting [M-WIWI-101510]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	13

Mandatory			
T-WIWI-102885	Advanced Management Accounting	4,5 CR	Wouters
Supplementary Courses (Election: 4,5 credits)			
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102835	Marketing Strategy Business Game	1,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-108651	Extraordinary Additional Course in the Module Cross-Functional Management Accounting	4,5 CR	Wouters

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course "Advanced Management Accounting" is compulsory.

The additional courses can only be chosen after the compulsory course has been completed successfully.

Competence Goal
Students will be able to apply advanced management accounting methods to managerial decision-making problems in marketing, finance, organization and strategy.

Content
The module includes a course on several advanced management accounting methods that can be used for various decisions in operations and innovation management. By selecting another course, each student looks in more detail at one interface between management accounting a particular field in management, namely marketing, finance, or organization and strategy.

Annotation
The module "Cross-functional Management Accounting" always includes the compulsory course “Advanced Management Accounting.” Students look at the interface between management accounting and another field in management. Students build the module by adding a course from the specified list. Students can also suggest another suitable course for this module for evaluation by the coordinator.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation
None

4.19 Module: Data Science for Finance [M-WIWI-105032]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	English	4	1

Mandatory			
T-WIWI-102878	Computational Risk and Asset Management	4,5 CR	Ulrich
T-WIWI-110213	Python for Computational Risk and Asset Management	4,5 CR	Ulrich

Competence Certificate
The module examination takes the form of an alternative exam assessment.
The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Competence Goal
The aim of the module is to use data science, machine learning and financial market theories to generate better investment, risk and asset management decisions. The student gets to know the characteristics of different asset classes in an application-oriented manner using real financial market data. We use Python and web scraping techniques to extract, visualize and examine patterns of publicly available financial market data. Interesting and non-public financial market data such as (option and futures data on shares and interest) are provided. Financial market theories are also discussed to improve data analysis through theoretical knowledge. Students get to know stock, interest rate, futures and options markets through the "data science glasses". Through "finance theory glasses" students understand how patterns can be communicated and interpreted using finance theory. Python is the link through which we bring data science and modern financial market modeling together.

Content
The course covers several topics, among them:

- Pattern detection in price and return data in equity, interest rate, futures and option markets
- Quantitative Portfolio Strategies
- Modeling Return Densities using tools from financial econometrics, data science and machine learning
- Valuation of equity, fixed-income, futures and options in a coherent framework to possibly exploit arbitrage opportunities
- Neural networks and Natural Language Processing

Workload
The total workload for this module is 270 hours (9 credit points).The total number of hours resulting from income from studying online video, answering quizzes, studying Ipython notebooks, active and interactive "Python Data Sessions" and reading literature you have heard.

Recommendation
Basic knowledge of capital markt theory.

M 4.20 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	10

Compulsory Elective Courses (Election:)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-114209	Artificial Intelligence in Service Systems II: Generative AI Applications & Adoption	4,5 CR	Satzger
T-WIWI-106187	Business Data Strategy	4,5 CR	Weinhardt
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche
T-WIWI-114089	Data Science for Business	4,5 CR	Pfeiffer
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-114210	(Gen)AI-based Automation in Organizations	4,5 CR	Mädche
T-WIWI-110918	Introduction to Bayesian Statistics for Analyzing Data	4,5 CR	Scheibehenne
T-WIWI-113459	Practical Seminar: Human-Centered Systems	4,5 CR	Mädche
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-106207	Practical Seminar: Data-Driven Information Systems	4,5 CR	Satzger, Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites
None.

Competence Goal
The student

- understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems and is capable of comparing and assessing strategic alternatives
- has the core skills to design, model, and control complex, inter-organisational analytical, processes, including various business functions as well as customers and markets
- understands the usage of performance indicators for a variety of controlling and management issues and is able to define models for generating the relevant performance indicators under considerations of data availability
- distinguishes different analytics methods and concepts and learn when to apply to better understand and anticipate business relationships and developments of industrial and in particular service companies to derive fact- and data- founded managerial actions and strategies.
- knows how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in decision support or business intelligence systems and analytical processes as a whole.

Content

The amount of business-related data availabe in modern enterprise information systems grows exponentially, and the various data sources are more and more integrated, transformed, and analyzed jointly to gain valuable business insights, pro-actively control and manage business processes, to leverage planning and decision making, and to provide appropriate, potentially novel services to customers based on relationships and developments observed in the data.

Also, data sources are more and more connected and single business unit that used to operate on separate data pools are now becoming highly integrated, providing tremendeous business opportunities but also challenges regarding how the data should be represented, integrated, preprocessed, transformed, and finally used in analytics planning and decision processes.

The courses of this module equip the students with core skills to understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems. Students will be capable to designing, comparing, and evaluating strategic alternatives. Also, students will learn how to design, model, and control complex analytical processes, including various business functions of industrial and service companies including customers and markets. Students learn core skills to understand fundamental strategies for integrating analytic models and operative controlling mechanisms while ensuring the technical feasibility of the resulting information systems..

Furthermore, the student can distinguish different methods and concepts in the realm of data science and learns when to apply. She/he will know the means of characterizing and analyzing hetergeneous, high-dimensional data available data in data warehouses and external data sources to gain additional insights valuable for enterprise planning and decision making. Also, the students know how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in business information and business intelligence systems.

The module offers the opportunity to apply and deepen this knowledge in a seminar and hands-on tutorials that are offered with all lectures.

Texteintrag

Workload

Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module.

Recommendation

The module requires a basic understanding of the tasks, systems and processes in business informatics. It is therefore recommended that students attend the course Fundamentals of Information Systems [2540450] beforehand. Furthermore, basic knowledge of operations research as well as descriptive and inferential statistics is required.

M 4.21 Module: Data Science: Data-Driven User Modeling [M-WIWI-103118]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	8

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-114089	Data Science for Business	4,5 CR	Pfeiffer
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-108765	Practical Seminar: Advanced Analytics	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites
None

Competence Goal
Students of this module

- learn methods for planning empirical studies, in particular laboratory experiments,
- acquire theoretical knowledge and practical skills in analysing empirical data,
- familiarize with different ways of modelling user behaviour, are able to critically discuss, and to evaluate them

Content
Understanding and supporting user interactions with applications better plays an increasingly large role in the design of business applications. This applies both to interfaces for customers and to internal information systems. The data that is generated during user interactions can be channelled straight into business processes, for instance by analysing and decomposing purchase decisions, and by feeding this data into product design processes.

The Crowd Analytics section considers the analysis of data from online platforms, particularly of those following crowd- or peer-to-peer based business models. This includes platforms like Airbnb, Kickstarter and Amazon Mechanical Turk.

Theoretical models of user (decision) behaviour help analyzing the empirically observed user behaviour in a systematic fashion. Testing these models and their predictions in controlled experiments (primarily in the lab) in turn helps refine theory and to generate practically relevant design recommendations. Analyses are carried out using advanced analytic methods.

Students learn fundamental theoretical models for user behaviour in systems and apply them to cases. Students are also taught methods and skills for conceptualizing and planning empirical studies and for analyzing the resulting data.

Recommendation
Basic knowledge of Information Management, Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.

4.22 Module: Data Science: Evidence-based Marketing [M-WIWI-101647]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	5

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-103139	Marketing Analytics	4,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
Keine.

Competence Goal
Students

- possess advanced knowledge of relevant market research contents
- know many different qualitative and quantitative methods for measuring customer behavior, preparation of strategic decisions, making causal deductions, usage of social media data and sales forecasting
- possess the statistical skills required for working in marketing research

Content
This module provides in-depth knowledge of relevant quantitative and qualitative methods used in market research.Students can attend the following courses:

- The course “Market Research” provides contents of practical relevance for measuring customer attitudes and customer behavior. The participants learn using statistical methods for strategic decision-making in marketing. Students who are interested in writing their master thesis at the Marketing & Sales Research Group are required to take this course.
- The course "Marketing Analytics“ is based on "Market Research“ and teaches advanced statistical methods for analyzing relevant marketing and market research questions. Please note that a successful completion of "Market Research" is a prerequisite for the completion of "Marketing Analytics".

Workload
The total workload for this module is approximately 270 hours.

Recommendation
None

4.23 Module: Data Science: Intelligent, Adaptive, and Learning Information Services [M-WIWI-105661]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	3

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-109921	Advanced Machine Learning	4,5 CR	Geyer-Schulz, Nazemi
T-WIWI-114209	Artificial Intelligence in Service Systems II: Generative AI Applications & Adoption	4,5 CR	Satzger
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-111267	Intelligent Agent Architectures	4,5 CR	Geyer-Schulz
T-WIWI-110915	Intelligent Agents and Decision Theory	4,5 CR	Geyer-Schulz
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student

- models, analyzes and optimizes the structure and dynamics of complex economic changes.
- designs and develops intelligent, adaptive or learning agents as essential elements of information services.
- knows the essential learning methods for this and can apply them (also on modern architectures) in a targeted manner.
- develops and implements personalized services, especially in the area of recommender systems.
- develops solutions in teams.

Content
The Intelligent Architectures course addresses how to design modern agent-based systems. The focus here is on software architecture and design patterns relevant to learning systems. In addition, important machine learning methods that complete the intelligent system are discussed. Examples of systems presented include key-map architectures and genetic methods.
The impact of management decisions in complex systems is considered in Business Dynamics. Understanding, modeling, and simulating complex systems enables analysis, purposeful design, and optimization of markets, business processes, regulations, and entire enterprises.
Special problems of intelligent systems are covered in Personalization and Services and Recommendersystems. The content includes approaches and methods to design user-oriented services. The measurement and monitoring of service systems is discussed, the design of personalized offers is discussed and the generation of recommendations based on collected data from products and customers is shown. The importance of user modeling and recognition is addressed, as well as data security and privacy.

Annotation
The module replaces from summer semester 2021 M-WIWI-101470 "Data Science: Advanced CRM".

Workload
The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours.

The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

Recommendation
None

M 4.24 Module: Design, Construction, Operation and Maintenance of Highways [M-BGU-100998]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-BGU-106613	Design Basics in Highway Engineering	3 CR	Zimmermann
T-BGU-106300	Infrastructure Management	6 CR	Zimmermann

Prerequisites
The selection of this module excludes the selection of the module "Highway Engineering" (WI4INGBGU2).

Competence Goal
See German version.

Annotation
None

Workload
See German version.

Recommendation
None

M 4.25 Module: Designing Interactive Information Systems [M-WIWI-104080]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	6

Compulsory Elective Courses (Election: at least 1 item)			
T-WIWI-113465	Designing Interactive Systems: Human-AI Interaction	4,5 CR	Mädche
T-WIWI-113460	Engineering Interactive Systems: AI & Wearables	4,5 CR	Mädche
Supplementary Courses (Election: at most 1 item)			
T-WIWI-111109	KD^{2}Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-114210	(Gen)AI-based Automation in Organizations	4,5 CR	Mädche
T-WIWI-113459	Practical Seminar: Human-Centered Systems	4,5 CR	Mädche

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Prerequisites
In this module, the courses "Designing Interactive Systems" or "Enineering Interactive Systems" must be compulsorily taken.

Competence Goal
The student

- has a comprehensive understanding of conceptual and theoretical foundations of interactive systems
- knows design processes for interactive systems
- is aware of the most important techniques and tools for designing interactive systems and knows how to apply them to real-world problems
- is able to apply design principles for the design of most important classes of interactive systems,
- creates new solutions of interactive systems teams

Content
Advanced information and communication technologies make interactive systems ever-present in the users' private and business life. They are an integral part of smartphones, devices in the smart home, mobility vehicles as well as at the working place in production and administration (e.g. in the form of dashboards).

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This module focuses on design processes and principles for interactive systems. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for the design of interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

Each lecture in the module is accompanied with a capstone project that is carried out with an industry partner.

Annotation
See http://issd.iism.kit.edu/305.php for further information.

Workload
The total workload for this module is approximately 270 hours.

M 4.26 Module: Digital Marketing [M-WIWI-106258]

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	2

Mandatory			
T-WIWI-112693	Digital Marketing	4,5 CR	Kupfer
Supplementary Courses (Election: 4,5 credits)			
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Klarmann, Konhäuser
T-WIWI-114174	Economic Decision Making	4,5 CR	Scheibehenne
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-112711	Media Management	4,5 CR	Kupfer
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann

Competence Certificate
The assessment is carried out as partial exams of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course, weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know current fundamental principles and latest trends in the field of digital marketing
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- are able to critically discuss and question theoretical concepts and current practices in marketing
- have theoretical knowledge that is fundamental for writing a master thesis in the field of marketing
- have gained insight into scientific research that prepares them to independently write a master's thesis
- have the theoretical knowledge and skills necessary to work in or collaborate with the marketing department of a company

Content
The aim of this module is to deepen central marketing contents in different areas.

Workload
Total effort for 9 credit points: approx. 270 hours.
The exact distribution is done according to the credit points of the courses of the module.

M 4.27 Module: Digital Service Systems in Industry [M-WIWI-102808]

Responsible: Prof. Dr. Wolf Fichtner
Prof. Dr. Stefan Nickel

Organisation: KIT Department of Economics and Management

Part of: Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	9

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-107043	Liberalised Power Markets	5,5 CR	Fichtner
T-WIWI-106200	Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-106563	Practical Seminar Digital Service Systems	4,5 CR	Satzger
T-WIWI-114109	Service Operations and Cyber Security	4,5 CR	Mohr

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal

Prerequisites
This module can only be assigned as an elective module.

Competence Goal
Students

- understand the basics of the management of digital services applied on an industrial context
- gain an industry-specific insight into the importance and most relevant characteristics of information systems as key components of the digitalization of business processes, products and services
- are able to transfer and apply the models and methods introduced on practical scenarios and simulations.
- understand the control and optimization methods in the sector of service management and are able to apply them properly.

Content
This module aims at deepening the fundamental knowledge of digital service management in the industrial context. Various mechanisms and methods to shape and control connected digital service systems in different industries are discussed and demonstrated with real life application cases.

Annotation
This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload
Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module.

Recommendation
None

M 4.28 Module: Digitalization in Facility Management [M-BGU-105592]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	German	4	2

Mandatory			
T-BGU-108941	Digitalization in Facility and Real Estate Management	6 CR	Lennerts
Compulsory Elective (Election: at most 2 items as well as at least 3 credits)			
T-BGU-111211	Energetic Refurbishment	1,5 CR	Lennerts, Schneider
T-BGU-111212	Facility and Real Estate Management II	1,5 CR	Lennerts
T-BGU-111921	Turnkey Construction	3 CR	Haghsheno

Competence Certificate
- 'Teilleistung' T-BGU-108941 with examination of other type according to § 4 Par. 2 No. 3

according to selected course:

- 'Teilleistung' T-BGU-111211 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111212 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111921 with written examination according to § 4 Par. 2 No. 1

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
see German version

Content
see German version

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
none

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Digitalization in Facility and Real Estate Management lecture/exercise: 60 h

according to selected courses or examinations respectively:

- Energetic Refurbishment II lecture: 15 h
- Facility and Real Estate Management II lecture: 15 h
- Turnkey Construction lecture/exercise: 30 h

independent study:

- preparation and follow-up lecture/exercises Digitalization in Facility and Real Estate Management: 40 h
- preparation of project Digitalization in Facility and Real Estate Management, incl. report and presentation (partial examination): 80 h

according to selected courses or examinations respectively:

- preparation and follow-up lectures Energetic Refurbishment II: 15 h
- examination preparation Energetic Refurbishment II (partial exam): 15 h
- preparation and follow-up lectures Facility and Real Estate Management II: 15 h
- examination preparation Facility and Real Estate Management II (partial exam): 15 h
- preparation and follow-up lecture/exercises Turnkey Construction: 30 h
- examination preparation Turnkey Construction (partial exam): 30 h

total: 270 h

Recommendation
none

M 4.29 Module: Econometrics and Statistics I [M-WIWI-101638]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)
Compulsory Elective Modules (Statistics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	6

Mandatory			
T-WIWI-111388	Applied Econometrics	4,5 CR	Krüger
Supplementary Courses (Election: between 4,5 and 5 credits)			
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course 'Applied Econometrics' [2520020] is compulsory and must be completed if it has not already been successfully completed in one of the modules 'Economics of Innovation and Growth' or 'Economics in a Connected World'. If the course 'Applied Econometrics' has already been completed in another module, the module cannot be chosen by the student. In this case, please contact the Examinations Office of the WIWI-Department, which will adjust the elective requirements in the module.

Competence Goal
The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data.He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

Content
The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the art data analysis.

Workload
The total workload for this module is approximately 270 hours.

M 4.30 Module: Econometrics and Statistics II [M-WIWI-101639]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (Statistics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	6

Election notes
+++

This module will not count towards the degree until the module "Econometrics and Statistics I" has also been successfully completed. If the module "Econometrics and Statistics I" is booked out to the additional examinations, the "Econometrics and Statistics II" module loses its curricular validity/valuation for the degree.

+++

Compulsory Elective Courses (Election: at least 1 item)			
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
Additional Lectures (Election: at most 1 item)			
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-103128	Portfolio and Asset Liability Management	4,5 CR	Safarian
T-WIWI-103123	Advanced Statistics	4,5 CR	Grothe
T-WIWI-103129	Stochastic Calculus and Finance	4,5 CR	Safarian

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1-3 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
This module can only be passed if the module *"Econometrics and Statistics I"* has been finished successfully before.

At least one course must be chosen from the compulsory elective programme.

Competence Goal
The student shows an in depth understanding of advanced Econometric techniques suitable for different types of data. He/She is able to apply his/her theoretical knowledge to real world problems with the help of statistical software and to evaluate performance of different approaches based on statistical criteria.

Content
This modula builds on prerequisites acquired in Module *"Econometrics and Statistics I"*. The courses of this module offer students a broad range of advanced Econometric techniques for state-of-the art data analysis.

Workload
Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours. The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.31 Module: Economic Theory and its Application in Finance [M-WIWI-101502]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	6

Compulsory Elective Courses (Election: 1 item)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Brumm, Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Supplementary Courses (Election:)			
T-WIWI-113469	Advanced Corporate Finance	4,5 CR	Ruckes
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
One of the courses T-WIWI-102861 "Advanced Game Theory" and T-WIWI-102609 "Advanced Topics in Economic Theory" is compulsary.

Competence Goal
The students

- have learnt the methods of formal economic modeling, particularly of General Equilibrium Theory and contract theory
- will be able to apply these methods to the topics in Finance, specifically the areas of financial markets and institutions and corporate finance
- have gained many useful insights into the relationship between firms and investors and the functioning of financial markets

Content
The mandatory course "Advanced Topics in Economic Theory" is devoted in equal parts to General Equilibrium Theory and to contract theory. The course "Asset Pricing" will apply techniques of General Equilibrium Theory to valuation of financial assets. The courses "Corporate Financial Policy" and "Finanzintermediation" will apply the techniques of contract theory to issues of corporate finance and financial institutions.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

M 4.32 Module: Economics in a Connected World [M-WIWI-107010]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	1

Mandatory			
T-WIWI-103107	Spatial Economics	4,5 CR	Ott
Compulsory Elective Courses (Election: at most 1 item)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Brumm, Mitusch
T-WIWI-111388	Applied Econometrics	4,5 CR	Krüger
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-112822	Economics of Innovation	4,5 CR	Ott
T-WIWI-112816	Growth and Development	4,5 CR	Ott
T-WIWI-113147	Telecommunications and Internet – Economics and Policy	4,5 CR	Mitusch

Competence Certificate
The assessment is carried out as partial exams according to § 4 paragraph 2 Nr. 1 – Nr. 3 SPO of the examination regulation of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The overall grade of the module is the average of the grades for each course, weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal

- Theoretical Understanding of Spatial and Network Economics:
  - develop a deep understanding of the economic forces shaping spatial distribution, locational choice, trade flows, and urban development in both physical and digital landscapes.
  - understand how processes of spatial concentration result from the interplay of agglomeration and dispersion forces.
- Equilibrium Analysis and Stability:
  - gain expertise in deriving economic equilibria and analyzing their stability properties
  - understand and identify bifurcation points, exploring their implications for dynamic changes in economic systems.
- Quantitative and Analytical Skills:
  - acquire advanced skills in applying mathematical and computational tools to model spatial and connected economics.
  - use simulations and calibrations to explore dynamic economic systems and assess the implications of policy interventions.
- Programming and Empirical Analysis:
  - build competence in programming tools (e.g., Python, MATLAB, or R) to implement economic models and analyze results.
  - use econometric methods to evaluate and interpret real-world data related to trade, locational choice, and infrastructure development.

Upon completion, these competence goals aim to prepare students for advanced research, policy-making, and strategic decision-making in economics, business engineering, and digital economics, enabling them to tackle real-world problems with a robust theoretical and quantitative foundation.

Content

This module explores the interplay of spatial, digital, and economic networks, focusing on trade, locational choice, and the role of physical and digital infrastructure in shaping economic outcomes. It combines theoretical and applied approaches, equipping students with advanced analytical tools and insights into interconnected economic systems. It investigates the economic forces shaping the spatial distribution of resources, firms, and individuals, with a focus on locational choice, trade flows, and urban development in physical landscapes.

A strong focus is laid on the derivation of economic equilibria, with particular attention to their stability properties. Stability analyses include the identification and exploration of bifurcation points to understand dynamic changes in economic systems. Furthermore, decentralized decisions are critically evaluated using the normative framework of social welfare, offering insights into trade-offs and efficiency in economic systems.

Workload

Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation

Sound understanding of theoretical foundations in microeconomic theory, macroeconomic theory, and statistics according to international standards of a bachelor's degree in Economics, Business Administration or similar disciplines. Basic knowledge in programming (R, Python) is required.

M 4.33 Module: Economics of Innovation and Growth [M-WIWI-107011]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	1

Compulsory Elective Courses (Election: at least 1 item)			
T-WIWI-112822	Economics of Innovation	4,5 CR	Ott
T-WIWI-112816	Growth and Development	4,5 CR	Ott
Supplementary Courses (Election:)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Brumm, Mitusch
T-WIWI-111388	Applied Econometrics	4,5 CR	Krüger
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-114054	Methods in Economics	1,5 CR	Ott
T-WIWI-102789	Seminar in Economic Policy	3 CR	Ott

Competence Certificate
The assessment is carried out as partial exams according to § 4 paragraph 2 Nr. 1 – Nr. 3 SPO of the examination regulation of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The overall grade of the module is the average of the grades for each course, weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal

- Theoretical and Analytical Competences:
  - understand the key mechanisms underlying micro-based macro models.
    gain the ability to analyze formal theoretical models in economics, focusing on innovation, growth and development.
  - understand the identification of equilibria, assessing their stability characteristics, including their graphical derivations based on phase-diagrams.
  - understand the normative perspective of the models: get competence in evaluating decentralized decision-making processes based on the concept of social welfare and
  - understanding associated trade-offs between centralized and decentralized solutions.
- Quantitative and Computational Competences:
  - gain proficiency in calibrating models with real-world data and simulating outcomes to analyze dynamic economic systems.
  - gain experience in applying programming tools (e.g., Python, MATLAB, or R) to implement economic models, run simulations, and interpret computational results.
  - gain the ability to apply econometric techniques to evaluate the effects of physical and digital networks on trade, locational choices, and infrastructure investments.
- Regarding Content:
  - know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of microeconomic and macroeconomic theories.
  - understand the important role of innovation to the overall economic growth and prosperity.
  - identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations.
  - explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare.

Upon completion, students will have gained a strong theoretical foundation and practical skills to evaluate innovation and growth processes that are incentive-based, micro-founded while addressing the macroeconomic perspective. The module prepares students for advanced research or professional applications in academia, policy, and practice.

Content

This module provides a comprehensive introduction to the economic foundations, processes, and quantitative methods that drive innovation and growth and thus shape the development of nations over time. Based on empirical recurring patterns (so-called stylized facts), the overall goal is to gain a sound understanding of the determinants of long-run prosperity, structural change, and the role of government.

The module covers key theoretical concepts, discusses the role of policy frameworks and instruments, and applies quantitative and econometric techniques. Some programming techniques are also applied (R, Python). The courses enable students to understand and analyze economic dynamics from an aggregate perspective, although the theories are consequently micro-founded. Theoretical foundations are indispensable tools for theory building and serve as a normative compass for economic policy making, especially in addressing complex societal challenges.

Workload

Total workload for 9 credit points: approx. 270 hours.

The exact distribution is based on the credit points of the courses in the module.

Recommendation

Sound understanding of theoretical foundations in microeconomic theory, macroeconomic theory, and statistics according to international standards of a bachelor's degree in Economics, Business Administration or similar disciplines. Basic knowledge in programming (R, Python) is required.

M 4.34 Module: eEnergy: Markets, Services and Systems [M-WIWI-103720]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt
T-WIWI-113726	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Competence Goal
The student

- is aware of design options for energy and especially electricity markets and can derive implications for the market results from the market design,
- knows about current trends regarding the Smart Grid and understands affiliated modelling aproaches,
- can evaluate business models of electricity grids according to the regulation regime
- is prepared for scientific contributions in the field of energy system analysis.

Content
The module conveys scientific and practical knowledge to analyse energy markets and according business models. To do so the scientific discussion on energy market designs is evaluated and analysed. Different energy market models are presented and their design implications are evaluated. Furthermore, the electricity system is analysed with regards to being a network industry and resulting regulation and business models are discussed. Besides these traditional areas of energy economics we will look at methods and models of digitalisation in the energy sector.

Annotation
The lecture Smart Grid Applications will be available starting in the winter term 2018/19.

Workload
The total workload for this module is approx. 270 hours (9 CP). The allocation is based on the credit points of the courses in the module. The workload for courses with 4.5 CP is approx. 135 hours.

The total number of hours per course results from the time required to attend the lectures and exercises, as well as the examination times and the time required to achieve the qualification objectives of the module for an average student for an average performance.

M 4.35 Module: Electives in Informatics [M-WIWI-101630]

Responsible: Dr.-Ing. Tobias Käfer
Prof. Dr. Sanja Lazarova-Molnar
Prof. Dr. Andreas Oberweis
Prof. Dr. Harald Sack
Prof. Dr. Ali Sunyaev
Prof. Dr. Melanie Volkamer
Prof. Dr.-Ing. Johann Marius Zöllner

Organisation: KIT Department of Economics and Management

Part of: Compulsory Elective Modules (Informatics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	21

Compulsory Elective Area (Election:)			
T-WIWI-110339	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services	4,5 CR	Sunyaev
T-WIWI-112966	Artificial Intelligence for Autonomous Driving	4,5 CR	Vinel
T-WIWI-102680	Computational Economics	4,5 CR	Shukla
T-WIWI-112690	Cooperative Autonomous Vehicles	4,5 CR	Vinel
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-110372	Supplement Software- and Systemsengineering	4,5 CR	Oberweis
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-102666	Knowledge Discovery	4,5 CR	Käfer
T-WIWI-112599	Management of IT-Projects	4,5 CR	Schätzle
T-WIWI-106340	Machine Learning 1 - Basic Methods	4,5 CR	Zöllner
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-112685	Modeling and Simulation	4,5 CR	Lazarova-Molnar
T-WIWI-102697	Business Process Modelling	4,5 CR	Oberweis
T-WIWI-102679	Nature-Inspired Optimization Methods	4,5 CR	Shukla
T-WIWI-109799	Process Mining	4,5 CR	Oberweis
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
Seminars and Advanced Labs (Election: at most 1 item)			
T-WIWI-110144	Emerging Trends in Digital Health	4,5 CR	Sunyaev
T-WIWI-110143	Emerging Trends in Internet Technologies	4,5 CR	Sunyaev
T-WIWI-109249	Sociotechnical Information Systems Development	4,5 CR	Sunyaev
T-WIWI-111126	Advanced Lab Blockchain Hackathon (Master)	4,5 CR	Sunyaev
T-WIWI-111125	Advanced Lab Sociotechnical Information Systems Development (Master)	4,5 CR	Sunyaev
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-112914	Advanced Lab Realization of Innovative Services (Master)	4,5 CR	Oberweis
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	5 CR	Zöllner
T-WIWI-109251	Selected Issues in Critical Information Infrastructures	4,5 CR	Sunyaev

Competence Certificate

The assessment is carried out as partial exams of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None.

Competence Goal

The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Content

The thematic focus will be based on the choice of courses in the areas of Applied Technical Cognitive Systems, Business Information Systems, Critical Information Infrastructures, Information Service Engineering, Security - Usability - Society or Web Science.

Workload

The total workload for this module is approximately 270 hours.

M 4.36 Module: Electronic Markets [M-WIWI-101409]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	9

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
T-WIWI-105946	Price Management	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-113147	Telecommunications and Internet – Economics and Policy	4,5 CR	Mitusch

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student

- knows coordination and motivation methods and analyzes them regarding their efficiency,
- classifies markets and describes the roles of the participants in a formal way,
- knows the conditions for market failure and knows and develops countermeasures,
- knows institutions and market mechanisms, their fundamental theories and empirical research results,
- knows the design criteria of market mechanisms and a systematical approach for creating new markets,
- models, analyzes and optimizes the structure and dynamics of complex business applications.

Content
What are the conditions that make electronic markets develop, and how can one analyze and optimize such markets?

In this module, the selection of the type of organization as an optimization of transaction costs is treated. Afterwards, the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure are described. Finally, motivational issues like bounded rationality and information asymmetries (private information and moral hazard), as well as the development of incentive schemes, are presented. Regarding the market design, especially the interdependencies of market organization, market mechanisms, institutions and products are described, and theoretical foundations are lectured.

Electronic markets are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics, such markets can be modelled. Simulations of complex systems allow the analysis and optimization of markets, business processes, policies, and organizations.

Topics include

- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control

Workload

The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours.

The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

Recommendation

None

4.37 Module: Emphasis in Informatics [M-WIWI-101628]

Responsible: Dr.-Ing. Tobias Käfer
Prof. Dr. Sanja Lazarova-Molnar
Prof. Dr. Andreas Oberweis
Prof. Dr. Harald Sack
Prof. Dr. Ali Sunyaev
Prof. Dr. Melanie Volkamer
Prof. Dr.-Ing. Johann Marius Zöllner

Organisation: KIT Department of Economics and Management

Part of: Compulsory Elective Modules (Informatics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	21

Compulsory Elective Area (Election: between 1 and 3 items)			
T-WIWI-110339	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services	4,5 CR	Sunyaev
T-WIWI-102680	Computational Economics	4,5 CR	Shukla
T-WIWI-113363	Collective Perception in Autonomous Driving	4,5 CR	Vinel
T-WIWI-112690	Cooperative Autonomous Vehicles	4,5 CR	Vinel
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-110372	Supplement Software- and Systemsengineering	4,5 CR	Oberweis
T-WIWI-113059	Human Factors in Autonomous Driving	4,5 CR	Vinel
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-113968	Management of IT-Projects	4,5 CR	Alpers
T-WIWI-102666	Knowledge Discovery	4,5 CR	Käfer
T-WIWI-106340	Machine Learning 1 - Basic Methods	4,5 CR	Zöllner
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-112685	Modeling and Simulation	4,5 CR	Lazarova-Molnar
T-WIWI-102697	Business Process Modelling	4,5 CR	Oberweis
T-WIWI-102679	Nature-Inspired Optimization Methods	4,5 CR	Shukla
T-WIWI-109799	Process Mining	4,5 CR	Oberweis
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
Seminars and Advanced Labs (Election: at most 1 item)			
T-WIWI-110144	Emerging Trends in Digital Health	4,5 CR	Sunyaev
T-WIWI-110143	Emerging Trends in Internet Technologies	4,5 CR	Sunyaev
T-WIWI-109249	Sociotechnical Information Systems Development	4,5 CR	Sunyaev
T-WIWI-111126	Advanced Lab Blockchain Hackathon (Master)	4,5 CR	Sunyaev
T-WIWI-111125	Advanced Lab Sociotechnical Information Systems Development (Master)	4,5 CR	Sunyaev
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-112914	Advanced Lab Realization of Innovative Services (Master)	4,5 CR	Oberweis
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	5 CR	Zöllner

T-WIWI-113026	Trustworthy Emerging Technologies	4,5 CR	Sunyaev

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of Informatics,
- is capable of finding and defending arguments for solving problems.

Content
The thematic focus will be based on the choice of courses in the areas of Applied Technical Cognitive Systems, Business Information Systems, Critical Information Infrastructures, Information Service Engineering, Security - Usability - Society or Web Science.

Workload
The total workload for this module is approximately 270 hours.

4.38 Module: Energy and Process Technology I [M-MACH-101296]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each winter term	1 term	4	1

Mandatory			
T-MACH-102211	Energy and Process Technology I	9 CR	Bauer, Maas, Schwitzke, Velji

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the requirement of credits of this module. The
assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits
and truncated after the first decimal.

Prerequisites
None

Competence Goal
In this modul students achieve a basic understanding of the technical properties of energy conversion processes and machines.

Content
Energy and Process Technology 1:

1. thermodynamic basics and cycle processes (ITT)
2. basics of piston engines (IFKM)
3. basics of turbomachines (FSM)
4. basics of thermal turbomachines (ITS)

Annotation
All lectures and exams are hold in German only.

4.39 Module: Energy and Process Technology II [M-MACH-101297]

Responsible: Prof. Dr. Ulrich Maas
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each summer term	1 term	4	1

Mandatory			
T-MACH-102212	Energy and Process Technology II	9 CR	Maas, Schwitzke

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module, whose sum of credits must meet the requirement of credits of this module. The
assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits
and truncated after the first decimal.

Prerequisites
None

Competence Goal
In this modul students achieve the ability to evaluate solitary and interconnected energy systems with respect to societal and economical aspects

Content
Energy and Process Technology 2:

1. basics in combustion and pollutant formation (ITT)

2. technical realisation and application of piston engines (IFKM) fluid flow engines (FSM) and thermal turbomachines (ITS)

3. technical aspects of energy supply systems and networks (ITS)

Annotation
All lectures and exams are hold in German only.

4.40 Module: Energy Economics and Energy Markets [M-WIWI-101451]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Mandatory			
T-WIWI-107043	Liberalised Power Markets	5,5 CR	Fichtner
Supplementary Courses (Election:)			
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-112151	Energy Trading and Risk Management	3,5 CR	N.N.
T-WIWI-108016	Simulation Game in Energy Economics	3,5 CR	Genoese
T-WIWI-107446	Quantitative Methods in Energy Economics	3,5 CR	Plötz
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitusch
T-WIWI-113935	Social Dimensions of Energy Transitions	3,5 CR	Fichtner

Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date.The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The lecture Liberalised Power Markets has to be examined.

Competence Goal
The student

- gains detailed knowledge about the new requirements of liberalised energy markets,
- describes the planning tasks on the different energy markets,
- knows solution approaches to respective planning tasks.

Content
Liberalised Power Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power
Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management
Simulation Game in Energy Economics: Simulation of the German electricity system

Workload
The total workload for this module is approx. 270 hours (9 credits). The allocation is based on the credit points of the courses in the module. The workload for courses with 3.5 credits is approx. 105 hours, for courses with 5.5 credits approx. 165 hours.
The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

Recommendation
The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.

M 4.41 Module: Energy Economics and Technology [M-WIWI-101452]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	5

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102793	Efficient Energy Systems and Electric Mobility	3,5 CR	Jochem
T-WIWI-102650	Energy and Environment	3,5 CR	Karl
T-WIWI-113073	Machine Learning and Optimization in Energy Systems	3,5 CR	Fichtner
T-WIWI-107464	Smart Energy Infrastructure	5,5 CR	Ardone, Pustisek
T-WIWI-102695	Heat Economy	3,5 CR	Fichtner

Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date.The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student

- gains detailed knowledge about present and future energy supply technologies (focus on final energy carriers electricity and heat),
- knows the techno-economic characteristics of plants for energy provision, for energy transport as well as for energy distribution and demand,
- is able to assess the environmental impact of these technologies.

Content
Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
Energy and Environment: emission factors, emission reduction measures, environmental impact
Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility

Workload
The total workload for this module is approx. 270 hours (9 credits). The allocation is based on the credit points of the courses in the module. The workload for courses with 3,5 credits is approx. 105 hours, and for courses with 5,5 credits approx. 165 hours.

The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

M 4.42 Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	14

Mandatory part (Election: 1 item)			
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-113151	Entrepreneurship Seasonal School	3 CR	Terzidis
T-WIWI-102865	Business Planning	3 CR	Terzidis
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-109064	Joint Entrepreneurship Summer School	6 CR	Terzidis
T-WIWI-111561	Startup Experience	6 CR	Terzidis
Supplementary Courses (Election: between 0 and 1 items)			
T-WIWI-102894	Entrepreneurship Research	3 CR	Terzidis
T-MACH-112882	Innovation2Business – Innovation Strategy in the Industrial Corporate Practice	4 CR	Albers
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
T-WIWI-113849	AI Innovation Ecosystems	3 CR	Beyer, Scheydt
T-WIWI-102612	Managing New Technologies	3 CR	Reiß

Competence Certificate
The module examination takes place in the form of partial examinations (according to §4, 1-3 SPO) on

1. the Entrepreneurship lecture (3 CP),
2. one of the seminars of the Chair of Entrepreneurship and Technology Management (3 CP or 6 CP) and, if applicable
3. another course listed in the module.

The seminars of the chair are

- Startup Experience
- Design Thinking
- Business planning for founders
- Entrepreneurship research (this can be credited mainly in the seminar module, but also in the entrepreneurship module)
- Joint Entrepreneurship School
- Entrepreneurship Seasonal School
- International Business Development and Sales
- Founding in the field of IT security
- Entrepreneurial Leadership & Innovation Management

The latter five seminars take place irregularly, as they are offered as part of projects.

The assessment of success is described for each course in the module. For courses with 3 CP in the compulsory elective and supplementary courses, 1/2 of the overall grade results from the entrepreneurship lecture, 1/4 from one of the chair's seminars with 3 CP and 1/4 from another course with 3 CP permitted in the module. If a course with 6 CP is selected in the compulsory elective or supplementary offer, this is included in the overall grade with a weighting of 1/2. The overall grade is cut off after the first decimal place.

Prerequisites
None

Competence Goal

Students are familiar with the basics and contents of entrepreneurship and ideally are able to start a company during or after their studies. The courses are therefore structured sequentially in modules, although in principle they can also be attended in parallel. In this way, the skills are taught to generate business ideas, to develop inventions into innovations, to write business plans for start-ups and to successfully establish a company. In the lecture, the basics of entrepreneurship will be developed, in the seminars, individual contents will be deepened. The overall learning objective is to enable students to develop and implement business ideas.

Content

The lectures form the basis of the module and give an overview of the overall topic. The seminars deepen the phases of the foundation processes, in particular the identification of opportunities, the development of a value proposition (especially based on inventions and technical innovations), the design of a business model, business planning, the management of a start-up, the implementation of a vision as well as the acquisition on resources and the handling of risks. The lecture Entrepreneurship provides an overarching and connecting framework for this.

Annotation

Please note: Seminars offered by Prof. Terzidis (or the members of his research group) are not eligible for crediting in a seminar module of the WiWi degree programs. Exception: Seminar "Entrepreneurship Research".

Workload

Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation

None

4.43 Module: Environmental Economics [M-WIWI-101468]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102650	Energy and Environment	3,5 CR	Karl
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102615	Environmental Economics and Sustainability	3 CR	Walz
T-WIWI-102616	Environmental and Resource Policy	4 CR	Walz
T-BGU-111102	Environmental Law	3 CR	Smeddinck

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offerd at every ordinary examination date. The assessment procedures are described for each course of the module seperately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The students

- understand the treatment of non-market resources as well as future resource shortages
- are able to model markets of energy and environmental goods
- are able to assess the results of government intervention
- know legal basics and are able to evaluate conflicts with regard to legal situation

Content
Environmental degradation and increasing resource use are global challenges, which have to be tackled on a worldwide level. The module addresses these challenges from the perspective of economics, and imparts the fundamental knowledge of environmental and sustainability economics, and environmental and resource policy to the students. Additional courses address environmental law, environmental pressure, and applications to the transport sector.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation
Knowledge of microeconomics is a prerequisite. For this reason, successful participation in the course *Economics I (Microeconomics)* [2600012] or a comparable course is strongly recommended.

M 4.44 Module: Experimental Economics [M-WIWI-101505]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	5

Compulsory Elective Courses (Election: 2 items)			
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-102863	Topics in Experimental Economics	4,5 CR	Reiß

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None.

Competence Goal
Students

- are acquainted with the methods of Experimental Economics along with its strengths and weaknesses;
- understand how theory-guided research in Experimental Economics interacts with the development of theory;
- are provided with foundations in data analysis;
- design an economic experiment and analyze its outcome.

Content
The module Experimental Economics offers an introduction into the methods and topics of Experimental Economics. It also fosters and extends knowledge in theory-guided experimental economics and its interaction with theory development. Throughout the module, readings of selected papers are required.

Annotation
The course "Predictive Mechanism and Market Design" is offered every second winter semester, e.g. WS2013 / 14, WS2015 / 16, ...

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation
Basic knowledge in mathematics, statistics, and game theory is assumed.

M 4.45 Module: Extracurricular Module in Engineering [M-WIWI-101404]

Responsible: Prüfungsausschuss der KIT-Fakultät für Wirtschaftswissenschaften
Organisation: KIT Department of Economics and Management
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Once	1 term	4	5

Compulsory Elective Courses (Election: between 9 and 12 credits)			
T-WIWI-106291	PH APL-ING-TL01	3 CR	
T-WIWI-106292	PH APL-ING-TL02	3 CR	
T-WIWI-106293	PH APL-ING-TL03	3 CR	
T-WIWI-106294	PH APL-ING-TL04 ub	0 CR	
T-WIWI-106295	PH APL-ING-TL05 ub	0 CR	
T-WIWI-106296	PH APL-ING-TL06 ub	0 CR	
T-WIWI-108384	PH APL-ING-TL07	3 CR	

Competence Certificate
The assessment of the module is determined by the respective module corrdinator. It can either be in the form of a general exam or partial exams, and must contain at least 9 credit points (max. 12 credits) and at least 6 hours per week (max. 8 hours per week). The examination may contain presentations, experiments, laboratories, term papers, etc. At least 50 percent of the module examination has to be in the form of a written or an oral examination (according to Section 4 (2), 1 or 2 of the examination regulation).

The formation of the overall grade of the module will be determined by the respective module coordinator.

Prerequisites
The current regulations and guidance on the procedure for applying for an extracurricular module in engineering are explained in detail at https://www.wiwi.kit.edu/APIng-Modul.php.

Competence Goal
Through the extracurricular engineering module, the student is able to deal with technical topics and issues in depth.

The concrete learning objectives are coordinated with the respective module supervisor of the module.

Workload
The total workload for this module is about 270 hours (9 credits). The distribution is based on the credit points of the courses completed as part of the module.

M 4.46 Module: Facility Management in Hospitals for Industrial Engineering [M-BGU-106453]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German	4	1

Mandatory			
T-BGU-108004	Facility Management in Hospitals	6 CR	Lennerts
Comnpulsory Elective (Election: at most 2 items as well as at least 3 credits)			
T-BGU-111218	Upgrading of Existing Buildings	3 CR	Lennerts
T-BGU-111211	Energetic Refurbishment	1,5 CR	Lennerts, Schneider
T-BGU-111212	Facility and Real Estate Management II	1,5 CR	Lennerts
T-BGU-111217	Project Development with Case Study	1,5 CR	Lennerts

Competence Certificate
- 'Teilleistung' T-BGU-108004 with examination of other type according to § 4 Par. 2 No. 3

according to selected course:

- 'Teilleistung' T-BGU-111218 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-111211 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111212 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111217 with oral examination according to § 4 Par. 2 No. 2

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
see German version

Content
see German version

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
module will be offered newly as from winter term 2023/24;
replaces module 'Facility Management in Hospitals' (M-BGU-105597)

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Facility Management in Hospitals lecture/exercise: 60 h

according to selected courses or examinations respectively:

- Upgrading of Existing Buildings lecture/exercise: 45 h
- Energetic Refurbishment II lecture: 15 h
- Facility and Real Estate Management II lecture: 15 h
- Project Development with Case Study lecture: 15 h

independent study:

- preparation and follow-up lecture/exercises Facility Management in Hospitals: 45 h
- preparation of term paper Facility Management in Hospitals (partial exam): 75 h

according to selected courses or examinations respectively:

- preparation and follow-up lecture/exercises Upgrading of Existing Buildings: 15 h
- examination preparation Upgrading of Existing Buildings(partial exam): 30 h
- preparation and follow-up lectures Energetic Refurbishment II: 15 h
- examination preparation Energetic Refurbishment II (partial exam): 15 h
- preparation and follow-up lectures Facility and Real Estate Management II: 15 h
- examination preparation Facility and Real Estate Management II (partial exam): 15 h
- preparation and follow-up lectures Project Development with Case Study: 15 h
- examination preparation Project Development with Case Study (partial exam): 15 h

total: 270 h

Recommendation
none

M 4.47 Module: Finance 1 [M-WIWI-101482]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	1

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

None

Competence Goal

The student

- has core skills in economics and methodology in the field of finance
- assesses corporate investment projects from a financial perspective
- is able to make appropriate investment decisions on financial markets

Content

The courses of this module equip the students with core skills in economics and methodology in the field of modern finance. Securities which are traded on financial and derivative markets are presented, and frequently applied trading strategies are discussed. A further focus of this module is on the assessment of both profits and risks in security portfolios and corporate investment projects from a financial perspective.

Workload

The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours.

The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module for an average performance.

M 4.48 Module: Finance 2 [M-WIWI-101483]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	10

Election notes

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This module will not count towards the degree until the module *Finance 1* has also been successfully completed. If the module Finance 1 is booked out to the additional examinations, the *Finance 2* module loses its curricular validity/valuation for the degree.

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Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-113469	Advanced Corporate Finance	4,5 CR	Ruckes
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-102621	Valuation	4,5 CR	Ruckes

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

It is only possible to choose this module in combination with the module *Finance 1*. The module is passed only after the final partial exam of *Finance 1* is additionally passed.

Competence Goal

The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

Content

The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

Annotation

The courses *eFinance: Information Engineering and Management for Securities Trading* [2540454] and *Financial Analysis* [2530205] can be chosen from summer term 2015 on.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

4.49 Module: Finance 3 [M-WIWI-101480]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	10

Election notes

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This module will not count towards the degree until the modules *Finance 1* and *Finance 2* have also been successfully completed. If the modules *Finance 1* and/or *Finance 2* are booked out to the additional examinations, the *Finance 3* module loses its curricular validity/valuation for the degree.

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Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-113469	Advanced Corporate Finance	4,5 CR	Ruckes
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-110933	Web App Programming for Finance	4,5 CR	Thimme

Competence Certificate

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites

It is only possible to choose this module in combination with the module *Finance 1*and *Finance 2*. The module is passed only after the final partial exams of *Finance 1 and Finance 2* are additionally passed.

Competence Goal

The student is in a position to discuss, analyze and provide answers to advanced economic and methodological issues in the field of modern finance.

Content

The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

Workload

The total workload for this module is approximately 270 hours. For further information see German version.

4.50 Module: Foundations for Advanced Financial -Quant and -Machine Learning Research [M-WIWI-105894]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	see Annotations	1 term	English	4	1

Mandatory			
T-WIWI-111846	Fundamentals for Financial -Quant and -Machine Learning Research	9 CR	Ulrich

Competence Certificate
The module examination is an alternative exam assessment with a maximum score of 100 points to be achieved. These points are distributed over 4 worksheets to be submitted during the semester. The worksheets cover the respective material of the module and are handed out, worked on and assessed in lecture weeks 3 (10 points), 6 (20 points), 9 (30 points) and 12 (40 points).

The module-wide exam (all 4 worksheets) must be taken in the same semester.

The worksheets are a mixture of analytical tasks and programming tasks with financial data.

Competence Goal
This MSc module teaches students fundamental stats and analytics concepts, as well necessary financial economic intuition, necessary to identify, design and execute interesting research questions in quant finance and financial machine learning.
Topics include: Maximum Likelihood learning of arma-garch models, expectation maximization learning applied to stochastic volatility and valuation models, Kalman filter techniques to learn latent states, estimation of affine jump diffusion models with options and higher-order moments, stochastic calculus, dynamic modeling of asset markets (bond, equity, options), equilibrium determination of risk premiums, risk premiums for higher moment risk, risk decomposition (fundamental vs idiosyncratic), option-implied return distributions, mixture-density-networks and neural nets.

Content
Learning Objectives: Skills and understanding of how to successfully set-up, execute and interpret financial data driven research with the following methods: MLE, Kalman Filter, Expectation Maximization, Option Pricing, dynamic asset pricing theory, backward-looking historical return densities, forward-looking options-implied return densities, mixture-density-network, neural networks. Programming is not taught in this course, yet, some graded and non-graded exercises might make heavy use of software based data analysis. See the course's pre-requisites and comments in the modul handbook.

Annotation

- Strongly recommended to have good knowledge in financial econometrics (MLE, OLS, GLS, ARMA-GARCH), mathematics (differential equations, difference equations and optimization), investments (CAPM, factor models), asset pricing (SDF, SDF pricing), derivatives (Black-Scholes, risk-neutral pricing), and programming of statistical concepts (Java or R or Python or Matlab or C or ...)
- Strongly recommended to have a strong interest for interdisciplinary research work in statistics, programming, applied math and financial economics.
- Students lacking the prior knowledge might find the resources of the Chair helpful: www.youtube.com/c/cram-kit.

Workload
The total workload for this course is approximately 270 hours. This is for a student with the appropriate prior knowledge in financial econometrics, finance, mathematics and programming. Students without programming experience of statistical concepts will need to invest extra time. Students who have struggled in math- or programming- or finance- oriented classes, will find this course very challenging. Please check the pre-requisites and comments in the module handbook.

M 4.51 Module: Fundamentals of Transportation [M-BGU-101064]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	2 terms	German/English	4	6

Compulsory Examination (Election: between 1 and 2 items as well as between 3 and 6 credits)			
T-BGU-106609	Characteristics of Transportation Systems	3 CR	Vortisch
T-BGU-106610	Transportation Systems	3 CR	Vortisch
Electives (Election: between 1 and 2 items as well as between 3 and 6 credits)			
T-BGU-106611	Freight Transport	3 CR	Szimba, Vortisch
T-BGU-106301	Long-Distance and Air Traffic	3 CR	Vortisch
T-BGU-101005	Tendering, Planning and Financing in Public Transport	3 CR	Vortisch
T-BGU-100014	Seminar in Transportation	3 CR	Kagerbauer, Vortisch
T-BGU-112552	Seminar on Modeling and Simulation in Transportation	3 CR	Kagerbauer, Vortisch
T-BGU-103425	Mobility Services and New Forms of Mobility	3 CR	Kagerbauer
T-BGU-103426	Strategic Transport Planning	3 CR	Waßmuth
T-BGU-106608	Information Management for Public Mobility Services	3 CR	Vortisch
T-BGU-111057	Sustainability in Mobility Systems	3 CR	Kagerbauer

Prerequisites
None

Competence Goal
See German version.

Recommendation
None

M 4.52 Module: Generation and Transmission of Renewable Power [M-ETIT-101164]

Responsible: Dr.-Ing. Bernd Hoferer
Prof. Dr.-Ing. Thomas Leibfried

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	4

compulsory optional subject (Election: at least 9 credits)			
T-ETIT-101941	Power Transmission and Power Network Control	5 CR	Leibfried
T-ETIT-101915	High-Voltage Test Technique	4 CR	Badent

Prerequisites
The module is passed only after the final partial exam of the module "M-ETIT-101163 Hochspannungstechnik" is additionally passed.

Competence Goal
The student

- has wide knowledge of electrical power engineering,
- is capable to analyse and develop electrical power engineering systems.

Content
The module deals with wide knowledge about the electrical power engineering. This ranges from the electric power equipment networks in terms of function, structure and interpretation on the calculation of electrical power networks to special areas such as the FACTS elements or power transformers.

4.53 Module: Global Production and Logistics [M-MACH-101282]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Mandatory			
T-MACH-111003	Global Logistics	4 CR	Furmans
T-MACH-113832	Global Production	5 CR	Lanza

Competence Certificate
Oral exams: duration approx. 5 min per credit point

Written exams: duration approx. 20 - 25 min per credit point

Amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
None

Competence Goal
The students

- are able to analyze the main topics of global production and logistics.
- can explain the main topics about planning and operations of global supply chains and are able to use simple models for planning.
- are capable to name the main topics about planning of global production networks.

Content
The module Global Production and Logistics provides comprehensive and well-founded basics for the main topics of global production and logistics. The lectures aim to show opportunities and market conditions for global enterprises. Part 1 focuses on economic backgrounds, opportunities and risks of global production. Part 2 focuses on the structure of international logistics, their modeling, design and analysis. The threats in international logistics are discussed in case studies.

Workload
The work load is about 270 hours, corresponding to 9 credit points.

Learning type
Lectures, seminars, workshops, excursions

4.54 Module: Handling Characteristics of Motor Vehicles [M-MACH-101264]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Vehicle Properties (Election: at least 9 credits)			
T-MACH-105152	Handling Characteristics of Motor Vehicles I	3 CR	Unrau
T-MACH-105153	Handling Characteristics of Motor Vehicles II	3 CR	Unrau
T-MACH-102156	Project Workshop: Automotive Engineering	4,5 CR	Frey, Gießler

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student

- knows and understands the characteristics of vehicles, owing to the construction and design tokens,
- knows and understands especially the factors being relevant for comfort and acoustics
- is capable of fundamentally evaluating and rating handling characteristics.

Content
See courses.

Workload
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 4.5 credit points is about 135 hours, and for courses with 3 credit points about 90 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

Recommendation
Knowledge of the content of the courses *Engineering Mechanics I* [2161238], *Engineering Mechanics II* [2162276] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

M 4.55 Module: High-Voltage Technology [M-ETIT-101163]

Responsible: Dr.-Ing. Bernd Hoferer
Prof. Dr.-Ing. Thomas Leibfried

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	2

Mandatory			
T-ETIT-110266	High-Voltage Technology	6 CR	Badent
T-ETIT-100723	Electronics and EMC	3 CR	Sack

Competence Goal
The student

- has wide knowledge of electrical power engineering,
- is capable to analyse and develop electrical power engineering systems.
- know coupling mechanisms and possible coupling paths for interference signals in electronic circuits and systems, as well as measures for interference suppression and for the functionally reliable construction of such systems.

4.56 Module: Highway Engineering [M-BGU-100999]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each summer term	1 term	4	2

Mandatory			
T-BGU-106300	Infrastructure Management	6 CR	Zimmermann
T-BGU-101860	Special Topics in Highway Engineering and Environmental Impact Assessment	3 CR	Zimmermann

Prerequisites
The selection of this module excludes the selection of the module "Design, Construction, Operation and Maintenance of Highways" (WI4INGBGU1).

Competence Goal
See German version.

Annotation
None

Workload
See German version.

Recommendation
None

M 4.57 Module: Incentives, Interactivity & Decisions in Organizations [M-WIWI-105923]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	3

Elective Offer (Election:)			
T-WIWI-111912	Advanced Topics in Digital Management	3 CR	Nieken
T-WIWI-111913	Advanced Topics in Human Resource Management	3 CR	Nieken
T-WIWI-111806	Behavioral Lab Exercise	4,5 CR	Nieken, Scheibehenne
T-WIWI-113465	Designing Interactive Systems: Human-AI Interaction	4,5 CR	Mädche
T-WIWI-114174	Economic Decision Making	4,5 CR	Scheibehenne
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams of the courses in this module. The assessment procedures are described for each course in the module separately.

The overall grade of the module is the average of grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
Please refer to the course descriptions for potential restrictions regarding an individual course.

Competence Goal
The student

- understands and analyses challenges and objectives within organizations
- applies economic models and empirical methods to analyze and solve challenges with a focus on the workplace and future of work
- understands the impact of digitalization and new information and communication technology on the work life and management decisions
- knows how to apply scientific research methods and understands the underlying problems

Content
The module „Incentives, Interactivity & Decisions in Organizations" offers an interdisciplinary approach to study incentive structures, the role of interactivity in information systems, and decision making in organizations. The module specifically focuses on topics related to the workplace and the future of work in organizations. The topics range from designing incentive systems and interactive systems to leadership, decision making, as well as understanding human behavior. All courses in the module foster active participation and allow students to learn state-of-the-art research methods and apply them to real-world challenges.

Workload
Total workload for 9 credits: approx. 270 hours.

Recommendation
Knowledge of Human Resource Management, microeconomics, game theory, and statistics is recommended.

M 4.58 Module: Industrial Production II [M-WIWI-101471]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German/English	4	7

Mandatory			
T-WIWI-114173	Design and Operation of Industrial Plants and Processes	5,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann
T-WIWI-103134	Project Management	3,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-114057	Circular Economy – Challenges and Potentials	3,5 CR	Schultmann
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-112103	Global Manufacturing	3,5 CR	Sasse
T-WIWI-113107	Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context	3,5 CR	Schultmann

Competence Certificate
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course "Design and Operation of Industrial Plants and Processes" and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course "Design and Operation of Industrial Plants and Processes" and at least one additional activity are compulsory and must be examined.

Competence Goal

- Students shall be able to describe the tasks of tactical production management with special attention drawn upon industrial plants.
- Students shall understand the relevant tasks in plant management (projection, realisation and supervising tools for industrial plants).
- Students shall be able to describe the special need of a techno-economic approach to solve problems in the field of tactical production management.
- Students shall be proficient in using selected techno-economic methods like investment and cost estimates, plant layout, capacity planning, evaluation principles of production techniques, production systems as well as methods to design and optimize production systems.
- Students shall be able to evaluate techno-economical approaches in planning tactical production management with respect to their efficiency, accuracy and relevance for industrial use.

Content

- Planning and Management of Industrial Plants: Basics, circulation flow starting from projecting to techno-economic evaluation, construction and operating up to plant dismantling.

Annotation
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.

Workload

Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.

M 4.59 Module: Industrial Production III [M-WIWI-101412]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German/English	4	6

Mandatory			
T-WIWI-102632	Production and Logistics Management	5,5 CR	Schultmann
Supplementary Courses from Module Industrial Production II (Election: at most 1 item)			
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-112103	Global Manufacturing	3,5 CR	Sasse
T-WIWI-113107	Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context	3,5 CR	Schultmann
Supplementary Courses (Election: at most 1 item)			
T-WIWI-114057	Circular Economy – Challenges and Potentials	3,5 CR	Schultmann
T-WIWI-103134	Project Management	3,5 CR	Schultmann
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt

Competence Certificate
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Production and Logistics Management* [2581954] and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course *Production and Logistics Management* [2581954] and at least one additional activity are compulsory and must be examined.

Competence Goal

- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the mail goals and set-up of software supporting tools in production and logistics management (i.e. APS, PPS-, ERP- and SCM Systems).
- Students discuss the scope of these software tools and their general disadvantages.

Content

- Planning tasks and exemplary methods of production planning and control in supply chain management.
- Supporting software tools in production and logistics management (APS, PPS- and ERP Systems).
- Project management in the field of production and supply chain management.

Annotation
Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production II.

Workload

The total amount of work for this module is approx. 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module.

The total number of hours per course results from the effort required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.60 Module: Informatics [M-WIWI-101472]

Responsible: Dr.-Ing. Tobias Käfer
Prof. Dr. Sanja Lazarova-Molnar
Prof. Dr. Andreas Oberweis
Prof. Dr. Harald Sack
Prof. Dr. Ali Sunyaev
Prof. Dr. Alexey Vinel
Prof. Dr. Melanie Volkamer
Prof. Dr.-Ing. Johann Marius Zöllner

Organisation: KIT Department of Economics and Management

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	20

Compulsory Elective Area (Election:)			
T-WIWI-110339	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services	4,5 CR	Sunyaev
T-WIWI-102680	Computational Economics	4,5 CR	Shukla
T-WIWI-112690	Cooperative Autonomous Vehicles	4,5 CR	Vinel
T-WIWI-113363	Collective Perception in Autonomous Driving	4,5 CR	Vinel
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-110372	Supplement Software- and Systemsengineering	4,5 CR	Oberweis
T-WIWI-113059	Human Factors in Autonomous Driving	4,5 CR	Vinel
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-113968	Management of IT-Projects	4,5 CR	Alpers
T-WIWI-102666	Knowledge Discovery	4,5 CR	Käfer
T-WIWI-106340	Machine Learning 1 - Basic Methods	4,5 CR	Zöllner
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-112685	Modeling and Simulation	4,5 CR	Lazarova-Molnar
T-WIWI-102697	Business Process Modelling	4,5 CR	Oberweis
T-WIWI-102679	Nature-Inspired Optimization Methods	4,5 CR	Shukla
T-WIWI-109799	Process Mining	4,5 CR	Oberweis
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
Seminars and Advanced Labs (Election: between 0 and 1 items)			
T-WIWI-110144	Emerging Trends in Digital Health	4,5 CR	Sunyaev
T-WIWI-110143	Emerging Trends in Internet Technologies	4,5 CR	Sunyaev
T-WIWI-109249	Sociotechnical Information Systems Development	4,5 CR	Sunyaev
T-WIWI-111126	Advanced Lab Blockchain Hackathon (Master)	4,5 CR	Sunyaev
T-WIWI-111125	Advanced Lab Sociotechnical Information Systems Development (Master)	4,5 CR	Sunyaev
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-112914	Advanced Lab Realization of Innovative Services (Master)	4,5 CR	Oberweis
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	5 CR	Zöllner

T-WIWI-109983	Project Lab Machine Learning	5 CR	Zöllner
T-WIWI-113026	Trustworthy Emerging Technologies	4,5 CR	Sunyaev

Competence Certificate
The assessment is carried out as partial exams of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
It is only allowed to choose one lab.

Competence Goal
The student

- has the ability to master methods and tools in a complex discipline and to demonstrate innovativeness regarding the methods used,
- knows the principles and methods in the context of their application in practice,
- is able to grasp and apply the rapid developments in the field of computer science, which are encountered in work life, quickly and correctly, based on a fundamental understanding of the concepts and methods of computer science,
- is capable of finding and defending arguments for solving problems.

Content
The thematic focus will be based on the choice of courses in the areas of Applied Technical Cognitive Systems, Business Information Systems, Critical Information Infrastructures, Information Service Engineering, Security - Usability - Society or Web Science.

Workload
The total workload for this module is approximately 270 hours. The total number of hours per course is calculated from the time required to attend the lectures and exercises, as well as the examination times and the time required for an average student to achieve the learning objectives of the module.

M 4.61 Module: Information Engineering [M-WIWI-101411]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Supplementary Courses (Election:)			
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
T-WIWI-113727	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The student

- understands and analyzes the central role of information as an economic good, a production factor, and a competitive factor,
- identifies, evaluates, prices, and markets information goods,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

Content
In the courses of the module the student can deepen his knowledge on the one hand on the design and operation of markets and on the other hand on the impact of digital goods in network industries regarding the pricing policies, business strategies and regulation issues. If choosen, the course Special Topics in Information Engineering & Management additionally provides an opportunity of practical research in the aforementioned range of subjects.

Annotation
All practical Seminars offered at the IM can be chosen for *Special Topics in Information Systems.* Please update yourself on www.iism.kit.edu/im/lehre.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

M 4.62 Module: Information Systems in Organizations [M-WIWI-104068]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	5

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche
T-WIWI-113465	Designing Interactive Systems: Human-AI Interaction	4,5 CR	Mädche
T-WIWI-114210	(Gen)AI-based Automation in Organizations	4,5 CR	Mädche
T-WIWI-113459	Practical Seminar: Human-Centered Systems	4,5 CR	Mädche

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The student

- has a comprehensive understanding of conceptual and theoretical foundations of informations systems in organizations
- is aware of the most important classes of information systems used in organizations:. process-centric, information-centric and people-centric information systems.
- knows the most important activities required to execute in the pre-implementation, implementation and post-implementation phase of information systems in organizations in order to create business value
- has a deep understanding of key capabilities of business intelligence systems and/or interactive information systems used in organizations

Content
During the last decades we witnessed a growing importance of Information Technology (IT) in the business world along with faster and faster innovation cycles. IT has become core for businesses from an operational company-internal and external customer perspective. Today, companies have to rethink their way of doing business, from an internal as well as an external digitalization perspective.

This module focuses on the internal digitalization perspective. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for information systems in organizations. The students get the necessary knowledge to guide the successful digitalization of organizations. Each lecture in the module is accompanied with a capstone project that is carried out in cooperation with an industry partner.

Annotation
New module starting summer term 2018.

Workload
The total workload for this module is approximately 270 hours.

4.63 Module: Innovation Management [M-WIWI-101507]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	13

Mandatory			
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
Compulsory Elective Courses (Election: 1 item)			
T-WIWI-113664	Design Thinking in Practice	3 CR	Scheydt
T-WIWI-113663	Development of Sustainable, Digital Business Models	3 CR	Weissenberger-Eibl
T-WIWI-111823	Successful Transformation Through Innovation	3 CR	Busch
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-113849	AI Innovation Ecosystems	3 CR	Beyer, Scheydt
T-WIWI-110263	Methods in Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-114184	Pioneering Leadership in German SMEs	3 CR	Schulz-Kamm
Supplementary Courses (Election: 1 item)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-113664	Design Thinking in Practice	3 CR	Scheydt
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
T-WIWI-111823	Successful Transformation Through Innovation	3 CR	Busch
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-113849	AI Innovation Ecosystems	3 CR	Beyer, Scheydt
T-WIWI-110263	Methods in Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-114184	Pioneering Leadership in German SMEs	3 CR	Schulz-Kamm

Competence Certificate

The module examination takes the form of partial examinations (according to §4(2), 1-3 SPO) on the core course and other courses of the module totaling at least 9 CP. The assessment of success is described for each course of the module.

The overall grade is based 50% on the lecture "Innovation Management: Concepts, Strategies and Methods", 25% on one of the seminars of the Chair of Innovation and Technology Management and 25% on another course permitted in the module. The overall grade is cut off after the first decimal place.

Prerequisites

The lecture "Innovation Management: Concepts, Strategies and Methods" and one of the seminars of the chair for Innovation and Technology Management are compulsory. The third course can be chosen from the courses of the module.

Competence Goal

Students develop a comprehensive understanding of the innovation process and its conditionality. There is an additional focus on the concepts and processes which are of particular relevance with regard to shaping the entire process. Various strategies and methods are then taught based on this.

After completing the module, students should have developed a systemic understanding of the innovation process and be able to shape this by developing and applying suitable methods.

Content

The Innovation Management: Concepts, Strategies and Methods lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.

Annotation
Seminars offered by Prof. Terzidis (or the members of his research group) are not eligible for crediting in a seminar module of the WiWi degree programs. Exception: Seminar "Entrepreneurship Research".

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation
None

M 4.64 Module: Integrated Production Planning [M-MACH-101272]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German	4	3

Mandatory			
T-MACH-109054	Integrated Production Planning in the Age of Industry 4.0	9 CR	Lanza

Competence Certificate
Written Exam (120 min)

Prerequisites
none

Competence Goal
The students

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning they have learned about to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of organization and planning of production systems.

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lecture, exercise, excursion

4.65 Module: Intellectual Property Law [M-INFO-101215]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: Compulsory Elective Modules (Law or Sociology)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Intellectual Property Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-101308	Copyright	3 CR	N.N.
T-INFO-101313	Trademark and Unfair Competition Law	3 CR	Matz
T-INFO-101307	Internet Law	3 CR	N.N.
T-INFO-108462	Selected Legal Issues of Internet Law	3 CR	N.N.
T-INFO-101310	Patent Law	3 CR	Werner

Competence Certificate
see partial achievements

Prerequisites
None

Competence Goal
The student

- has detailed knowledge of the main intellectual property rights,
- analyzes and evaluates complex issues and leads them to a legal solution,
- translates the legal principles into contracts on the use of intellectual property and solves more complex infringement cases
- knows and understands the main features of registration procedures and has a broad overview of legal issues raised by the Internet.
- analyzes, assesses and evaluates relevant legal issues from a legal, information technology and legal policy perspective, economic and legal policy perspectives

Content
The module provides knowledge in the core areas of intellectual property law and core topics of internet law. It explains the requirements and the necessary procedure for protecting inventions and industrial marks nationally and internationally. In addition, the necessary know-how is taught to use intellectual property rights and to defend intellectual property rights against attacks by third parties.

Workload
The total workload for this module is approximately 270 hours (9 credits). The allocation is based on the credits of the courses of the module. The workload for courses with 3 credits is about 90 hours.The total number of hours per course results from the effort required to attend the lectures as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.66 Module: Lean Management in Construction [M-BGU-101884]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	German	4	4

Election notes
The course Project Management in Construction and Real Estate Industry II is only allowed to be selected if the selectable course Project Management in Construction and Real Estate Industry I has been passed in the context of another module.

Mandatory			
T-BGU-108000	Lean Construction	4,5 CR	Haghsheno
T-BGU-101007	Project Paper Lean Construction	1,5 CR	Haghsheno
Electives (Election: between 1 and 2 items as well as between 3 and 4,5 credits)			
T-BGU-111921	Turnkey Construction	3 CR	Haghsheno
T-BGU-111922	Civil Engineering Structures and Regenerative Energies	3 CR	Haghsheno
T-BGU-103427	Site Management	1,5 CR	Haghsheno
T-BGU-111211	Energetic Refurbishment	1,5 CR	Lennerts, Schneider
T-BGU-103432	Project Management in Construction and Real Estate Industry I	3 CR	Haghsheno
T-BGU-103433	Project Management in Construction and Real Estate Industry II	3 CR	Haghsheno

Competence Certificate
- 'Teilleistung' T-BGU-108000 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-101007 with examination of other type according to § 4 Par. 2 No. 3

according to selected course:

- 'Teilleistung' T-BGU-111921 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-111922 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-103427 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111211 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-103432 with examination of other type according to § 4 Par. 2 No. 3
- 'Teilleistung' T-BGU-103433 with examination of other type according to § 4 Par. 2 No. 3

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
see German version

Content
see German version

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
As from summer term 2022 the selectable courses are partly replaced. With queries about the completion of the old module version please contact Dr. Schneider.

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- Lean Construction lecture/exercise: 60 h

according to selected courses or examinations respectively:

- Turnkey Construction lecture/exercise: 30 h
- Civil Engineering Structures and Regenerative Energies lecture/exercise: 30 h
- Site Management lecture: 15 h
- Energetic Refurbishment lecture: 15 h
- Project Management in Construction and Real Estate Industry I lecture, exercise: 30 h
- Project Management in Construction and Real Estate Industry II lecture, exercise: 30 h

independent study:

- preparation and follow-up lectures, exercises Lean Construction: 30 h
- preparation of project report Lean Construction (partial exam): 30 h
- examination preparation Lean Construction (partial exam): 60 h

according to selected courses or examinations respectively:

- preparation and follow-up lecture/exercises Turnkey Construction: 30 h
- examination preparation Turnkey Construction (partial exam): 30 h
- preparation and follow-up lecture/exercises Civil Engineering Structures and Regenerative Energies: 30 h
- examination preparation Civil Engineering Structures and Regenerative Energies (partial exam): 30 h
- preparation and follow-up lectures Site Management: 15 h
- examination preparation Site Management (partial exam): 15 h
- preparation and follow-up lectures Energetic Refurbishment: 15 h
- examination preparation Energetic Refurbishment (partial exam): 15 h
- preparation and follow-up lectures, exercises Project Management in Construction and Real Estate Industry I: 30 h
- examination preparation Project Management in Construction and Real Estate Industry I (partial exam): 30 h
- preparation and follow-up lectures, exercises Project Management in Construction and Real Estate Industry II: 30 h
- examination preparation Project Management in Construction and Real Estate Industry II (partial exam): 30 h

total: 270 h

Recommendation
It is recommend to take the module Fundamentals of construction [WI3INGBGU3] from the Bachelor's degree program.

Literature
Gehbauer, F. (2013) Lean Management Im Bauwesen. Skript des Instituts für Technologie und Management im Baubetrieb, Karlsruher Institut für Technologie (KIT).
Liker, J. & Meier, D. (2007) Praxisbuch, der Toyota Weg: für jedes Unternehmen. Finanzbuch Verlag.
Rother, M., Shook, J., & Wiegand, B. (2006). Sehen lernen: mit Wertstromdesign die Wertschöpfung erhöhen und Verschwendung beseitigen. Lean Management Institut.

4.67 Module: Logistics and Supply Chain Management [M-MACH-105298]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	English	4	2

Mandatory			
T-MACH-110771	Logistics and Supply Chain Management	9 CR	Furmans

Competence Certificate
The assessment consists of a 120 minutes written examination (according to §4(2), 1 of the examination regulation).

Prerequisites
None

Competence Goal
The student

- has comprehensive and well-founded knowledge of the central challenges in logistics and supply chain management, an overview of various practical issues and the decision-making requirements and models in supply chains,
- can model supply chains and logistics systems using simple models with sufficient accuracy,
- identifies cause-effect relationships in supply chains,
- is able to evaluate supply chains and logistics systems based on the methods they have mastered.

Content
Logistics and Supply Chain Management provides comprehensive and well-founded fundamentals for the crucial issues in logistics and supply chain management. Within the scope of the lectures, the interaction of different design elements of supply chains is emphasized. For this purpose, qualitative and quantitative description models are used. Methods for mapping and evaluating logistics systems and supply chains are also covered. The lecture contents are enriched by exercises and case studies and partially the comprehension of the contents is provided by case studies. The interacting of the elements will be shown, among other things, in the supply chain of the automotive industry.

Module grade calculation
grade of the module is grades of the exam

Workload
contact hours (1 HpW = 1 h x 15 weeks):

- lecture: 60 h

independent study:

- preparation and follow-up lectures: 90 h
- preparation of case studies: 60 h
- examination preparation: 60 h

total: 270 h

Recommendation
none

Learning type
Lectures, tutorials, case studies.

Literature
Knut Alicke: Planung und Betrieb von Logistiknetzwerken: Unternehmensübergreifendes Supply Chain Management, 2003

Dieter Arnold et. al.: Handbuch Logistik, 2008

Marc Goetschalkx: Supply Chain Engineering, 2011

4.68 Module: Machine Tools and Industrial Handling [M-MACH-101286]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German	4	5

Mandatory			
T-MACH-110963	Machine Tools and High-Precision Manufacturing Systems	9 CR	Fleischer

Competence Certificate
Oral exam (45 minutes)

Prerequisites
None

Competence Goal
The students

- are able to assess the use and application of machine tools and high-precision manufacturing systems and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of machine tools and high-precision manufacturing systems (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of machine tools and high-precision manufacturing systems.
- are capable of selecting and evaluating machine tools and high-precision manufacturing systems according to technical and economic criteria.

Content
The module gives an overview of the construction, use and application of machine tools and high-precision manufacturing systems. In the course of the module a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools and high-precision manufacturing systems is conveyed. First, the main components of the systems are systematically explained and their design principles as well as the integral system design are discussed. Subsequently, the use and application of machine tools and high-precision manufacturing systems will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0 and artificial intelligence.
Guest lectures from industry round off the module with insights into practice.

The individual topics are:

- Structural components of dynamic manufacturing Systems
- Feed axes: High-precision positioning
- Spindles of cutting machine Tools
- Peripheral Equipment
- Machine control unit
- Metrological Evaluation
- Maintenance strategies and condition Monitoring
- Process Monitoring
- Development process for machine tools and high-precision manufacturing Systems
- Machine examples

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lecture, exercise, excursio

4.69 Module: Major Field: Integrated Product Development [M-MACH-102626]

Responsible: Prof. Dr.-Ing. Albert Albers
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
18	Grade to a tenth	Each winter term	1 term	German	4	4

Mandatory			
T-MACH-105401	Integrated Product Development	18 CR	Albers, Düser

Competence Certificate
See course ("Teilleistung")

Prerequisites
None

Competence Goal
By working practically in experience-based learning arrangements with industrial development tasks, graduates are able to succeed in new and unknown situations when developing innovative products by using methodological and systematic approaches. They can apply and adapt strategies of development and innovation management, technical system analysis and team leadership to the situation. As a result, they are able to foster the development of innovative products in industrial development teams in prominent positions, taking into account social, economic and ethical aspects.

Content
Organizational integration: integrated product development model, core team management and simultaneous engineering, informational integration: innovation management, cost management, quality management and knowledge management

Personal integration: team development and leadership

Guest lectures from the industry

Annotation
The participation in the course "Integrated Product Development" requires the simultaneous participation in the lecture(2145156), the workshop (2145157) and the product development project (2145300).

For organizational reasons, the number of participants for the product development project is limited. Therefore, a selection process will take place. Registration for the selection process is made by means of a registration form, which is available annually from April to July on the homepage of the IPEK. Afterwards the selection itself will be discussed in personal interviews with Professor Albers.

The rule here is:

- Students within the course of studies will be decided on the basis of their progress (not only with semesters), which will be determined in a personal interview. The personal selection interviews take place in addition, in order to make the students aware of the special project-oriented format and the time required in correlation with the ECTS points of the course before the final registration for the course.
- With the same study progress after waiting period
- With same waiting time by lot.
- The same procedure is used for students from other courses.

Workload
The work load is about 480 hours, corresponding to 16 credit points.

Learning type
lecture
tutorial
product development project

M 4.70 Module: Management Accounting [M-WIWI-101498]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	3

Mandatory			
T-WIWI-102800	Management Accounting 1	4,5 CR	Wouters
T-WIWI-102801	Management Accounting 2	4,5 CR	Wouters

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits
and truncated after the first decimal.

Prerequisites
If the module has already been completed in the Bachelor's program, it may not be taken again in the Master's program.

Competence Goal
Students

• are familiar with various management accounting methods,

• can apply these methods for cost estimation, profitability analysis, and product costing,

• are able to analyze short-term and long-decisions with these methods,

• have the capacity to devise instruments for organizational control.

Content
The module consists of two courses "Management Accounting 1" and "Management Accounting 2". The emphasis is on structured learning of management accounting techniques.

Annotation
The following courses are part of this module:

- The course Management Accounting 1, which is offered in every sommer semester
- The course Management Accounting 2, which is offered in every winter semester

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

M 4.71 Module: Manufacturing Technology [M-MACH-101276]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German	4	6

Mandatory			
T-MACH-102105	Manufacturing Technology	9 CR	Schulze

Competence Certificate
Written Exam (180 min)

Prerequisites
None

Competence Goal
The students

- can name different manufacturing processes, can describe their specific characteristics and are capable to depict the general function of manufacturing processes and are able to assign manufacturing processes to the specific main groups.
- are enabled to identify correlations between different processes and to select a process depending on possible applications.
- are capable to describe the theoretical basics for the manufacturing processes they got to know within the scope of the course and are able to compare the processes.
- are able to correlate based on their knowledge in materials science the processing parameters with the resulting material properties by taking into account the microstructural effects.
- are qualified to evaluate different processes on a material scientific basis.

Content
Within this engineering sciences-oriented module the students will get to learn principle aspects of manufacturing technology. Further information can be found at the description of the lecture "Manufacturing Technology".

Annotation
The lecture Manufactoring Technology will be offered for the last time in WS 2024/2025 (the lecture videos will remain online). The exam will be offered for the last time in SS 2025 for first-time writers and for the last time in WS 2025/2026 for repeaters.

Workload
regular attendance: 63 hours
self-study: 207 hours

Learning type
Lectures, exercise, excursion

4.72 Module: Market Engineering [M-WIWI-101446]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Mandatory			
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt
Supplementary Courses (Election: 4,5 credits)			
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-113160	Digital Democracy	4,5 CR	Fegert
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD^{2}Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students

- know the design criterias of market mechanisms and the systematic approach to create new markets,
- understand the basics of the mechanism design and auction theory,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

Content
This module explains the dependencies between the design von markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. the approaches for a systematic analysis are explained in the mandatory course *Market Engineering* [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Workload
The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 4.5 credits is approx. 135 hours for courses with 5 credits approx. 150 hours.

The total number of hours per course results from the time required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

Recommendation
None

M 4.73 Module: Marketing and Sales Management [M-WIWI-105312]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	English	4	9

Compulsory Elective Courses (Election:)			
T-WIWI-112693	Digital Marketing	4,5 CR	Kupfer
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Klarmann, Konhäuser
T-WIWI-114174	Economic Decision Making	4,5 CR	Scheibehenne
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-111848	Online Concepts for Karlsruhe City Retailers	3 CR	Klarmann
T-WIWI-102883	Pricing	4,5 CR	Klarmann

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

When every singled examination is passed, the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- know several qualitative and quantitative approaches to prepare decisions in Marketing
- have the theoretical knowledge to write a master thesis in Marketing
- have the theoretical knowledge to work in/together with the Marketing department

Content
The aim of this module is to deepen central marketing contents in different areas.

Workload
The total workload for this module is approximately 270 hours.

M 4.74 Module: Material Flow in Networked Logistic Systems [M-MACH-101278]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	8

Mandatory			
T-MACH-105189	Mathematical Models and Methods for Production Systems	6 CR	Baumann, Furmans
Material flow in interconnected logistics systems (Election:)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-MACH-113950	Dimensioning of Material Flow Systems in Production and Logistics	4 CR	Furmans
T-MACH-105151	Energy Efficient Intralogistic Systems	4 CR	Kramer, Schönung
T-MACH-111003	Global Logistics	4 CR	Furmans
T-MACH-105187	IT-Fundamentals of Logistics	4 CR	Thomas
T-MACH-105174	Warehousing and Distribution Systems	4 CR	Furmans
T-MACH-105171	Safety Engineering	4 CR	Kany

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
The student

- acquires in-depth knowledge on the main topics of logistics, gets an overview of different logistic questions in practice,
- is able to evaluate logistic systems by using the learnt methods,
- is able to analyze and explain the phenomena of industrial material and value streams.

Content
The module *Material Flow in networked Logistic Systems* provides in-depth basics for the main topics of logistics and industrial material and value streams. The obligatory lecture focuses on queuing methods to model production systems. To gain a deeper understanding, the course is accompanied by exercises.

Workload
Regular attendance: 270 hours (9 credits). Lectures with 180 hours attendance 6 credits. Lectures with 120 hours 4 credits.

Recommendation
It is recommended to successfully complete the course "Material Flow in Logistics Systems" [T-MACH-102151] before starting the module.

Learning type
Lecture, tutorial.

4.75 Module: Mathematical Programming [M-WIWI-101473]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules (Operations Research)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Compulsory Elective Courses (Election: at most 2 items)			
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102726	Global Optimization I	4,5 CR	Stein
T-WIWI-103638	Global Optimization I and II	9 CR	Stein
T-WIWI-102856	Convex Analysis	4,5 CR	Stein
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-102724	Nonlinear Optimization I	4,5 CR	Stein
T-WIWI-103637	Nonlinear Optimization I and II	9 CR	Stein
T-WIWI-102855	Parametric Optimization	4,5 CR	Stein
Supplementary Courses (Election: at most 2 items)			
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-102727	Global Optimization II	4,5 CR	Stein
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102725	Nonlinear Optimization II	4,5 CR	Stein
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the courses "Mixed Integer Programming I", "Multicriteria Optimization", "Convex Analysis", "Parametric Optimization", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

If the module is taken as an elective, no compulsory courses need to be taken. If you take the module in the compulsory elective area and only want to complete courses from the supplementary offer, please contact the examination office of the KIT Department of
Economics and Management.

Competence Goal
The student

- names and describes basic notions for advanced optimization methods, in particular from continuous and mixed integer programming,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

Content
The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables.

Annotation
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Workload
The total workload for this module is approximately 270 hours.

M 4.76 Module: Microeconomic Theory [M-WIWI-101500]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	4

Compulsory Elective Courses (Election: at least 9 credits)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Brumm, Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-113264	Matching Theory	4,5 CR	Puppe
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- are able to model practical microoeconomic problems mathematically and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs.

Here is an example of a positive question: what firm decisions does a specific regulatory policy result in under imperfect competition? An example of a normative question would be: which voting rule has appealing properties?

Content
The module teaches advanced concepts and content in microeconomic theory. Thematically, it offers a formally rigorous treatment of game theory and exemplary applications, such as strategic interaction on markets and non-/cooperative bargaining ("Advanced Game Theory"), as well as specialized courses dedicated to auctions ("Auktionstheorie") and incentive systems in organizations ("Incentives in Organizations"). Moreover, it offers the opportunity to delve deeper into the mathematical theory of voting and collective decision making, i.e. the systematic aggregation of preferences and judgments ("Social Choice Theory").

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

M 4.77 Module: Microfabrication [M-MACH-101291]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Mandatory			
T-MACH-102166	Fabrication Processes in Microsystem Technology	3 CR	Bade
Mikrofertigung (Ergänzungsbereich) (Election: at least 6 credits)			
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-MACH-100530	Physics for Engineers	6 CR	Dienwiebel, Gumbsch, Nesterov-Müller, Weygand
T-MACH-102167	Nanotribology and -Mechanics	3 CR	Dienwiebel, Hölscher
T-MACH-102191	Polymers in MEMS B: Physics, Microstructuring and Applications	3 CR	Worgull
T-MACH-102192	Polymers in MEMS A: Chemistry, Synthesis and Applications	3 CR	Rapp
T-MACH-102200	Polymers in MEMS C: Biopolymers and Bioplastics	3 CR	Rapp, Worgull
T-MACH-105556	Practical Course Polymers in MEMS	3 CR	Worgull
T-MACH-109122	X-ray Optics	4 CR	Last
T-MACH-108312	Introduction to Microsystem Technology - Practical Course	4 CR	Last

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
The student

- gains advanced knowledge concerning fabrication techniques in micrometer scale
- aquires knowledge in up-to-date developing research
- can detect and use causal relation in microfabrication process chains.

Content
This engineering module allows the student to gain advanced knowledge in the area of microfabrication. Different manufacturing methods are described and analyzed in an advanced manner. Necessary interdisciplinary knowledge from physics, chemistry, materials science and also up-to-date developments (nano and x-ray optics) in micro fabrication is offered.

Workload
270 hours

4.78 Module: Microoptics [M-MACH-101292]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	4

Mikrooptik (Election: at least 9 credits)			
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-MACH-101910	Microactuators	3 CR	Kohl
T-ETIT-100741	Laser Physics	4 CR	Eichhorn
T-ETIT-101945	Optical Waveguides and Fibers	4 CR	Koos
T-MACH-109122	X-ray Optics	4 CR	Last
T-MACH-108312	Introduction to Microsystem Technology - Practical Course	4 CR	Last

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
The student

- basic knowlegde for the applications of microoptical systems
- understanding fabrication processes of microoptical elements & systems
- analyzing strengths and weaknesses of lithography processes
- knowledge on the basics of optical sources and detectors and their use in technical systems
- fundamental knowledge on different lasers and their design
- knowlegde on X-ray imaging methodes

Content
Optical imaging, measuring and sensor systems are a base for modern natural sciences. In particular life sciences and telecommunications have an intrinsic need for the application of optical technologies. Numerous fields of physics and engineering, e.g. astronomy and material sciences, require optical techniques. Micro optical systems are introduced in medical diagnostics and biological sensing as well as in products of the daily life.

In this module, an introduction to the basics of optics is provided; optical effects are presented with respect to their technical use.

Optical elements and instruments are presented. Fabrication processes of micro optical systems and elements, in particular lithography, are discussed.

In addition X-ray optics and X-ray imaging systems are presented as well as elements of optical telecommunication. A closer look on the physics behind lasers, being one of the most important technical light sources, is provided. As high end technology and clean room equipment is present in all the lectures of this module, the students will have a hands-on training with several experiments in micro optics.

Workload
270 hours

M 4.79 Module: Microsystem Technology [M-MACH-101287]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	6

Mikrosystemtechnik (Election: at least 9 credits)			
T-MACH-100967	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II	3 CR	Guber
T-MACH-100968	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III	3 CR	Guber
T-MACH-108312	Introduction to Microsystem Technology - Practical Course	4 CR	Last
T-MACH-101910	Microactuators	3 CR	Kohl
T-MACH-102152	Novel Actuators and Sensors	4 CR	Kohl, Sommer
T-ETIT-101907	Optoelectronic Components	4 CR	Randel
T-MACH-100530	Physics for Engineers	6 CR	Dienwiebel, Gumbsch, Nesterov-Müller, Weygand
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-MACH-111807	Introduction to Bionics	3 CR	Hölscher
T-MACH-114100	Introduction to Microsystem Technology I	3 CR	Badilita, Korvink
T-MACH-114101	Introduction to Microsystem Technology II	3 CR	Badilita, Korvink

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

Content
The module offers courses in microsystem technology. Knowledge is imparted in various fields like basics in construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

Workload
270 hours

M 4.80 Module: Mobile Machines [M-MACH-101267]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each winter term	2 terms	4	5

Mandatory			
T-MACH-105168	Mobile Machines	8 CR	Geimer
Mobile Machines (Election: at least 1 credit)			
T-MACH-105307	Drive Train of Mobile Machines	4 CR	Geimer
T-MACH-105311	Design and Development of Mobile Machines	4 CR	Geimer
T-MACH-108887	Design and Development of Mobile Machines - Advance	0 CR	Geimer, Siebert
T-MACH-102093	Fluid Power Systems	5 CR	Geimer
T-MACH-111389	Fundamentals in the Development of Commercial Vehicles	3 CR	Weber
T-MACH-105172	Simulation of Coupled Systems	4 CR	Geimer
T-MACH-108888	Simulation of Coupled Systems - Advance	0 CR	Geimer
T-MACH-111821	Control of Mobile Machines	4 CR	Becker, Geimer
T-MACH-111820	Control of Mobile Machines – Prerequisites	0 CR	Becker, Geimer

Competence Certificate
The assessment is carried out as a general oral exam (duration approx. 60 mins) (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

The overall grade of the module is the grade of the oral examination.

The assessment may be carried out as partial oral exams (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.In this case the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The assessment procedures are described for each course of the module seperately.

Prerequisites
None

Competence Goal
The student

- knows and understands the basic structure of the machines
- masters the basic skills to develop the selected machines

Content
In the module of *Mobile Machines* [WI4INGMB15] the students will learn the structure of the machines and deepen the knowledge of the subject for developing the machines. After conclusion the module the student will know the latest developments in mobile machines and is able to evaluate the concepts and the trends of developments. The module is practically orientated and supported by industry partners.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
Knowledge of Fluid Power Systems are helpful, otherwise it is recommended to take the course *Fluid Power Systems* [2114093].

M 4.81 Module: Modeling the Dynamics of Financial Markets [M-WIWI-106660]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	English	4	1

Mandatory			
T-WIWI-113414	Modeling the Dynamics of Financial Markets	9 CR	Ulrich

Competence Certificate
The module examination takes the form of a one-hour written comprehensive examination on the courses "Dynamic Capital Market Theory", "Essentials for Dynamic Financial Machine Learning" and "Exercises, Python, Research Frontier in Dynamic Capital Markets".

Competence Goal
Dynamic Capital Market Theory:

Professional competence:

- Understanding of the principles of Dynamic Asset Pricing Theory
- Mastery of concepts such as stochastic calculus and dynamic modeling in discrete and continuous time
- Application of dynamic programming theory to portfolio and investment decisions
- Knowledge of pricing bonds, stocks, futures and options markets.

Interdisciplinary skills:

- Develop analytical skills for working on and solving complex problems in finance
- Ability to apply theoretical models to real financial market scenarios.

Essentials for Dynamic Financial Machine Learning:

Professional Competence:

- Competencies in Multivariate Time Series Modeling and Dynamic Volatility Modeling.
- Skills in dealing with big financial data.
- Knowledge in the estimation of risk premia and the application of Kalman Filtering.

Interdisciplinary skills:

- Analytical skills in applying machine learning algorithms to dynamic financial market data.
- Development of problem-solving skills through the practical application of Python in financial data analysis.

Content

Dynamic Capital Market Theory:

The course "Dynamic Capital Market Theory" offers an introduction to the modeling of dynamic capital markets. Portfolio holdings and asset prices move dynamically across time and states. This course teaches basic financial economic thinking to help understand why this is the case and how to optimally act in such environments.
Next to the asset pricing focus, the second focus of the course is on optimal portfolio choice (robo advisory). For that, this course develops the theory of dynamic programming in discrete and continuous time and applies it to solve portfolio choice and corporate investment decisions. These concepts are key for financial engineering and the machine learning branch of Reinforcement Learning.

Students obtain proficiency in the following topics:

- Dynamic Valuation and Optimal Dynamic Asset Allocation
- Dynamic modeling in discrete time and continuous time
- Stochastic Calculus
- Markov Decision Processes and Dynamic Programming in discrete time and continuous time
- Pricing of bonds, equity, futures and options

Lectures (2 SWS) develop all concepts on the whiteboard.

Essentials for Dynamic Financial Machine Learning:

The course "Essentials for Dynamic Financial Machine Learning" teaches students to work with financial data, algorithms and statistical concepts.
Students are exposed to algorithms to learn key quantities of dynamic capital markets, such as time-varying risk premia, time-varying volatility and unobserved realizations of random states. The course covers the following concepts:

- Multivariate time series modeling
- Dynamic volatility modeling
- Handling big financial data
- Estimating risk premia
- Kalman Filtering

Weekly lectures (2 SWS) develop all algorithmic material on the whiteboard.

Exercises, Python, Research Frontier in Dynamic Capital Markets:

This course provides hands-on experience in implementing concepts from dynamic capital market theory and financial machine learning using Python. Students will develop practical skills in coding and data analysis that complement the theoretical knowledge gained in the companion courses. The course covers:

- Introduction to Python for financial applications Data manipulation and visualization with pandas and matplotlib.
- Implementing dynamic portfolio optimization algorithms.
- Coding stochastic processes and simulations.
- Building and testing time series models.
- Applying machine learning techniques to financial data.
- Developing Reinforcement Learning algorithms for trading strategies.
- Implementing and backtesting option pricing models.
- Creating interactive financial dashboards

Weekly computer lab sessions (2 SWS) will guide students through coding exercises and problem sets that directly relate to topics covered in "Dynamic Capital Market Theory" and "Essentials for Dynamic Financial Machine Learning". Students will work on individual and group projects, applying their programming skills to real-world financial problems and current research questions in dynamic capital markets.
This course forms an integral part of the module, complementing the theoretical components with practical implementation skills essential for modern quantitative finance.

Workload

Total workload for 9 credit points: approx. 270 hours. The exact distribution is based on the credit points of the courses in the module:

- Dynamic Capital Market Theory: 3 CP
- Essentials for Dynamic Financial Machine Learning: 3 CP
- Exercises, Python, Research Frontier in Dynamic Capital Markets: 3 CP

The total number of hours per course is determined by the amount of time spent attending the lectures and tutorials, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.

Recommendation
Recommendation: Knowledge in the fields of Advanced Statistics, Deep Learning, Financial Economics, Differential Equations, Optimization.

Learning type
The module consists of two weekly lectures and respective tutorials:

1. **Dynamic Capital Market Theory** and
2. **Essentials for Dynamic Financial Machine Learning**.
3. **Exercises, Python, Research Frontier in Dynamic Capital Markets**

M 4.82 Module: Modern Mobility on Rails and Roads [M-MACH-106496]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	3	2

Modern Mobility on Rail and Road (Election: 2 items)			
T-MACH-113016	Digitization in the Railway System	4,5 CR	Cichon
T-MACH-113069	Vehicle Systems for Urban Mobility	4,5 CR	Cichon
T-MACH-113068	Innovation and Project Management in Rail Vehicle Engineering	4,5 CR	Cichon

Competence Goal

- Students will have a basic understanding of train protection and its technical implementation in Germany, the functioning of the European Train Control System (ETCS) and its planning as well as Automated Train Operation. They can explain the knowledge they have learned (terms, relationships) in context and apply it to practical issues. Furthermore, students will be able to classify the operational and technical advantages and disadvantages in the context of the digitalization of the rail network in Germany and take future challenges into account. students will be able to discuss the technical aspects and areas of application of ETCS at the various levels and give a basic outline of balise planning for ETCS Level 2. Digital planning approaches such as PlanPro as well as measurement and test runs are known and can be categorized.
- Students gain a basic understanding of the key transport, transport policy and technological contexts of urban mobility. Based on this basic understanding, various public transport vehicle concepts in the urban and regional environment are analyzed, compared and the optimal range of applications discussed. In addition to established public transport systems, special attention is paid to innovative mobility solutions. In particular, the aim is to create an understanding of how sustainable, systemic mobility solutions should be designed depending on the individual application.
- In this course, students will learn the basics of innovation and project management in the context of rail vehicle development. Creativity techniques are applied to the challenges of the rail system in a practical way, such as aspects of sustainability. Students will also learn about the various organizational, systemic, economic and technological challenges of a project and project management.

4.83 Module: Module Master's Thesis [M-WIWI-101650]

Responsible: Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: Master's Thesis

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
30	Grade to a tenth	Each term	1 term	German	4	2

Mandatory			
T-WIWI-103142	Master's Thesis	30 CR	Studiendekan der KIT-Fakultät für Informatik, Studiendekan des KIT-Studienganges

Competence Certificate
The Master's thesis is a written piece of work that demonstrates that the student is able to work on a problem from their subject in an academic manner. It is regulated in detail in § 14 SPO 2015.

At least two KIT examiners supervise and assess the work. At least one of the examiners must be a professor and usually an examiner at the Department of Economics and Management.

The regular completion period is six months. Upon justified request by the student, the Examination Board may extend the completion period by a maximum of three months. If the Master's thesis is not completed and submitted to the examiner by the deadline, it will be assessed as "insufficient", unless the candidate is not responsible for this failure (e.g. maternity leave). In addition to the written work on the topic, a presentation can be agreed as an obligatory and grade-relevant part of the thesis. Depending on the agreement, this can take place before submission or after submission on an agreed date. The preparation time for the presentation does not count towards the processing time for the written part, unless it has been included in the overall workload of the final project.

The thesis may be written in English with the consent of the examiner. Other languages require the consent of the examiner and the approval of the examination board.

The candidate may only return the topic of the Master's thesis once and only within the first month of registration.

If the thesis is not passed, it may be repeated once. A new topic must be issued. The same topic may not be repeated. This also applies to comparable topics. In case of doubt, the examination board will decide. The new topic may again be supervised by the examiners of the first thesis.

This regulation also applies analogously after an official withdrawal from a registered topic.

The module grade is the grade for the Master's thesis.

Prerequisites
Prerequisite for admission to the Master thesis is that 50 percent of the credit points has to be completed.

A written confirmation of the examinor about supervising the Master Thesis is required.

Please pay regard to the institute specific rules for supervising a Master Thesis.

The Master Thesis has to contain the following declaration in German:

„Ich versichere wahrheitsgemäß, die Arbeit selbstständig verfasst, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde sowie die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet zu haben“.

If this declaration is not given, the Master Thesis will not be accepted.

Competence Goal
The student can independently handle a complex and unfamiliar subject based on scientific criteria and on the current state of research.

He/she is in a position to critically analyze and structure the researched information as well as derive principles and regularities. He/she knows how to apply the thereby achieved results to solve the task at hand. Taking into account this knowledge and his/her interdisciplinary knowledge, he/she can draw own conclusions, derive improvement potentials, propose and implement science-based decisions.

This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to sensibly structure a research paper, document them and clearly communicate the results in scientific form.

Content

The Master Thesis is a major scientific work. The topic of the Master Thesis will be chosen by the student themselves and adjusted with the examinor. The topic has to be related to Industrial Engineering and Management and has to refer to subject-specific or interdisciplinary problems.

Workload

A total of approx. 900 hours is expected for the preparation and presentation of the Master's thesis. In addition to writing the thesis, this figure includes all necessary activities such as literature research, familiarization with the topic, familiarization with any necessary tools, conducting studies/experiments, supervision meetings, etc.

M 4.84 Module: Nanotechnology [M-MACH-101294]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	4

Mandatory			
T-MACH-111814	Introduction to Nanotechnology	4 CR	Hölscher
Nanotechnologie (Ergänzungsbereich) (Election: at least 5 credits)			
T-MACH-111807	Introduction to Bionics	3 CR	Hölscher
T-MACH-102167	Nanotribology and -Mechanics	3 CR	Dienwiebel, Hölscher
T-MACH-102152	Novel Actuators and Sensors	4 CR	Kohl, Sommer
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-ETIT-100740	Quantum Functional Devices and Semiconductor Technology	3 CR	Koos
T-MACH-105555	System Integration in Micro- and Nanotechnology	4 CR	Gengenbach
T-MACH-105695	Selected topics of system integration for micro- and nanotechnology	4 CR	Gengenbach, Hagenmeyer, Koker, Sieber
T-MACH-108809	Micro- and Nanosystem Integration for Medical, Fluidic and Optical Applications	4 CR	Gengenbach, Koker, Sieber
T-MACH-110272	System Integration in Micro- and Nanotechnology 2	4 CR	Gengenbach
T-MACH-111030	Micro- and nanotechnology in implant technology	4 CR	Ahrens, Doll
T-PHYS-102282	Nano-Optics	8 CR	Naber
T-PHYS-102504	Simulation of Nanoscale Systems, without Seminar	6 CR	Wenzel
T-MACH-108312	Introduction to Microsystem Technology - Practical Course	4 CR	Last

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
The student

- has detailed knowledge in the field of nanotechnology
- is able to evaluate the specific characteristics of nanosystems.

Content
The module deals with the most important principles and fundamentals of modern nanotechnology. The compulsory module "Introduction to Nanotechnology" introduces the basics of nanotechnology and nanoanalytics. The specific phenomena and properties found in nanoscale systems are the main topic of the module.

Workload
270 hours

Learning type
Lectures

M 4.85 Module: Natural Hazards and Risk Management [M-WIWI-104837]

Responsible: apl. Prof. Dr. Michael Kunz
Organisation: KIT Department of Economics and Management
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Compulsory Elective Courses (Election: at least 9 credits)			
T-BGU-101499	Introduction to Hydrogeology	5 CR	Goldscheider
T-BGU-108943	Engineering Hydrology	3 CR	Ehret
T-BGU-111275	Integrated Design Project in Water Resources Management	6 CR	Ehret, Seidel
T-BGU-101859	Morphodynamics	3 CR	Rodrigues Pereira da Franca
T-BGU-106620	Examination Prerequisite Environmental Communication	0 CR	Kämpf
T-BGU-101676	Environmental Communication	4 CR	Kämpf

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
See German version

Content
See German version

Annotation
Students, who successfully completed both modules “Understanding and Prediction of Disasters” I and II (alternatively: one of the modules in Bachelor and Master) can get a certificate of the module coordinator (CEDIM). This certificate lists the successful completed courses within the two modules.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

M 4.86 Module: Network Economics [M-WIWI-101406]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	3

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-100005	Competition in Networks	4,5 CR	Mitusch
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Brumm, Mitusch
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitusch
T-WIWI-113147	Telecommunications and Internet – Economics and Policy	4,5 CR	Mitusch

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The students

- have acquired the basic knowledge for a future job in a network company or in a regulatory agency, ministry etc.
- recognize the specific characterizations of network sectors, know fundamental methods for an economic analysis of network sectors and recognize the interfaces for an interdisciplinary cooperation of economists, engineers and lawyers
- understand the interactions between infrastructures, control systems, and the users of networks, especially concerning their implications on investments, price setting and competitive behavior, and they can model or simulate exemplary applications
- can assess the necessity of regulation of natural monopolies and identify regulatory measures that are important for networks.

Content
The module is concerned with network or infrastructure industries in the economy, e.g. telecommunication, traffic and energy sectors. These sectors are characterized by close interdependencies of operators and users of infrastructure as well as on states. States intervene in various forms, by the public and regulation authorities, due to the importance of network industries and due to limited abilities of markets to work properly in these industries. The students are supposed to develop a broad knowledge of these sectors and of the political options available.

Workload
Total workload for 9 credit points: approx. 270 hours

The exact distribution is based on the credit points of the courses in the module.

Recommendation
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

M 4.87 Module: Operations Research in Supply Chain Management [M-WIWI-102832]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules (Operations Research)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	9

Election notes
At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and"Special Topics of Stochastic Optimization (elective)" has to be taken.
Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106200	Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
Supplementary Courses (Election: at most 1 item)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Spieckermann
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate
The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and "Special Topics of Stochastic Optimization (elective)" has to be taken.

If the module is taken as an elective, no compulsory courses need to be taken. If you take the module in the compulsory elective area and only want to complete courses from the supplementary offer, please contact the examination office of the KIT Department of
Economics and Management.

Competence Goal
The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of SCM and their respective optimization problems,
- is acquainted with classical location problem models (in planes, in networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Suppy Chain Mangement, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

Annotation
Some lectures and courses are offered irregularly.

The planned lectures and courses for the next three years are announced online.

Workload
Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours

Recommendation
Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

4.88 Module: Optoelectronics and Optical Communication [M-MACH-101295]

Responsible: Prof. Dr. Jan Gerrit Korvink
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Optoelektronik und Optische Kommunikationstechnik (Kernbereich) (Election: 1 item)			
T-ETIT-100639	Optical Transmitters and Receivers	6 CR	Freude
Optoelektronik und Optische Kommunikationstechnik (Ergänzungsbereich) (Election: at least 5 credits)			
T-MACH-102152	Novel Actuators and Sensors	4 CR	Kohl, Sommer
T-ETIT-101938	Communication Systems and Protocols	5 CR	Becker, Becker
T-ETIT-100741	Laser Physics	4 CR	Eichhorn
T-ETIT-100740	Quantum Functional Devices and Semiconductor Technology	3 CR	Koos
T-ETIT-101945	Optical Waveguides and Fibers	4 CR	Koos

Competence Certificate
The assessment is carried out as partial exams

(according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
none

Competence Goal
Student has basic knowledge of optical communication systems and related device and fabrication technologies.

- He/she can apply this knowledge to specific problems.

Content
This module covers practical and theoretical aspects in the areas of optical communications and optoelectronics. System aspects of communication networks are complemented by fundamental principles and device technologies of optoelectronics as well as and microsystem fabrication technologies.

Workload
270 hours

M 4.89 Module: Principles of Food Process Engineering [M-CIWVT-101120]

Responsible: PD Dr. Volker Gaukel
Organisation: KIT Department of Chemical and Process Engineering
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	3

Principles of Food Process Engineerung (Election: 1 item)			
T-CIWVT-111536	Process Engineering: Example Food Processing	6 CR	Gaukel
T-CIWVT-100152	Advanced Food Processing	3 CR	Gaukel
Elective Courses: Food Process Engineering (Election: between 3 and 8 credits)			
T-CIWVT-112174	Extrusion Technology in Food Processing	4 CR	
T-CIWVT-108801	Food Science and Functionality	4 CR	Seifert

Prerequisites
none

Competence Goal
See German version.

M 4.90 Module: Private Business Law [M-INFO-101216]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: Compulsory Elective Modules (Law or Sociology)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	6

Private Business Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-111405	Seminar: Commercial and Corporate Law in the IT Industry	3 CR	Nolte
T-INFO-101288	Corporate Compliance	3 CR	Herzig
T-INFO-102036	Computer Contract Law	3 CR	Menk
T-INFO-111436	Employment Law	3 CR	Hoff
T-INFO-111437	Tax Law	3 CR	Dietrich

Competence Certificate
see partial achievements

Prerequisites
None

Competence Goal
The student

- has gained in-depth knowledge of German company law, commercial law and civil law;
- is able to analyze, evaluate and solve complex legal and economic relations and problems;
- is well grounded in individual labour law, collective labour law and commercial constitutional law, evaluates and critically assesses clauses in labour contracts;
- recognizes the significance of the parties to collective labour agreements within the economic system and has differentiated knowledge of labour disputes law and the law governing the supply of temporary workers and of social law;
- possesses detailed knowledge of national earnings and corporate tax law and is able to deal with provisions of tax law in a scientific manner and assesses the effect of these provisions on corporate decision-making.

Content
The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.

Workload
The total workload for this module is approximately 270 hours (9 credits). The allocation is based on the credits of the courses of the module. The workload for courses with 3 credits is about 90 hours.The total number of hours per course results from the effort required to attend the lectures as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.91 Module: Process Engineering in Construction [M-BGU-101110]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	German	4	1

Mandatory			
T-BGU-101844	Process Engineering	3 CR	Schneider
Electives (Election: between 2 and 3 items as well as between 6 and 7,5 credits)			
T-BGU-101845	Construction Equipment	3 CR	Gentes
T-BGU-101832	Operation Methods for Foundation and Marine Construction	1,5 CR	Schneider
T-BGU-101801	Operation Methods for Earthmoving	1,5 CR	Schlick
T-BGU-101846	Tunnel Construction and Blasting Engineering	3 CR	Haghsheno
T-BGU-101847	Project Studies	3 CR	Gentes
T-BGU-101850	Disassembly Process Engineering	3 CR	Gentes

Competence Certificate
- 'Teilleistung' T-BGU-101844 with written examination according to § 4 Par. 2 No. 1

according to selected course:

- 'Teilleistung' T-BGU-101845 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-101832 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-101801 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-101846 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-101847 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-101850 with oral examination according to § 4 Par. 2 No. 2

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
The course Verfahrenstechnik [6241704] is compulsory and must be examined.

Competence Goal
Students understand different processes and the related construction equipment, it's technology, capabilities and constraints. Students can define process solutions consisting of machinery and devices. They can evaluate existing processes through knowledge about process performance and operating conditions, and the can identify potential for improvement.

Content
Within the frame of this module, various construction und conditioning processes will be presented as well as performance calculations conducted. Students learn about the construction machinery and devices of these processes. Transmission, generation, conversion and controlling of power are explained with the help of various practical examples. Moreover, the module includes possibilities for an on-site familiarization.

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
None

Workload
see German version

Recommendation
none

4.92 Module: Production Engineering [M-MACH-106590]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	3

Production Engineering (Election: at least 9 credits)			
T-MACH-113647	Digitalization from Product Concept to Production	4 CR	Wawerla
T-MACH-113832	Global Production	5 CR	Lanza
T-MACH-105188	Integrative Strategies in Production and Development of High Performance Cars	4 CR	Schlichtenmayer
T-MACH-112115	Artificial Intelligence in Production	5 CR	Fleischer
T-MACH-105783	Learning Factory “Global Production“	6 CR	Lanza
T-MACH-108878	Laboratory Production Metrology	5 CR	Lanza, Stamer
T-MACH-110318	Product- and Production-Concepts for Modern Automobiles	4 CR	Kienzle, Steegmüller
T-MACH-110984	Production Technology for E-Mobility	4 CR	Fleischer
T-MACH-110960	Project Internship Additive Manufacturing: Development and Production of an Additive Component	4 CR	Zanger
T-MACH-102107	Quality Management	4 CR	Lanza
T-MACH-113031	Rapid Industrialization of Immature Products using the Example of Electric Mobility	4 CR	Bauer
T-MACH-112121	Seminar Application of Artificial Intelligence in Production	4 CR	Fleischer
T-MACH-105185	Control Technology	4 CR	Gönnheimer
T-MACH-113372	Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation	4 CR	Benfer, Lanza
T-MACH-105177	Metal Forming	4 CR	Herlan
T-MACH-102148	Gear Cutting Technology	4 CR	Klaiber

Competence Certificate
Oral exams: duration approx. 5 min per credit point

Written exams: duration approx. 20 - 25 min per credit point

Amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
The module M-MACH-101284 -Production Technology must not have been started.

Competence Goal
The students

- are able to apply the methods of production science to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- are able to use their knowledge target-oriented to achieve an efficient production technology.
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.
- are able to describe and compare complex production processes exemplarily.

Content
Within this module the students will get to know and learn about production science. Manifold lectures and excursions as part of several lectures provide specific insights into the field of production science.

Workload
The work load is about 270 hours, corresponding to 9 credit points.

Learning type

Lectures, seminars, workshops, excursions

M 4.93 Module: Project Management in Construction [M-BGU-101888]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	German	4	3

Election notes
The course Project Management in Construction and Real Estate Industry II is only allowed to be selected if the selectable course Project Management in Construction and Real Estate Industry I has been passed.

Mandatory			
T-BGU-103432	Project Management in Construction and Real Estate Industry I	3 CR	Haghsheno
T-BGU-111921	Turnkey Construction	3 CR	Haghsheno
Electives (Election: between 1 and 2 items as well as between 3 and 4,5 credits)			
T-BGU-103427	Site Management	1,5 CR	Haghsheno
T-BGU-111211	Energetic Refurbishment	1,5 CR	Lennerts, Schneider
T-BGU-111922	Civil Engineering Structures and Regenerative Energies	3 CR	Haghsheno
T-BGU-103433	Project Management in Construction and Real Estate Industry II	3 CR	Haghsheno

Competence Certificate
- 'Teilleistung' T-BGU-103432 with examination of other type according to § 4 Par. 2 No. 3
- 'Teilleistung' T-BGU-111921 with written examination according to § 4 Par. 2 No. 1

according to selected course:

- 'Teilleistung' T-BGU-103427 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111211 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111922 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-103433 with examination of other type according to § 4 Par. 2 No. 3

details about the learning controls see at the respective 'Teilleistung'

Prerequisites
none

Competence Goal
see German version

Content
see German version

Module grade calculation
grade of the module is CP weighted average of grades of the partial exams

Annotation
As from summer term 2022 the selectable courses are partly replaced. With queries about the completion of the old module version please contact Dr. Schneider.

Workload
see German version

Recommendation
see German version

Literature

Ahrens, H.; Bastian, K.; Muchowski, L. (Hrsg.) (2021): Handbuch – Projektsteurung, Baumanagement. Fraunhofer IRB Verlag.

Allison, M.; Ashcarft, H.; Cheng, R.; Klawens, S.; Pease, J. (2018): Integrated Project Delivery - An Action Guide for Leaders.

Ausschuss der Verbände und Kammern der Ingenieure und Architekten für die Honorarordnung e.V. (Hrsg.) (2020): Heft Nr. 9: Projektmanagement in der Bau- und Immobilienwirtschaft - Standards für Leistungen und Vergütung. Reguvis Fachmedien.

Breyer, W. (2017): Partnering Modelle - ein internationaler Vergleich. In: Planen, Errichten und Betreiben. Digitalisierung im Bau. 4. Internationaler BBB-Kongress. Hrsg. von Fritz Berner. BBB Professoren. Stuttgart: Institut für Baubetriebslehre, Universität Stuttgart, S. 163–177.

Eitelhuber, A. et al. (Hrsg.) (2008). Partnering in der Bau- und Immobili- enwirtschaft: Projektmanagement- und Vertragsstandards in Deutschland. Handbücher: Rechtswissenschaften und Verwaltung. Kohlhammer, Stuttgart. ISBN: 9783170198616.

Eschenbruch, K. (2009). Projektmanagement und Projektsteuerung für die Immobilien- und Bauwirtschaft. Die rechtlichen Grundlagen für Leistung, Vergütung, Nachträge, Haftung, Vergabe und Vertragsgestaltung – Kom- mentar zum Vertragsmusterrecht und Leistungsbild Bund – mit Vertrags- mustern aus der Praxis für öffentliche und private Auftraggeber. 3. Aufl., Werner, Neuwied. ISBN: 978-3-8041-1467-8.

Fiedler, M. (2018): Lean Construction – Das Managementhandbuch – Agile Methoden und Lean Management im Bauwesen. Springer, Berlin, Heidelberg.

Girmscheid, G. (2016): Projektabwicklung in der Bauwirtschaft: Wege zur Win-Win-Situation für Auftraggeber und Auftragnehmer. Wege zur Win-Win-Situation für Auftraggeber und Auftragnehmer. 5. Aufl. VDI-Buch. Springer, Berlin, Heidelberg. ISBN: 978-3-662-49329-8.

Heidemann, A. (2011): Kooperative Projektabwicklung im Bauwesen unter der Berücksichtigung von Lean-Prinzipien - Entwicklung eines Lean- Projektabwicklungssystems. Internationale Untersuchungen im Hinblick auf die Umsetzung und Anwendbarkeit in Deutschland". Karlsruhe: Universität Karlsruhe. ISBN: 978-3-86644-583-3.

Kochendörfer, B.; Liebchen, J. H.; Viering, M. G. (2018): Bau-Projekt-Management. Grundlagen und Vorgehensweisen. 5. Aufl. Leitfaden des Baubetriebs und der Bauwirtschaft. Wiesbaden, Springer Vieweg. ISBN: 978-3-8348-1823-2. DOI: 10.1007/978-3-8348-2245-1. URL: http: //dx.doi.org/10.1007/978-3-8348-2245-1.

Mafakheri, F.; Dai, L.; Slezak, D.; Nasiri, F. (2007): Project Delivery System Selection under Uncertainty. In: Journal of Management in Engineering 23 (4), S. 200-206.

Schlabach, C. (2013): Untersuchungen zum Transfer der australischen Projektabwicklungsform Project Alliancing auf den deutschen Hochbaumarkt. Dissertation, Kassel, Universität Kassel. ISBN: 9783862194902.

Sommer, H. (2016): Projektmanagement im Hochbau mit BIM und Lean Management. Springer Vieweg.

Walker, D. H. T.; Rowlinson, S. (Hrsg) (2020): Routledge handbook of integrated project delivery. 1. Aufl. Routledge handbooks. London, Routledge. ISBN: 9781138736689.

Zuber, S. Z. S.; Nawi, M. N. M.; Nifa, F. A. A.; Bahaudin, A. Y. (2018): An Overview of Project Delivery Methods in Construction Industry. In: International Journal of Supply Chain Management 7 (6), S. 177-182.

4.94 Module: Public Economic and Technology Law [M-INFO-106754]

Responsible: TT-Prof. Dr. Frederike Zufall
Organisation: KIT Department of Informatics
Part of: Compulsory Elective Modules (Law or Sociology)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	2

Public Economic and Technology Law (Election: at least 1 item as well as at least 9 credits)			
T-INFO-101309	Telecommunications Law	3 CR	
T-INFO-101312	European and International Law	3 CR	Brühann
T-INFO-111404	Seminar: IT- Security Law	3 CR	Schallbruch
T-INFO-113381	Public International Law	3 CR	Zufall
T-INFO-113887	EU Data Protection Law	3 CR	Gil Gasiola

Competence Certificate
see partial achievement

Prerequisites
see partial achievement

Competence Goal
Students

- have in-depth knowledge and understanding of selected areas of public economic and technology law
- understand international and European legal frameworks,
- can establish connections between technical and legal issues, and assess and evaluate them from a legal perspective.

Content
The module covers a range of topics in public economic and technology law. In addition to telecommunications law and IT security law, it includes an in-depth examination of the European and international legal framework. Current regulatory topics relating to the platform economy, the EU digital single market and on regulating artificial intelligence are equally addressed.

Workload
The total workload for this module is approx. 270 hours (9 credits). The distribution is based on the credit points of the courses in the module. The workload for courses with 3 credits is approx. 90 hours. The total number of work hours per course results from the time required to attend the lectures, the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

Recommendation
see partial achievement

4.95 Module: Rail System Technology [M-MACH-101274]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	5

Mandatory			
T-MACH-102143	Rail System Technology	9 CR	Cichon

Competence Certificate
written examination in German language
Duration: 120 minutes
No tools or reference materials may be used during the exam except calculator and dictionary

Competence Goal

- The students understand relations and interdependencies between rail vehicles, infrastructure and operation in a rail system.
- Based on operating requirements and legal framework they derive the requirements concerning a capable infrastructure and suitable concepts of rail vehicles.
- They recognize the impact of alignment, understand the important function of the wheel-rail-contact and estimate the impact of driving dynamics on the operating program.
- They evaluate the impact of operating concepts on safety and capacity of a rail system.
- They know the infrastructure to provide power supply to rail vehicles with different drive systems.
- The students learn the role of rail vehicles and understand their classification. They understand the basic structure und know the functions of the main systems. They understand the overall tasks of vehicle system technology.
- They learn functions and requirements of car bodies and jugde advantages and disadvantages of design principles. They know the functions of the car body's interfaces.
- They know about the basics of running dynamics and bogies.
- The students learn about advantages and disadvantages of different types of traction drives and judge, which one fits best for each application.
- They understand brakes from a vehicular and an operational point of view. They assess the fitness of different brake systems.
- They know the basic setup of train control management system and understand the most important functions.
- They specify and define suitable vehicle concepts based on requirements for modern rail vehicles.

Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations
8. Vehicle system technology: structure and main systems of rail vehicles
9. Car body: functions, requirements, design principles, crash elements, coupling, doors and windows
10. Bogies: forces, running gears, bogies, Jakobs-bogies, active components, connection to car body, wheel arrangement
11. Drives: priciples, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multisystem vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
12. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electropneumatic brake, emergency brake, parking brake)
13. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends
14. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck vehicles, locomotives, freight wagons

Annotation
A bibliography is available for download (Ilias-platform).

The lectures can be attended in the same term.

Workload

1. Regular attendance: 42 hours
2. Self-study: 42 hours
3. Exam and preparation: 186 hours

Learning type
Lectures

4.96 Module: Safety, Computing and Law in Highway Engineering [M-BGU-101066]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	German	4	2

Mandatory			
T-BGU-101804	IT-Based Road Design	3 CR	Zimmermann
T-BGU-101674	Safety Management in Highway Engineering	3 CR	Zimmermann
T-BGU-106615	Laws concerning Traffic and Roads	3 CR	Hönig

Prerequisites
The examination "Design Basics in Highway Engineering" has to be passed. This can be taken either in the module "Design, Construction, Operation and Maintenance of Highways" (WI4INGBGU1) or can be approved from a previous study (e.g. Civil Engineering BSc at KIT).

Competence Goal
See German version.

Annotation
None

Recommendation
None

M 4.97 Module: Seminar Module [M-WIWI-101808]

Responsible: Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: Compulsory Elective Modules (mandatory)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Election notes
Two seminars out of the course list, that have at least 3 CP each and are offered by a representative of the Department of Economics and Management or of the Center for applied legal studies (Department of Informatics), have to be chosen.

Alternatively, one of the two seminars can be absolved at an engineering department.

Compulsory Seminars (Election: 2 items)			
T-WIWI-103474	Seminar in Business Administration A (Master)	3 CR	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
T-WIWI-103476	Seminar in Business Administration B (Master)	3 CR	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
T-WIWI-103477	Seminar in Economics B (Master)	3 CR	Professorenschaft des Fachbereichs Volkswirtschaftslehre
T-WIWI-103478	Seminar in Economics A (Master)	3 CR	Professorenschaft des Fachbereichs Volkswirtschaftslehre
T-WIWI-103479	Seminar in Informatics A (Master)	3 CR	Professorenschaft des Instituts AIFB
T-WIWI-103480	Seminar in Informatics B (Master)	3 CR	Professorenschaft des Instituts AIFB
T-WIWI-103481	Seminar in Operations Research A (Master)	3 CR	Nickel, Rebennack, Stein
T-WIWI-103482	Seminar in Operations Research B (Master)	3 CR	Nickel, Rebennack, Stein
T-WIWI-103483	Seminar in Statistics A (Master)	3 CR	Grothe, Schienle
T-WIWI-103484	Seminar in Statistics B (Master)	3 CR	Grothe, Schienle
T-INFO-101997	Seminar: Legal Studies I	3 CR	N.N.
T-INFO-105945	Seminar: Legal Studies II	3 CR	N.N.
T-MACH-102135	Conveying Technology and Logistics	3 CR	Furmans
T-MACH-109062	Seminar Production Technology	3 CR	Fleischer, Lanza, Schulze
T-MACH-108737	Seminar Data-Mining in Production	3 CR	Lanza
T-ETIT-100754	Seminar Creating a Patent Specification	3 CR	Stork
T-WIWI-108763	Seminar in Engineering Science Master (approval)	3 CR	Fachvertreter ingenieurwissenschaftlicher Fakultäten
Interdisciplinary Qualifications (Election: at least 3 credits)			
T-WIWI-112967	Tutoring: Training and Practice *This item will not influence the grade calculation of this parent.*	2 CR	
T-WIWI-111438	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	1 CR	
T-WIWI-111439	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	2 CR	
T-WIWI-111440	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	3 CR	
T-WIWI-113353	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	2 CR	

T-WIWI-113352	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	1 CR	
T-WIWI-113354	Self-Booking-HOC-SPZ-FORUM-STK-Graded *This item will not influence the grade calculation of this parent.*	3 CR	
T-WIWI-111441	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	1 CR	
T-WIWI-111442	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	2 CR	
T-WIWI-111443	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	3 CR	
T-WIWI-113355	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	1 CR	
T-WIWI-113356	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	2 CR	
T-WIWI-113357	Self-Booking-HOC-SPZ-FORUM-STK-Ungraded *This item will not influence the grade calculation of this parent.*	3 CR	

Competence Certificate

The modul examination consists of two seminars and of at least one key qualification (KQ) course (according to §4 (3), 3 of the examintaion regulation). A detailed description of every singled assessment is given in the specific course characerization.

The final mark for the module is the average of the marks for each of the two seminars weighted by the credits and truncated after the first decimal. Grades of the KQ courses are not included.

Prerequisites

The course specific preconditions must be observed.

- *Seminars*: Two seminars out of the course list, that have at least 3 CP each and are offered by a representative of the Department of Economics and Management or of the Center for applied legal studies (Department of Informatics), have to be chosen.
- Alternatively, one of the two seminars can be absolved at an engineering department. The seminar has to be offered by a representative of the respective department as well. The assessment has to meet the demands of the Department of Economics and Management (active participation, term paper with a workload of at least 80 h, presentation). This alternative seminar **requires an official approval** and can be applied at the examination office of the Department of Economics and Management. Seminars at the institutes wbk and IFL do not require these approval.
- *Key Qualification (KQ)-course(s)*: One or more courses with at least 3 CP in total of additional key qualifications have to be chosen among the courses [HoC, ZAK, Sprachenzentrum].

Competence Goal

- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.
- Students are familiar with the DFG´s Code of Conduct "Guidelines for Safeguarding Good Research Practice" and base their scientific work on it.

Content

Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailled description o these qualifications is given in the section “Key Qualifications” of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload

he total workload for this module is approximately 270 hours. For further information see German version.

4.98 Module: Sensor Technology I [M-ETIT-101158]

Responsible: Dr. Wolfgang Menesklou
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each summer term	1 term	4	4

Mandatory			
T-ETIT-101911	Sensors	3 CR	Menesklou
Compulsory Elective (Election: at most 2 items as well as at least 6 credits)			
T-ETIT-100707	Seminar Sensors	3 CR	Menesklou
T-ETIT-113577	Seminar Sensors – practical part	3 CR	Menesklou
T-MACH-101910	Microactuators	3 CR	Kohl
T-MACH-102164	Practical Training in Basics of Microsystem Technology	3 CR	Last
T-MACH-114100	Introduction to Microsystem Technology I	3 CR	Badilita, Korvink
T-MACH-114101	Introduction to Microsystem Technology II	3 CR	Badilita, Korvink

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
The course *Sensor Technology* [23231] is obligatory and has to be attended. The elected courses must not be credited in other modules.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
Knowledge of electrical engineering is assumed. Therefore it is recommended to attend the courses *Electrical Engineering II* [23224] beforehand.

4.99 Module: Service Analytics [M-WIWI-101506]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	11

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-114209	Artificial Intelligence in Service Systems II: Generative AI Applications & Adoption	4,5 CR	Satzger
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche
T-WIWI-112152	Practical Seminar: Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-113725	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

Content
The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data "Big Data" and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

Annotation
This module is part of the KSRI teaching profile "Digital Service Systems". Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

Workload
Total workload for 9 credit points: approx. 270 hours.

Attendance time: 90 hours

Preparation and follow-up: 100 hours

Exam and exam preparation: 80 hours

Recommendation
The course Service Analytics A [2595501] should be taken.

4.100 Module: Service Design Thinking [M-WIWI-101503]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	English	4	1

Mandatory			
T-WIWI-102849	Service Design Thinking	9 CR	Satzger, Terzidis

Competence Certificate
The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Prerequisites
None

Competence Goal
Students

- Gain a comprehensive understanding of the globally recognized innovation approach "Design Thinking" as introduced and promoted by the Stanford University
- Apply the learned approach in the context of a real innovation project provided by a partner organization
- Conceive new, creative solutions through extensive need finding of relevant service users
  Develop prototypes early and independently, test them and improve them iteratively to solve the challenge provided by the partner organization
- Communicate, present and network in interdisciplinary and international environments.

Content
Course phases (roughly 4 weeks each):

Design Space Exploration:

- Exploring the problem space by questioning the given innovation challenge from practice.
- Familiarization with the topic area of the respective challenge.
- Gathering first impressions of the requirements and needs of people related to the problem.

Critical Function Prototype:

- Building an intensive understanding of the needs of the target group of the respective challenge.
- Deriving critical functions from the customer's perspective that could help solve the overall problem.
- Building prototypes for the critical functions and testing them in real customer situations.

Dark Horse Prototype:

- Reversal of assumptions and experiences made so far. The goal is to develop radically new and unconventional ideas.
- Implementation of the ideas into simple prototypes and subsequent testing.

Funky Prototype:

- Integration of the individual successfully tested functions from the critical function and dark horse phase into solution concepts. These are also tested and further developed.

Functional Prototype:

- Selection of successful funky prototypes and development of these towards high-resolution prototypes. The final solution approach for the project is written down in detail and feedback is obtained.

Final Prototype:

- Implementing the final prototype and presenting it to the practical partner as well as the SUGAR Network.

Annotation

Due to practical project work as a component of the program, access is limited. The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June. For more information on the application process and the program itself are provided in the module component description and the program's website (https://sdtkarlsruhe.de/). Furthermore, the lecturers provide an information event for applicants every year in May.This module is part of the KSRI Teaching Program.

Workload

The workload for this module is approx. 2 days per week over a period of 9 months. The workload for this practical module is therefore comparatively high. The reason for this is that the participants work in international teams with students from other universities and partner organizations and solve real innovation challenges.

The workload of approx. 270 hours is spread over approx. 105 hours (3.5 CP) in the first semester and 165 hours (5.5 CP) in the second semester.

Recommendation

This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

M 4.101 Module: Service Economics and Management [M-WIWI-102754]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	6

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-112823	Platform & Market Engineering: Commerce, Media, and Digital Democracy	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
Students

- understand the scientific basics of the management of digital services and corresponding systems
- gain a comprehensive insight in the importance and the most important features of information systems as an central component of the digitalization of business processes, products and services
- know the most relevant concepts and theories to shape the digital transformation process of service systems successfully
- understand the OR methods in the sector of service management and apply them adequately
- are able to use large amounts of available data systematically for the planning, operation and improvement of complex service offers and to design and control information systems
- are able to develop market-oriented coordination mechanisms and apply service systems.

Content
This module provides the foundation for the management of digital services and corresponding systems. The courses in this module cover the major concepts for a successful management of service systems and their digital transformation. Current examples from the research and practice enhance the relevance of the discussed topics.

Annotation
This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload
Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module.

Recommendation
None

M 4.102 Module: Service Innovation, Design & Engineering [M-WIWI-102806]

Responsible: Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	English	4	6

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger
T-WIWI-113460	Engineering Interactive Systems: AI & Wearables	4,5 CR	Mädche
T-WIWI-114210	(Gen)AI-based Automation in Organizations	4,5 CR	Mädche
T-WIWI-113459	Practical Seminar: Human-Centered Systems	4,5 CR	Mädche
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
Dependencies between courses:

The course Practical Seminar Service Innovation cannot be applied in combination with the course Practical Seminar Digital Service Design.

Competence Goal
Students

- know about the challenges, concepts, methods and tools of service innovation management and are able to use them successfully.
- have a profound comprehension of the development and design of innovative services and are able to apply suitable methods and tools on concrete and specific issues.
- are able to embed the concepts of innovation management, development and design of services into organisations
- are aware of the strategic importance of services, are able to present value creation in the context of services systems and to strategically exploit the possibilities of their digital transformation
- elaborate concrete and problem-solving solutions for practical tasks in teams.

Content
This module is designed to constitute the basis for the development of successful ICT supported innovations thus including the methods and tools for innovation management, for the design and the development of digital services and the implementation of new business models. Current examples from science and practice enhance the relevance of the topics addressed.

Annotation
This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload
Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module.

Recommendation

Attending the course Practical Seminar Service Innovation [2595477] is recommended in combination with the course Service Innovation [2595468].

Attending the course Practical Seminar Digital Service Design [new] is recommended in combination with the course Digital Service Design [new].

4.103 Module: Service Management [M-WIWI-101448]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	12

Compulsory Elective Courses (Election: 9 credits)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-114209	Artificial Intelligence in Service Systems II: Generative AI Applications & Adoption	4,5 CR	Satzger
T-WIWI-112757	Digital Services: Innovation & Business Models	4,5 CR	Satzger

Competence Certificate
The assessment is carried out as partial exams, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Content
The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Annotation
From summer semester 2023, the course Service Innovation will be offered with a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Current foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Workload
Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module. 120-135 hours for the courses with 4.5 credits, 135-150 hours for the courses with 5 credits and 150-180 hours for the courses with 6 credits.

The total number of hours per course results from the time required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

Recommendation
None

M 4.104 Module: Service Operations [M-WIWI-102805]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules (Operations Research)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	8

Election notes
At least one of the fourcourses Operations Research in Supply Chain Management, Operations Research in Health Care Management, Practical seminar: Health Care Management orDiscrete-Event Simulation in Production and Logistics has to be assigned.
Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

Compulsory Elective Courses (Election: at most 2 items)			
T-WIWI-102718	Discrete-Event Simulation in Production and Logistics	4,5 CR	Spieckermann
T-WIWI-102884	Operations Research in Health Care Management	4,5 CR	Nickel
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-102716	Practical Seminar: Health Care Management (with Case Studies)	4,5 CR	Nickel
Supplementary Courses (Election: at most 1 item)			
T-MACH-112213	Applied material flow simulation	4,5 CR	Baumann
T-WIWI-110971	Demand-Driven Supply Chain Planning	4,5 CR	Heckmann
T-WIWI-114109	Service Operations and Cyber Security	4,5 CR	Mohr

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the four courses "Operations Research in Supply Chain Management", "Operations Research in Health Care Management", "Practical seminar: Health Care Management" or "Discrete-Event Simulation in Production and Logistics" has to be assigned.

If the module is taken as an elective, no compulsory courses need to be taken. If you take the module in the compulsory elective area and only want to complete courses from the supplementary offer, please contact the examination office of the KIT Department of
Economics and Management.

Competence Goal
Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

Content

The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data “Big Data” and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

Annotation

This module is part of the KSRI teaching profile “Digital Service Systems”. Further information on a service-specific profiling is available under www.ksri.kit.edu/teaching.

Workload

Total workload for 9 credit points: approx. 270 hours. The allocation is based on the credit points of the courses in the module.

Recommendation

The course Practical Seminar Health Care should be combined with the course OR in Health Care Management.

4.105 Module: Sociology [M-GEISTSOZ-101169]

Responsible: Prof. Dr. Gerd Nollmann
Organisation: KIT Department of Humanities and Social Sciences
Part of: Compulsory Elective Modules (Law or Sociology)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	2

Mandatory			
T-GEISTSOZ-104565	Computer Aided Data Analysis	0 CR	Nollmann
T-GEISTSOZ-109052	Application of Social Science Methods (WiWi)	9 CR	Nollmann

Prerequisites
Students must pass three excersise sheets within the seminar "Computer based data analysis".

Competence Goal
The student

- Gains theoretical and methodical knowledge of social processes and structures,
- learns a script based data analysis tool (R, Stata, Python),
- gathers his/her data within an own framework and/or analyzes complex data,
- is able to present his/her work results in a precise and clear way.

Content
The Sociology module offers students the opportunity to learn a data analysis tool (R, Stata, Python) within the framework of a two-semester course and to independently transfer this tool to a content-related question. Both the tool and the contents are determined by the lecturers. The contents can refer to the analysis of large population surveys (SOEP, Microcensus, ALLBUS), to own experiments, to own field studies or to Big Data analyses.

Annotation
Basic knowledge in multivariate regression and inference statistics is required.

M 4.106 Module: Specialization in Food Process Engineering [M-CIWVT-101119]

Responsible: PD Dr. Volker Gaukel
Organisation: KIT Department of Chemical and Process Engineering
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	3

Elective Courses: Specialization in Food Process Engineering (Election: at least 9 credits)			
T-CIWVT-111433	Drying of Dispersions	1,5 CR	Karbstein
T-CIWVT-108871	Microbiology for Engineers	3 CR	Schwartz
T-CHEMBIO-109442	Food Chemistry Basics	3 CR	Bunzel
T-CIWVT-111434	Additives and Active Substances	1,5 CR	van der Schaaf
T-CIWVT-111534	Introduction to Sensory Analysis with Practice	1,5 CR	Scherf
T-CIWVT-111535	Food Science and Functionality	3 CR	Watzl
T-CHEMBIO-108091	Introduction to Food Law	1,5 CR	Kuballa
T-CIWVT-112174	Extrusion Technology in Food Processing	4 CR	

Competence Goal
The students

- can explain and apply engineering fundamentals of process engineering
- Know and understand various specific aspects of food processing and can apply their basic knowledge to the specifics of food processing/ to the professional practice of food processing.

Content
See courses.

M 4.107 Module: Specific Topics in Materials Science [M-MACH-101268]

Responsible: Dr.-Ing. Wilfried Liebig
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Spezielle Werkstoffkunde (Election: at least 9 credits)			
T-MACH-102141	Constitution and Properties of Wearresistant Materials	4 CR	Ulrich
T-MACH-105150	Constitution and Properties of Protective Coatings	4 CR	Ulrich
T-MACH-102099	Experimental Lab Class in Welding Technology, in Groups	4 CR	Dietrich
T-MACH-105179	Functional Ceramics	4 CR	Botros
T-MACH-105157	Foundry Technology	4 CR	Günther, Klan
T-MACH-102111	Principles of Ceramic and Powder Metallurgy Processing	4 CR	Schell
T-MACH-100287	Introduction to Ceramics	6 CR	Schell
T-MACH-102182	Ceramic Processing Technology	4 CR	Binder
T-MACH-105164	Laser in Automotive Engineering	4 CR	Schneider
T-MACH-112763	Laser Material Processing	4 CR	Schneider
T-MACH-102102	Physical Basics of Laser Technology	5 CR	Schneider
T-MACH-102137	Polymer Engineering I	4 CR	Liebig
T-MACH-102138	Polymer Engineering II	4 CR	Liebig
T-MACH-102154	Laboratory Laser Materials Processing	4 CR	Schneider
T-MACH-105178	Practical Course Technical Ceramics	4 CR	Schell
T-MACH-102157	High Performance Powder Metallurgy Materials	4 CR	Schell
T-MACH-105170	Welding Technology	4 CR	Farajian
T-MACH-102170	Structural and Phase Analysis	4 CR	Wagner
T-MACH-102103	Superhard Thin Film Materials	4 CR	Ulrich
T-MACH-100531	Systematic Materials Selection	4 CR	Dietrich, Schulze
T-MACH-102139	Failure of Structural Materials: Fatigue and Creep	4 CR	Gruber, Gumbsch
T-MACH-102140	Failure of Structural Materials: Deformation and Fracture	4 CR	Gumbsch, Weygand

Competence Certificate
The assessment is carried out as partial exams of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module seperately.

Prerequisites
None

Competence Goal
Students acquire special basic knowledge in selected areas of materials science and engineering and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

Content
See courses.

Module grade calculation
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Workload
The module requires an average workload of 270 hours.

Learning type
Lecture, Tutorials.

M 4.108 Module: Stochastic Optimization [M-WIWI-103289]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules (Operations Research)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	11

Compulsory Elective Courses (Election: between 1 and 2 items)			
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
Supplementary Courses (Election: at most 1 item)			
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-106545	Optimization under Uncertainty	4,5 CR	Rebennack
T-WIWI-112109	Topics in Stochastic Optimization	4,5 CR	Rebennack

Competence Certificate
The assessment is carried out as partial exams (according to § 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The assessment procedures are described for each course of the module seperately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
At least one of the courses "Advanced Stochastic Optimization", "Large-scale Optimization" or "Introduction to Stochastic Optimization" has to be taken.

If the module is taken as an elective, no compulsory courses need to be taken. If you take the module in the compulsory elective area and only want to complete courses from the supplementary offer, please contact the examination office of the KIT Department of
Economics and Management.

Competence Goal
The student

- names and describes basic notions for advanced stochastic optimization methods, in particular, ways to algorithmically exploit the special model structures,
- knows the indispensable methods and models for quantitative analysis of stochastic optimization problems,
- models and classifies stochastic optimization problems and chooses the appropriate solution methods to solve also challenging stochastic optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

Content
The module focuses on the modeling as well as the imparting of theoretical principles and solution methods for optimization problems with special structure, which occur for example in the stochastic optimization.

Annotation
The courses are sometimes offered irregularly. The curriculum, planned for three years in advance, can be found on the Internet at http://sop.ior.kit.edu/28.php.

Workload
The total workload for this module is approximately 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module. The total number of hours per course is determined by the amount of time spent attending the lectures and exercises, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.

Recommendation
It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.

4.109 Module: Strategic Design of Modern Production Systems [M-MACH-105455]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	3

Strategic Design of Modern Production Systems (Election: at least 9 credits)			
T-MACH-113647	Digitalization from Product Concept to Production	4 CR	Wawerla
T-MACH-113832	Global Production	5 CR	Lanza
T-MACH-105188	Integrative Strategies in Production and Development of High Performance Cars	4 CR	Schlichtenmayer
T-MACH-105783	Learning Factory “Global Production“	6 CR	Lanza
T-MACH-110318	Product- and Production-Concepts for Modern Automobiles	4 CR	Kienzle, Steegmüller
T-MACH-102107	Quality Management	4 CR	Lanza
T-MACH-113372	Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation	4 CR	Benfer, Lanza

Competence Certificate
Oral exams: duration approx. 5 min per credit point

Written exams: duration approx. 20 - 25 min per credit point

Amount, type and scope of the success control can vary according to the individually choice.

Prerequisites
none

Competence Goal
The students

- are able to apply the methods of the strategic design of modern production systems to new problems.
- are able to outline the underlying conditions and influencing factors of today's production and derive recommendations for action for an integrated strategy.
- are able to use their knowledge target-oriented to achieve an efficient production technology.
- are able to analyze new situations and choose methods of production science target-oriented based on the analyses, as well as justifying their selection.
- are able to describe and compare complex production processes exemplarily.

Content
Within this module the students will get to know and learn about methods for the strategic design of modern production systems. Manifold lectures and excursions as part of several lectures provide specific insights into the field of science.

Workload
The work load is about 270 hours, corresponding to 9 credit points.

Learning type
Lectures, seminars, workshops, excursions

M 4.110 Module: Student Innovation Lab (SIL) 1 [M-WIWI-105010]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: Business Administration
Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	English	4	1

Mandatory			
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
T-WIWI-110166	SIL Entrepreneurship Project	3 CR	Terzidis
T-WIWI-110287	SIL Entrepreneurship Emphasis	3 CR	Terzidis

Competence Certificate
The assessment of this module comprises a written examination of 60 minutes on the lecture contents of the lecture "Entrepreneurship" as well as two seminars. All examinations are graded. In both seminars the following tasks have to be fulfilled:

- "SIL Entrepreneurship Project": Presentation of the Value Profile & submission of the Business Plan
- "SIL Entrepreneurship Emphasis": Submission of price calculation, market potential analysis, competition analysis, financial plan, risk analysis, decision basis for funding and legal form

In addition, both courses provide for smaller, ungraded tasks to monitor progress.

The grade consists of 60 % of the written examination, 20 % of the examination "SIL Entrepreneurship Project" and 20 % of the examination "SIL Entrepreneurship Advanced".

Prerequisites
The module can only be completed together with the module M-WIWI-105011 "Student Innovation Lab 2".

An application is required for participation in the modules Student Innovation Lab (SIL) 1 and Student Innovation Lab (SIL) 2. Information about the application can be found at http://www.kit-student-innovation-lab.de/index.php/for-students/.

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Competence Goal
Personal competence

- Ability to reflect: Students can analyse certain elements of their actions in social interaction, critically assess them and develop alternative actions.
- Decision-making ability: Students can prepare a decision template in due time and provide the necessary factual arguments for alternative decisions and thus make timely decisions.
- Interdisciplinary cooperation: Students can recognise the limits of their domain competence and adjust to domains outside their subject area. The students are able to recognise missing (own) competences and to supplement them with complementary competences (of other persons in the team). Students can communicate their domain to others and develop a basic understanding of foreign domains.
- Value-based action: Students can use selected tools of psychology to recognize their own values. They can compare these values with other team members and critically reflect on whether their offers match these values.

Social competence

- Ability to cooperate: Students can analyse and assess their cooperation behaviour in the group.
  Communication skills: Students can present their information in a convincing, focused and target group-oriented way.
- Conflict ability: Students can recognise conflicts at an early stage, analyse conflict situations and name solution concepts.

Innovation and Entrepreneurship Competence

- Agile product development: Students can apply methods of agile product development such as Scrum.
  Methodical innovation finding: Students can perform user- or technology-centric innovation processes to develop sustainable value propositions for dedicated target groups (e.g. Design Thinking (DT), Technology Application Selection (TAS) process).
- Orientation on the management of new technology-based companies (NTBF): Students can name the central concepts of intellectual property and legal form. Students can name the most important tasks of entrepreneurial leadership. They can identify the relevant forms of business modelling and draw up a business plan. Students know the central approaches to building an organisation. Students will be able to identify the ownership structure of investments and how to develop a strategy. The students can name marketing concepts and create a business model.
- Create investment readiness: The students are able to create a rudimentary sales and cost planning. Furthermore, they are able to create a project plan for a company and derive an investment plan from it. The students can present the business plan to potential investors and develop investor empathy.
- Business model development competence: Students are able to use relevant tools for business modelling, e.g. the Business Model Canvas. Students can develop and evaluate alternative business models.
- Dealing with risks:Students can identify the basic risks in terms of desirability, technical feasibility and profitability. Students can use customer interaction methods to test desirability and willingness to pay. Students can draw up a rudimentary competitive analysis. Students can identify and identify risks and possible reactions.

Systemic technical competence

- Problem-solving competence: Students can analyse, assess and solve a technical problem in a structured way.
- Agile Methodology of System Development: Students can name the different system development processes and apply them appropriately.
- Validation in a volatile environment: Students can perform a technical and economic validation under volatile boundary conditions. For this purpose they can name the boundary conditions and interpret the results of the validation.
- Functional decomposition: Students are able to identify and interpret complex customer needs and derive functional requirements from them.
- Architecture development: The students are able to recognize correlations from the functional requirements and to derive a suitable system architecture.

Content

In a real laboratory, the module imparts professional, social and personal competences in entrepreneurship and in the respective technical domain. The aim is to prepare students in the best possible way for an entrepreneurial activity within or outside an established organisation. Our teaching is research-based and practice-oriented.

As an integral part, the lecture Entrepreneurship offers the theoretical basis and gives an overview of important theoretical concepts and empirical evidence. Current case studies and practical experiences of successful founders underline the theoretical and empirical contents. In order to operate a company on a long-term basis, important specialist knowledge is also of decisive importance. The content of the lecture therefore includes an introduction to Entrepreneurial Marketing and Leadership as well as the basics of Opportunity Recognition and Business Modeling. Customer-centric development methods, the lean start-up approach and methods for technology-oriented innovation are presented. Future founders must be able to develop and manage resources such as financial and human capital, infrastructure and intellectual property. Further aspects relate to the establishment of an organisation and the financing of one's own project.

The knowledge gained in the lecture Entrepreneurship will be applied in a practice-oriented seminar and in the labs. We use an action learning approach to complement the knowledge with skills and reflective attitudes. In five-member teams, the students experience their way from idea generation to the final investor pitch.

With regard to the labs, students have the following options:

- As an innovation platform, the Automation Innovation Lab offers flying robots for cooperative swarm solutions.
- The Industry 4.0 Innovation Lab enables innovations in the area of the next industrial revolution with mobile robot platforms.
- In the Internet of Things Innovation Lab, innovations in Assisted Living and Smart Housing are made possible by a comprehensive kit of mobile robots and sensors.
- The Computer Vision for Health Lab offers a selection of state-of-the-art imaging devices and powerful computing hardware for innovative image-based applications for medicine and healthcare.

The module also teaches methods of agile system development (Scrum) and the associated validation methods as well as methods of functional prototyping. Gate plans are applied within the module to determine project progress.

Methods for the reflection of individual & team work are treated and applied as well as group work specific knowledge about different roles of team members, solution of conflict situations and interdisciplinary teams are obtained.

Workload

Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module. The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.111 Module: Student Innovation Lab (SIL) 2 [M-WIWI-105011]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr. Werner Nahm
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork
Prof. Dr. Orestis Terzidis
Prof. Dr.-Ing. Thomas Zwick

Organisation: KIT Department of Economics and Management

Part of: Compulsory Elective Modules (Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a third	Each winter term	2 terms	English	4	1

Mandatory			
T-ETIT-110291	Innovation Lab	9 CR	Hohmann, Nahm, Sax, Stork, Zwick

Competence Certificate

The examination in this module comprises the submission of graded intermediate results in the form of prototypes (low fidelity and high fidelity) as well as various technical and economic reports (according to § 4 (2), 3 SPO):

1. Submission of a technical report with requirements list and system architectur
2. Submission of the reflection of the gate plans
3. Presentation of the High-fidelity

The module grade consists of 50% of the evaluation of the low fidelity prototype including intermediate results of a technical and economic nature and 50% of the evaluation of the high fidelity prototype including intermediate results of a technical and economic nature.

Prerequisites

The module can only be completed together with the module M-WIWI-105010 "Student Innovation Lab (SIL) 1".

An application is required for participation in the modules Student Innovation Lab (SIL) 1 and Student Innovation Lab (SIL) 2. Information about the application can be found at http://www.kit-student-innovation-lab.de/index.php/for-students/.

Competence Goal
Personal competence

- Ability to reflect: Students can analyse certain elements of their actions in social interaction, critically assess them and develop alternative actions.
- Decision-making ability: Students can prepare a decision template in due time and provide the necessary factual arguments for alternative decisions and thus make timely decisions.
- Interdisciplinary cooperation: Students can recognise the limits of their domain competence and adjust to domains outside their subject area. The students are able to recognise missing (own) competences and to supplement them with complementary competences (of other persons in the team). Students can communicate their domain to others and develop a basic understanding of foreign domains.
- Value-based action: Students can use selected tools of psychology to recognize their own values. They can compare these values with other team members and critically reflect on whether their offers match these values.

Social competence

- Ability to cooperate: Students can analyse and assess their cooperation behaviour in the group.
  Communication skills: Students can present their information in a convincing, focused and target group-oriented way.
- Conflict ability: Students can recognise conflicts at an early stage, analyse conflict situations and name solution concepts.

Innovation and Entrepreneurship Competence

- Agile product development: Students can apply methods of agile product development such as Scrum.
  Methodical innovation finding: Students can perform user- or technology-centric innovation processes to develop sustainable value propositions for dedicated target groups (e.g. Design Thinking (DT), Technology Application Selection (TAS) process).
- Orientation on the management of new technology-based companies (NTBF): Students can name the central concepts of intellectual property and legal form. Students can name the most important tasks of entrepreneurial leadership. They can identify the relevant forms of business modelling and draw up a business plan. Students know the central approaches to building an organisation. Students will be able to identify the ownership structure of investments and how to develop a strategy. The students can name marketing concepts and create a business model.
- Create investment readiness: The students are able to create a rudimentary sales and cost planning. Furthermore, they are able to create a project plan for a company and derive an investment plan from it. The students can present the business plan to potential investors and develop investor empathy.
- Business model development competence: Students are able to use relevant tools for business modelling, e.g. the Business Model Canvas. Students can develop and evaluate alternative business models.
- Dealing with risks:Students can identify the basic risks in terms of desirability, technical feasibility and profitability. Students can use customer interaction methods to test desirability and willingness to pay. Students can draw up a rudimentary competitive analysis. Students can identify and identify risks and possible reactions.

Systemic technical competence

- Problem-solving competence: Students can analyse, assess and solve a technical problem in a structured way.
- Agile Methodology of System Development: Students can name the different system development processes and apply them appropriately.
- Validation in a volatile environment: Students can perform a technical and economic validation under volatile boundary conditions. For this purpose they can name the boundary conditions and interpret the results of the validation.
- Functional decomposition: Students are able to identify and interpret complex customer needs and derive functional requirements from them.
- Architecture development: The students are able to recognize correlations from the functional requirements and to derive a suitable system architecture.

Content
In a real laboratory, the module imparts professional, social and personal competences in entrepreneurship and in the respective technical domain. The aim is to prepare students in the best possible way for an entrepreneurial activity within or outside an established organisation. Our teaching is research-based and practice-oriented.

As an integral part, the lecture Entrepreneurship offers the theoretical basis and gives an overview of important theoretical concepts and empirical evidence. Current case studies and practical experiences of successful founders underline the theoretical and empirical contents. In order to operate a company on a long-term basis, important specialist knowledge is also of decisive importance. The content of the lecture therefore includes an introduction to Entrepreneurial Marketing and Leadership as well as the basics of Opportunity Recognition and Business Modeling. Customer-centric development methods, the lean start-up approach and methods for technology-oriented innovation are presented. Future founders must be able to develop and manage resources such as financial and human capital, infrastructure and intellectual property. Further aspects relate to the establishment of an organisation and the financing of one's own project.

The knowledge gained in the lecture Entrepreneurship will be applied in a practice-oriented seminar and in the labs. We use an action learning approach to complement the knowledge with skills and reflective attitudes. In five-member teams, the students experience their way from idea generation to the final investor pitch.

With regard to the labs, students have the following options:

- As an innovation platform, the Automation Innovation Lab offers flying robots for cooperative swarm solutions.
- The Industry 4.0 Innovation Lab enables innovations in the area of the next industrial revolution with mobile robot platforms.
- In the Internet of Things Innovation Lab, innovations in Assisted Living and Smart Housing are made possible by a comprehensive kit of mobile robots and sensors.
- The Computer Vision for Health Lab offers a selection of state-of-the-art imaging devices and powerful computing hardware for innovative image-based applications for medicine and healthcare.

The module also teaches methods of agile system development (Scrum) and the associated validation methods as well as methods of functional prototyping. Gate plans are applied within the module to determine project progress.

Methods for the reflection of individual & team work are treated and applied as well as group work specific knowledge about different roles of team members, solution of conflict situations and interdisciplinary teams are obtained.

Annotation
New module starting winter term 2019/2020.

Workload
The module comprises a total of 270 hours (8 hours attendance time, 213 hours preparation and follow-up time, 49 hours preparation time for examination), which corresponds to a total of 9 credit points for two semesters.

4.112 Module: The Circular Factory [M-MACH-107129]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	English	4	2

Mandatory			
T-MACH-113983	The Circular Factory	9 CR	Lanza

Competence Certificate
written exam, duration 120 minutes

Prerequisites
none

Competence Goal
The students ...

- can name dimensions of circularity and circular economy methods (e.g., repair, refurbish, recycle) and describe them in detail.
- can describe challenges in planning and control circular factories, including remanufacturing networks and disassembly systems.
- are able to apply guidelines for designing circular products.
- distinguish data acquisition techniques for metrologically assessing returned products and apply uncertainty-driven product modeling in circular production systems.
- have methodical knowledge on learning from human observation and disassembly automatization and apply this knowledge to new problem cases.
- can describe reprocessing methods, including reconditioning and material characterization.
- understand the challenges in intralogistics for circular products.

After completing this course, students are able to understand the challenges of establishing a circular economy. They are also able to evaluate possible solutions and assess them in relation to these challenges. In particular, students are ultimately able to understand circular production in a circular factory holistically and to relate it to existing concepts in industrial practice.

Content
The basic aspects of sustainability and circular production are taught as part of the engineering module.

Workload
regular attendance: 62 hours
self-study: 208 hours
In total: 270 h = 9 LP

Learning type
Lecture and excursions

M 4.113 Module: Transport Infrastructure Policy and Regional Development [M-WIWI-101485]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: Economics
Compulsory Elective Modules (Economics)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	2

Compulsory Elective Courses (Election: 2 items)			
T-WIWI-103107	Spatial Economics	4,5 CR	Ott
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba

Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
None

Competence Goal
The students

- understand the economic issues related to transport and regional development with a main focus on economic policy issues generated by the relationship of transport and regional development with the public sector
- are able to compare different considerations of politics, regulation and the private sector and to analyse and assess the respective decision problems both qualitatively and by applying appropriate methods from economic theory
- are prepared for careers in the public sector, particularly for public companies, politics, regulatory agencies, related consultancies, mayor construction companies or infrastructure project corporations

Content
The development infrastructure (e.g. transport, energy, telecommunications) has always been one of the most relevant factors for economic development and particularly influences the development of the regional economy. From the repertoire of state actions, investments into transport infrastructure are often regarded the most important measure to foster regional economic growth. Besides the direct effects of transport policy on passenger and freight transport, a variety of individual economic activities is significantly dependent on the available or potential transport options. Decisions on the planning, financing and realization of mayor infrastructure projects require a solid and far-reaching consideration of direct and indirect growth effects with the occurring costs.

Through its combination of lectures the module reflects the complex interdependencies between infrastructure policy, transport industry and regional policy and provides its participants with a comprehensive understanding of the functionalities of one of the most important sectors of the economy and its relevance for economic policy.

Annotation
The courses *Assessment of Public Policies and Projects I* (winter term) and *Assessment of Public Policies and Projects II* (summer term) will no longer be part of this module. Student who have already had exams in this courses can integrate these exams in this module.

Workload
The total workload for this module is approximately 270 hours. The exact distribution is based on the credit points of the courses in the module. The total number of hours per course is determined by the amount of time spent attending the lectures and tutorials, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.

M 4.114 Module: Transportation Modelling and Traffic Management [M-BGU-101065]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	8

Compulsory Examination (Election: between 2 and 3 items as well as between 6 and 9 credits)			
T-BGU-101797	Methods and Models in Transportation Planning	3 CR	Vortisch
T-BGU-101798	Traffic Engineering	3 CR	Vortisch
T-BGU-113971	Exercise Transportation Data Analysis	0 CR	Vortisch
T-BGU-101799	Traffic Management and Transport Telematics	3 CR	Vortisch
T-BGU-101800	Traffic Flow Simulation	3 CR	Vortisch
Electives (Election: between 0 and 3 credits)			
T-BGU-113671	Exercise Transportation Data Analysis	0 CR	Kagerbauer
T-BGU-100010	Transportation Data Analysis	3 CR	Kagerbauer
T-BGU-106611	Freight Transport	3 CR	Szimba, Vortisch
T-BGU-106301	Long-Distance and Air Traffic	3 CR	Vortisch
T-BGU-101005	Tendering, Planning and Financing in Public Transport	3 CR	Vortisch
T-BGU-100014	Seminar in Transportation	3 CR	Kagerbauer, Vortisch
T-BGU-112552	Seminar on Modeling and Simulation in Transportation	3 CR	Kagerbauer, Vortisch
T-BGU-103425	Mobility Services and New Forms of Mobility	3 CR	Kagerbauer
T-BGU-103426	Strategic Transport Planning	3 CR	Waßmuth
T-BGU-106608	Information Management for Public Mobility Services	3 CR	Vortisch
T-BGU-111057	Sustainability in Mobility Systems	3 CR	Kagerbauer

Prerequisites
None

Competence Goal
See German version.

Recommendation
None

4.115 Module: Urban Water Technologies [M-BGU-104448]

Responsible: Dr.-Ing. Mohammad Ebrahim Azari Najaf Abad
PD Dr.-Ing. Stephan Fuchs

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	English	4	3

Mandatory			
T-BGU-112365	Urban Water Technologies	9 CR	Azari Najaf Abad, Fuchs

Prerequisites
none

Recommendation
none

M 4.116 Module: Vehicle Development [M-MACH-101265]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	9

Vehicle Development (Election: at least 9 credits)			
T-MACH-102207	Tires and Wheel Development for Passenger Cars	3 CR	Leister
T-MACH-111389	Fundamentals in the Development of Commercial Vehicles	3 CR	Weber
T-MACH-102156	Project Workshop: Automotive Engineering	4,5 CR	Frey, Gießler
T-MACH-110796	Python Algorithms for Vehicle Technology	4 CR	Rhode
T-MACH-105172	Simulation of Coupled Systems	4 CR	Geimer
T-MACH-108888	Simulation of Coupled Systems - Advance *This item will not influence the grade calculation of this parent.*	0 CR	Geimer
T-MACH-102148	Gear Cutting Technology	4 CR	Klaiber
T-MACH-112126	Data-Driven Algorithms in Vehicle Technology	4 CR	Scheubner
T-MACH-114075	Principles of Whole Vehicle Engineering	1,5 CR	Harrer
T-MACH-114095	Principles of Whole Vehicle Engineering	1,5 CR	Harrer

Competence Certificate
The assessment is carried out as partial exams.

The partial exams consists of a written exam (90 to 120 minutes) or an oral exam (duration 30 to 40 minutes).

Prerequisites
None

Competence Goal
The student

- knows and understands the procedures in automobile development,
- knows and understands the technical specifications at the development procedures,
- is aware of notable boundaries like legislation.

Content
By taking the module Vehicle Development the students get to know the methods and processes applied in the automobile industry. They learn the technical particularities which have to be considered during the vehicle development and it is shown how the numerous single components cooperate in a harmoniously balanced complete vehicle. There is also paid attention on special boundary conditions like legal requirements.

Workload
The total work load for this module is about 270 Hours (9 Credits). The partition of the work load is carried out according to the credit points of the courses of the module. The work load for courses with 6 credit points is about 180 hours, for courses with 4.5 credit points about 135 hours, for courses with 3 credit points about 90 hours, and for courses with 1.5 credit points about 45 hours. The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam duration and the time that is required to achieve the objectives of the module as an average student with an average performance.

Recommendation
Knowledge of the content of the courses *Engineering Mechanics I* [2161238], *Engineering Mechanics II* [2162276] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.

M 4.117 Module: Virtual Engineering B [M-MACH-101281]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Mandatory			
T-MACH-102124	Virtual Engineering II	4 CR	Ovtcharova
Virtual Engineering B (Election: at least 5 credits)			
T-MACH-102185	CATIA CAD Training Course	2 CR	Ovtcharova
T-MACH-105312	CATIA Advanced	4 CR	Ovtcharova
T-MACH-102209	Information Engineering	3 CR	Meyer, Ovtcharova
T-MACH-106743	IoT Platform for Engineering	4 CR	Ovtcharova
T-MACH-113669	Hot Research Topics in AI for Engineering Applications	4 CR	Meyer
T-MACH-102181	PLM for Product Development in Mechatronics	4 CR	Eigner
T-MACH-106740	Virtual Engineering Lab	4 CR	Ovtcharova

Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Prerequisites
keine

Competence Goal
The students should:

- have basic knowledge about industrial practice of Information Technology in the field of product development,
- have basic knowledge about innovative visualization techniques like Virtual Reality and feasible application of Virtual Mock-Ups (VMU) for validating product properties.
- Is able to estimate potentials and risks of current Virtual Reality Systems in product development.
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Content
The module Virtual Engineering B communicates basics of Virtual Reality applications and their fields of application for validating product properties and for supporting product development processes.

Optional courses of this module complete the content with practical application of VR techniques in product development (Virtual Reality Exercise) and current product development processes.

Workload
Workload at 9 graduate credits / credit points: ca. 270 hours.

- regular attendance: 100 hours
- Preparation and reworking: 50 hours
- Exam and exam revision/preparation: 120 hours

Detailed apportionment results from credit points of the courses of the module

Learning type
Lecture, Exercise.

4.118 Module: Water Chemistry and Water Technology I [M-CIWVT-101121]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-CIWVT-106802	Water Technology	6 CR	Horn
T-CIWVT-106840	Practical Course in Water Technology	3 CR	Hille-Reichel, Horn
T-CIWVT-110866	Excursions: Water Supply	1 CR	Horn

Prerequisites
none

Competence Goal
Students learn fundamental knowledge in water chemistry and how to apply it to processes in aquatic systems in general and in reactors for water treatment. Water treatment will be taught for drinking water and partly waste water. The students are able to apply physical, chemical and biochemical treatment for the respective removal of particulate and dissolved components in water. They are able to use the fundamental design parameters for the different types of unit operations.

Students can explain the most important processes in water treatment. They are able to do calculations, and to compare and interpret data. They learn how to use different methods, and to interpret different processes.

Content
Water cycle, different types of raw water (ground and surface water). Water as solvent, carbonate balance, differentiation between microbiological and chemical population. Unit operations: sieving, sedimentation, filtration, flocculation, flotation, ion exchange, aeration, oxidation, disinfection, adsorption). For all unit operations design parameters will be provided. Simple 1D models will be discussed for description of kinetics and retention time in reactors for water treatment.

6 different experiments out of: equilibrium study of the calcium carbonate system, flocculation, adsorption, oxidation, atomic absorption spectroscopy, ion chromatography, liquid chromatography, sum parameter, and an oral presentation of the student. In addition, excursions to two different treatment plants (waste water, drinking water)

Literature

- Crittenden, J. C. et al. (2012): Water treatment, principles and design. 3. Auflage, Wiley & Sons, Hoboken.
- Jekel, M., Czekalla, C. (Hrsg.) (2016). DVGW Lehr- und Handbuch der Wasserversorgung. Deutscher Industrieverlag.
- Harris, D. C., Lucy, C. A. (2019): Quantitative chemical analysis, 10. Auflage. W. H. Freeman and Company, New York.
- Patnaik, P., 2017: Handbook of environmental analysis: Chemical pollutants in air, water, soil, and solid wastes. CRC Press.
- Wilderer, P. (Ed., 2011): Treatise on water science, four-volume set, 1st edition, volume 3: Aquatic chemistry and biology. Elsevier, Oxford.
- Lecture notes will be provided in ILIAS

4.119 Module: Water Chemistry and Water Technology II [M-CIWVT-101122]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	2

Mandatory			
T-CIWVT-108841	Water Quality Assessment	6 CR	Abbt-Braun
T-CIWVT-110864	Excursions: Membrane Technologies	1 CR	Horn, Saravia
T-CIWVT-110865	Membrane Technologies in Water Treatment	5 CR	Horn, Saravia

Prerequisites
The Module "Water Chemistry and Water Technology I" must be passed.

Competence Goal
The student

- has knowledge of types and sum of the water constituents and their interaction with each other and with the water molecules,
- is able to explain the interrelationships of the occurrence of geogenic and anthropogenic substances as well as of microorganisms in the different areas of the hydrological cycle and is able to select suitable analytical methods for their determination,
- knows about the different types of water treatment and water purification methods to convert, reduce or concentrate water constituents, especially for membrane processes,
- is able to use methodical tools, analyze the correlations and critically evaluate the critically evaluate the different procedures.

Content
The types of water, water law, basic terms of water chemical analysis, analysis quality, sampling, rapid test procedures and general investigation methods as well as summary parameters are dealt with. The analytical methods for main and secondary constituents as well as for organic and inorganic trace substances are discussed with examples for orientation.
The effects of the different treatment and purification methods are shown and it is explained how they can convert, reduce or concentrate water constituents.

5 Courses

T 5.1 Course: (Gen)AI-based Automation in Organizations [T-WIWI-114210]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-104068 - Information Systems in Organizations
M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2500015	(Gen)AI-based Automation in Organizations	3 SWS	Lecture / Blended	Mädche, Benke

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Alternative exam assessment. It consists of a one-hour exam and the implementation of a capstone project.

The final grade is made up of 60% of the exam grade and 40% of the capstone project grade.

Details on the structure of the assessment will be announced during the lecture.

Workload
135 hours

Below you will find excerpts from events related to this course:

V (Gen)AI-based Automation in Organizations

2500015, SS 2025, 3 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

5.2 Content

The advent of generative artificial intelligence (GenAI) has received great attention in business and society due to its capabilities of content creation or decision making. Individuals started rapidly to use the capabilities of tools like ChatGPT and Google Gemini for text and image generation, personal recommendations, or decision support. At the same time, organizations are challenged to leverage GenAI but also AI technology in general within their business models, processes, and information systems. (Gen)AI technologies enable executing cognitive tasks which in the past were carried out manually by organizations' employees. Ultimately, this leads to an increase of automation in organizations. For example, organizations can automate the creation of customer service responses, contract document reviewing in legal departments, application screening in human resources, or fraud detection in financial transactions.

This digital transformation process to higher levels of automation must be managed by organizations. While the goal is to free up capacity of employees from simple repetitive tasks for more complex ones, improce efficiency and extend innovation capabilities, organizations also must consider social and ethical aspects when implementing automation. Thus, a (Gen)AI integration strategy that benefits organizations must consider many facets, e.g., strategic objectives, business model adaptation, governance and risk management, implementation project portfolio management, and change management.
Summarizing, this course will teach concepts to support organizations and their employees to increase the level of automation leveraging (Gen)AI technologies under consideration of an economic and social perspective.

This course consists of the following major building blocks:

- Introduction to (Gen)AI concepts and technology.
- Overview of history and key concepts of automation in organizations.
- Organizational perspective on integrating (Gen)AI.
- Individual perspective on integrating (Gen)AI capabilities.
- Challenges and countermeasures to secure the integration of (Gen)AI capabilities into organizations from a socio-economic perspective.

The course is complemented with quizzes for knowledge recapture and hands-on activities in which the students apply the lecture content and implement the integration of (generative) AI capabilities in organizational processes and structures based on real-world case studies to increase organizational automation.

5.3 Learning goals

As a result of attending this program, students will be able to:

- describe key concepts of (Gen)AI technologies enabling the increase of automation in organizations.
- understand the historical evolution and describe core concepts of automation to drive organizational efficiency and innovation.
- articulate (Gen)AI integration principles for effectively implementing automation in organizations.
- explore and prototype (Gen)AI-based applications to streamline individual tasks and workflows in the context of organizational automation.
- analyze best practices for addressing challenges to ensure adoption of (Gen)AI capabilities for organizational automation from a socio-economic perspective..

5.4 Prerequisites

No specific prerequisites are required for the lecture.

T 5.5 Course: Additives and Active Substances [T-CIWVT-111434]

Responsible: Dr.-Ing. Ulrike van der Schaaf
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each summer term	1

T 5.6 Course: Advanced Corporate Finance [T-WIWI-113469]

Responsible: Prof. Dr. Martin Ruckes

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2530214	Advanced Corporate Finance	2 SWS	Lecture / 🗣	Ruckes
Exams					
WT 24/25	7900058	Advanced Corporate Finance			Ruckes
ST 2025	7900317	Advanced Corporate Finance			Ruckes

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-102622 - Corporate Financial Policy must not have been started.

Below you will find excerpts from events related to this course:

V Advanced Corporate Finance
2530214, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
The course covers the foundational principles of advanced topics of corporate finance, such as corporate governance, executive compensation, strategy & finance, mergers & acquisitions (M&A), and sustainable finance. Additionally, the course explores the respective institutional aspects within these areas of corporate finance. The approach is holistic, including both theoretical-conceptional aspects (e.g., moral hazard and the influence of asymmetric information) and empirical insights (e.g., the effects of financial decisions on firm value). Throughout, the course will emphasize both fundamental and current research findings.

Learning outcomes:

Upon successful completion of the course, students will possess profound knowledge and skills in advanced areas of corporate finance. These areas include topics such as corporate governance, executive compensation, strategy and finance, mergers and acquisitions (M&A), as well as key aspects of sustainable finance. Participants of this course will be able to describe and analyze the theoretical and conceptual foundations of the effects of information asymmetries and moral hazard on corporate financing behavior and assess their impact in corporate practice. Furthermore, upon completion of the course, participants will be familiar with the fundamental institutional elements in these areas and be able to discuss and solve advanced problems in corporate finance from both a theoretical and an empirical perspective. Moreover, students will acquire an advanced understanding of the central scientific findings in these topic areas, which will enable them to critically apply them in scientific and practical contexts.

Literature
Verschiedene Literaturquellen, u.a. Brealey/Myers/Allen/Edmans: Principles of Corporate Finance; Thomson/Conyon: Corporate Governance: Mechanisms and Systems; Larcker/Tayan: Corporate Governance Matters. Weitere Literatur wird in der Lehrveranstaltung bekannt gegeben.

Various source of literature, among others Brealey/Myers/Allen/Edmans: Principles of Corporate Finance; Thomson/Conyon: Corporate Governance: Mechanisms and Systems; Larcker/Tayan: Corporate Governance Matters. Additional reading materials will be introduced during the course.

T 5.7 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

Responsible: TT-Prof. Dr. Julian Thimme
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Exams			
WT 24/25	7900319	Advanced Empirical Asset Pricing	Thimme
ST 2025	7900321	Advanced Empirical Asset Pricing	Thimme

Competence Certificate
The success control takes place in form of a written examination (60 min) during the semester break. If the number of participants is low, an oral examination may also be offered. The examination is offered every semester and can be repeated at any regular examination date.

A bonus can be acquired by submitting exercise solutions to 80% of the assigned exercise tasks. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Recommendation
We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course. In addition, prior participation in the Asset Pricing Master course is strongly recommended.

Annotation
New course from winter semester 2019/2020.

Workload
135 hours

T 5.8 Course: Advanced Food Processing [T-CIWVT-100152]

Responsible: PD Dr. Volker Gaukel
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101120 - Principles of Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2211010	Process Engineering for the Production of Food from Animal Origins	2 SWS	Lecture / 🗣	Gaukel
Exams					
WT 24/25	7220004	Advanced Food Processing			Gaukel

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.9 Course: Advanced Game Theory [T-WIWI-102861]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Prof. Dr. Clemens Puppe
Prof. Dr. Johannes Philipp Reiß

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2500037	Advanced Game Theory	2 SWS	Lecture / 🗣	Puppe, Ammann
WT 24/25	2500038	Übung zu Advanced Game Theory	1 SWS	Practice / 🗣	Puppe, Ammann
Exams					
WT 24/25	7900013	Advanced Game Theory			Puppe
ST 2025	7900126	Advanced Game Theory			Puppe

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
Basic knowledge of mathematics and statistics is assumed.

Below you will find excerpts from events related to this course:

V Advanced Game Theory
2500037, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

The course “Advanced Game Theory” deals with the formulation and solution concepts of games. A game is defined as a formal representation of a situation in which a number of individuals interact in a setting of strategic interdependence.

The first part of the course builds upon the topics of the bachelor’s course “Introduction to Game Theory”. In particular, in contrast to the bachelor’s lecture, the course introduces a rigorous mathematical treatment of simultaneous move and dynamic games (noncooperative games) as well as their solution concepts.

The second part of the course deals with the topics of evolutionary and cooperative game theory. Both the models as well as the solution concepts of evolutionary stable strategies, the core, and the Shapley value are introduced.

The third part of the course embeds the topic of game theory in the more general context of mechanism design and concludes with the introduction of voting games and their solution concepts.

Learning objectives:

The student should learn

- to name and define the models and solution concepts of a variety of games in both mathematical-formal and precise verbal form.
- to solve games of different types and difficulties with the appropriate solution concepts.
- to prove and reason about simple statements on games and their solution concepts.
- to model strategic interdependencies in the real world as games in a formal mathematical way.

Workload:

Total workload for 4.5 credit points: approx. 135 hours
Attendance: 30 hours
Self-study: 105 hours

Literature

- Mas-Colell, A., Whinston, M. D. and Green, J. R. 1995. *Microeconomic Theory*. Oxford University Press.
- Osborne, M. J. and Rubinstein, A. 1998. *A Course in Game Theory*. 5. print. MIT Press.
- Myerson, R. B. 1997. *Game Theory: Analysis of Conflict.* Harvard University Press.

T 5.10 Course: Advanced Lab Blockchain Hackathon (Master) [T-WIWI-111126]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Workload
135 hours

T 5.11 Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
WT 24/25	2512101	Seminar: Digital Twins with Lego: Hands-on Workshop in Data-driven Simulation (Master)	2 SWS	Seminar / On-Site	Lazarova-Molnar, Götz, Khodadadi
WT 24/25	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / Blended	Toussaint, Schiefer, Schüler
WT 24/25	2512314	Practical Course Linked Data and the Semantic Web (Master)	3 SWS	Practical course / On-Site	Käfer, Braun
WT 24/25	2512401	Practical Course Sociotechnical Information Systems Development (Master)	3 SWS	Practical course / Online	Sunyaev, Leiser
WT 24/25	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course / Blended	Zöllner, Daaboul
WT 24/25	2512600	Project lab Information Service Engineering (Master)	3 SWS	Practical course / Blended	Sack
ST 2025	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / On-Site	Schiefer, Toussaint, Ullrich
ST 2025	2512207	Smart Living Lab – IoT for Everyday (Master)	3 SWS	Practical course / On-Site	Oberweis, Rybinski
ST 2025	2512500	Project Lab Machine Learning	3 SWS	Practical course / Blended	Daaboul, Zöllner, Schneider
ST 2025	2512555	Praktikum Security, Usability and Society (Master)	3 SWS	Practical course / Blended	Volkamer, Strufe, Berens, Mossano, Hennig, Veit, Länge
ST 2025	2512600	Project lab Telling Data Stories with Semantic Technologies and Generative AI (Master)	3 SWS	Practical course / Blended	Sack, Tietz
Exams					
WT 24/25	7900046	Advanced Lab Security (Master)			Volkamer
WT 24/25	7900102	Advanced Lab Information Service Engineering (Master)			Sack
WT 24/25	7900107	Advanced Lab Cognitive Automobile and Robots (Master)			Zöllner
WT 24/25	7900143	Advanced Lab Development of Sociotechnical Information Systems (Master)			Sunyaev
WT 24/25	7900218	Advanced Lab Linked Data and the Semantic Web (Master)			Käfer
WT 24/25	7900306	Advanced Lab Realization of Innovative Services (Master)			Oberweis
WT 24/25	7900307	Advanced Lab Security, Usability and Society (Master)			Volkamer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Annotation
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at https://portal.wiwi.kit.edu.

Workload
135 hours

Below you will find excerpts from events related to this course:

V **Lab Realisation of innovative services (Master)**
2512205, WS 24/25, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Organizational issues
Informationen zu Themen und die Anmeldung erfolgt vor Praktikumsbeginn im Wiwi-Portal
https://portal.wiwi.kit.edu/ys

V **Practical Course Linked Data and the Semantic Web (Master)**
2512314, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
On-Site

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

V **Practical Course Cognitive automobiles and robots (Master)**
2512501, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

The lab is intended as a practical supplement to courses such as "Machine Learning 1/2".
Scientific topics, mostly in the area of autonomous driving and robotics, will be addressed in joint work with ML/KI methods. The goal of the internship is for participants to design, develop, and evaluate ML Software system.

In addition to the scientific goals, such as the study and application of methods, the aspects of project-specific teamwork in research (from specification to presentation of results) are also worked on in this internship.

The individual projects require the analysis of the set task, selection of appropriate methods, specification and implementation and evaluation of the solution approach. Finally, the selected solution is to be documented and presented in a short lecture.

Learning Objectives:

- Students will be able to practically apply theoretical knowledge from lectures on machine learning to a selected area of current research.
- Students will be proficient in analyzing and solving thematic problems.
- Students will be able to evaluate, document, and present their concepts and results.

Recommendations:

- Theoretical knowledge of machine learning and/or AI.
- Python knowledge
- Initial experience with deep learning frameworks such as PyTorch/Jax/Tensorflow may be beneficial.

Workload:

The workload of 5 credit points consists of practical implementation of the selected solution, as well as time for literature research and planning/specification of the selected solution. In addition, a short report and presentation of the work performed will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Project lab Information Service Engineering (Master)** 2512600, WS 24/25, 3 SWS, Language: English, Open in study portal	**Practical course (P)** **Blended (On-Site/Online)**

Content
The ISE project lab is based on the summer semester lecture "Information Service Engineering". Goal of the course is to work on a given research problem in small groups (3-4 students) related to the ISE lecture topics, i.e. Natural Language Processing, Knowledge Graphs, and Machine Learning. The solution of the given research problem requires the development of a software implementation.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

Required coursework includes:

- Mid term presentation (5-10 min)
- Final presentation (10-15 min)
- Course report (c. 16 pages)
- Participation and contribution of the students during the course
- Software development and delivery

Notes:

The ISE project lab can also be credited as a **seminar** (if necessary).

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

Participation will be restricted to 16 students.

Participation in the lecture "Information Service Engineering" (summer semester) is required. There are video recordings on our youtube channel.

ISE Tutor Team:

- Dr. Genet Asefa Gesese
- Dr. Shufan Jiang
- Dr. Anna Jacysyzn
- M. Sc. Ebrahim Norouzi
- M. Sc. Sarah Rebecca Ondraszek
- B. Sc. Tabea Tietz

WS 2024/25 Tasks List:

- Generating Competency Questionss from ontologies using LLMs
- Ontology Verbalization and Categorization via LLMs
- Towards the Automated Extraction of Patterns from Ontologies with Large Language Models
- Leveraging Large Language Models for Artwork Recognition from Historical Texts
- Identification of mathematical definitions from Scientific Papers
- The Chronicles of Culture Knowledge Graphs: Creating Data Stories with Generative AI

Literature
ISE video channel on youtube: https://www.youtube.com/channel/UCjkkhNSNuXrJpMYZoeSBw6Q/

V **Lab Realisation of innovative services (Master)**
2512205, SS 2025, 3 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Organizational issues
Informationen zu Themen und die Anmeldung erfolgt vor Praktikumsbeginn im Wiwi-Portal
https://portal.wiwi.kit.edu/ys

V **Smart Living Lab – IoT for Everyday (Master)**
2512207, SS 2025, 3 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
As part of the lab, various topics on everyday automation are offered. During the lab, the participants will gain an insight into problem-solving oriented project work and work on a project together in small groups.

In case of questions, please contact fabian.rybinski@kit.edu.

Organizational issues
Informationen zu Themen und die Anmeldung erfolgt vor Praktikumsbeginn im Wiwi-Portal
https://portal.wiwi.kit.edu/ys

Bei Fragen bitte an fabian.rybinski@kit.edu wenden.

V

Project Lab Machine Learning

2512500, SS 2025, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:

The workload of 5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V

Praktikum Security, Usability and Society (Master)

2512555, SS 2025, 3 SWS, Language: English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
In the lab-course “Security, Usability and Society”, students deal with practical and interdisciplinary topics from the field of IT security and privacy at the cutting edge of society. In addition to the programming of data-saving apps, the development or implementation of user studies can also be possible tasks in this course.

The course can be credited towards the KASTEL certificate. Further information about the KASTEL certificate can be found on the SECUSO website: https://secuso.aifb.kit.edu/Studium_und_Lehre.php

Prerequisites:

The internship is aimed at Bachelor's and Master's students from the Industrial Engineering and Management, Business Informatics and Computer Science degree programs as well as related degree programs.

Organization:

There are two mandatory attendance dates: The kick-off is scheduled for the first week of the lectures, and the final presentations will take place in the second to last week of lectures. Additional dates will be arranged individually with the supervisors. All in-person lectures will be held in English. The main components of the course is the work on the respective topic, a final presentation and a final report. After consultation with the supervisor, all components can be either completed in German or English.

If you have any questions about the course or the registration, please contact contact@secuso.org.

Registration:

The topics for the course as well as the registration is organized via the WiWi-Portal. To reserve a place and choose a topic, students register for the course in the WiWi-Portal. A description of the current topics as well as important dates and deadlines can also be found there.

Please note that the number of topics is limited and topics are allocated in the order of registration.

V Project lab Telling Data Stories with Semantic Technologies and Generative AI (Master)

2512600, SS 2025, 3 SWS, Language: English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

Large Knowledge Graphs are often overwhelming for non-technical users due to their complexity, making it difficult to understand the structures and contents in a clear and intuitive way. Data Stories are designed to help users explore data; they simplify the complex relationships within Knowledge Graphs, reveal "hidden" connections and patterns between entities, and provide narrative summaries that highlight the most relevant aspects of large datasets. This makes it easier for non-technical users to intuitively explore and interpret graph data, helping them discover insights they weren't specifically searching for.

In this course, we aim to conceptualize and implement methods for creating Data Stories from large and complex Knowledge Graphs. This includes the creation of engaging visualizations and the use of generative AI to bridge the gap between data creators and users. Domain experts will share their insights into the data and help evaluate the effectiveness of the Data Stories.

In this course you have the chance to combine creativity and practical implementation tasks to develop solutions for real-world projects and problems.

T 5.12 Course: Advanced Lab Realization of Innovative Services (Master) [T-WIWI-112914]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
WT 24/25	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / Blended	Toussaint, Schiefer, Schüler
ST 2025	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / On-Site	Schiefer, Toussaint, Ullrich
Exams					
WT 24/25	7900218	Advanced Lab Linked Data and the Semantic Web (Master)			Käfer
WT 24/25	7900306	Advanced Lab Realization of Innovative Services (Master)			Oberweis

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Annotation
As part of the lab, the participants should work together in small groups to produce innovative services (mainly for students).

Further information can be found on the ILIAS page of the lab.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Lab Realisation of innovative services (Master)
2512205, WS 24/25, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Organizational issues
Informationen zu Themen und die Anmeldung erfolgt vor Praktikumsbeginn im Wiwi-Portal
https://portal.wiwi.kit.edu/ys

V Lab Realisation of innovative services (Master)
2512205, SS 2025, 3 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Organizational issues
Informationen zu Themen und die Anmeldung erfolgt vor Praktikumsbeginn im Wiwi-Portal
https://portal.wiwi.kit.edu/ys

T 5.13 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

Responsible: Prof. Dr. Melanie Volkamer

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	see Annotations	2

Events					
WT 24/25	2512554	Praktikum Security, Usability and Society (Bachelor)	3 SWS	Practical course / Blended	Volkamer, Strufe, Berens, Morisco, Fallahi, Ballreich, Hennig, Länge, Mossano
WT 24/25	2512555	Praktikum Security, Usability and Society (Master)	3 SWS	Practical course / Blended	Volkamer, Strufe, Berens, Fallahi, Morisco, Ballreich, Hennig, Länge, Mossano
ST 2025	2512554	Practical lab Security, Usability and Society (Bachelor)	3 SWS	Practical course / Blended	Volkamer, Strufe, Berens, Mossano, Hennig, Veit, Länge, Fallahi
ST 2025	2512555	Praktikum Security, Usability and Society (Master)	3 SWS	Practical course / Blended	Volkamer, Strufe, Berens, Mossano, Hennig, Veit, Länge
Exams					
WT 24/25	7900116	Advanced Lab Security, Usability and Society (Bachelor)			Volkamer
WT 24/25	7900307	Advanced Lab Security, Usability and Society (Master)			Volkamer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Recommendation
Knowledge from the lecture "Information Security" is recommended.

Annotation
The course will not be offered in the summer semester 2023.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Praktikum Security, Usability and Society (Bachelor)
2512554, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

English:

The Praktikum Security, Usability and Society will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a back-up one, to mattia.mossano@kit.edu . Topics are assigned first-come-first-served until all of them are filled. Topics in italics have already been assigned.

Application deadline 25.10.2024
Assignment 30.10.2024
Confirmation deadline 03.11.2024

Important dates:

Kick-off: 23.10.2024, 09:00 AM CET in Big Blue Button - Link and Kronenplatz 5.20, 3A-11.1

Report & code feedback deadline: 26.01.2025, 23:59 CET
Feedback on Report & code: 10.02.2025, 23:59 CET
Final report + code deadline: 17.02.2025, 23:59 CET

Presentation draft deadline: 23.02.2025, 23:59 CET
Feedback on presentation draft: 28.02.2025, 23:59 CET
Final presentation deadline: 07.03.2025, 23:59 CET

Presentation day: 11.03.2025, 09:00 CET

Topics:

Privacy Friendly Apps

In this area, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php . Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Title: NoPhish App Rework
Number of students: 2 Ba/Ma
Description: The NoPhish app was one of the first measures from the NoPhish concept. The app has been around for a long time and has not been updated since then. Accordingly, the task of the project is to make the app functional for the current Android version. The app is also to be optimized so that updates, e.g. new chapters, can be added easily.

Designing Security User studies

These topics are related to how to set up and conduct user studies of various types. Online studies, interviews and lab studies are possible. At the end of the semester, the students present a report / paper and a talk in which they present their methodologies and the results of small pre-studies.

Title: IT-Security and Privacy Studies in the health sector
Number of students: 1 Ba/Ma
Description: Cyberattacks in the healthcare sector are on the rise and medical facilities are increasingly becoming the target of hacker attacks. This often affects sensitive patient data or, in the event of a cyberattack, patient care. The German Federal Office for Information Security (BSI) reports that "[t]he security situation of the IT infrastructure of medical practices in Germany [...] has hardly been studied to date." The aim of the work is to find out which scientific studies already exist in the field of IT security and privacy and which best practices can be derived from these studies, e.g. on the subject of recruitment, study design or consideration of special needs.

Title: Understanding Privacy and Security Risk Awareness Among Sports Science Students at KIT
Number of students: 1 Ba/Ma
Description: Privacy and Security Awareness in Data Handling: The key issue is that many sports science students may not fully understand the privacy and security risks involved in handling sensitive data. As students increasingly deal with personal and research-related information, gaps in their awareness of data protection, such as risks of data breaches or misuse, can lead to significant vulnerabilities. The aim of the task is to design a survey that assesses their current understanding of these risks, helping to identify areas where further education or guidance is needed.

Run Usable Security Studies and Results Analysis

These topics are related to run and analyze the results of user-studies. Online studies, interviews and lab studies are all possible, depending on the topic. At the end of the semester, the students present a report / paper with the analyses conducted and a talk in which they present the results.

Title: Visualization of Eye Gaze Patterns during Authentication Tasks
Number of students: 1 Ba/Ma
Description: In this project, students will analyze and visualize eye gaze data collected during two specific authentication tasks: the Dot Task and the Slider Task. The primary objective is to represent subjects' eye movements visually, enhancing the understanding of gaze patterns during the authentication process. *Dot Task Visualization:* For the Dot Task, participants were instructed to focus on a sequence of dots displayed on a screen. The dataset includes the positions of these dots and the corresponding gaze locations of the subjects. The student's task is to create a dynamic visualization that not only represents these positions accurately but also illustrates the sequence in which the dots were focused on by the subjects. *Slider Task Visualization:* The Slider Task involved presenting participants with a series of images, for which both the images' locations on the screen and the subjects' gaze locations are recorded. The challenge is to develop a heatmap visualization based on this data, effectively demonstrating the concentration and dispersion of gaze points across different images.

Title: Compare BSI Phishing Game with the NoPhish Game
Number of students: 1 Ba
Description: The NoPhish app, one of the first implementations of the NoPhish concept, is a form of serious game. The BSI has also developed a game in the field of phishing. Both "games" use different approaches to impart knowledge from the same context. The aim is to evaluate the two games in terms of similarities and differences.

Title: Chatbots for Literature Reviews
Number of students: 1 Ba
Description: Chatbots are becoming increasingly popular and are already being used in various areas. But in what form can these bots be used for science? The variety of chatbots also raises the question of whether there are chatbots that are better suited to a scientific context. The aim is to identify a selection of chatbots and evaluate them in terms of their effectiveness for future literature research. To this end, the results of the chatbots will be compared with the ACM database in order to check their effectiveness for finding literature for a specific period of time.

Title: Phishing Advice from Organizations (English Only)
Number of students: 1 Ba/Ma
Description: Many companies distribute information on how to recognize phishing via various channels such as e-mails, e.g. Amazon or Telekom. The question arises as to how helpful these tips are in reality. Are they too specific to the context of the company or so abstractly formulated that they are of no real help to users? The aim of the work is to collect various hints and then compare them with the hints of the NoPhish concept in order to find differences and similarities between the hints and the concept.

Title: How do website owners become aware that their website was hacked?
Number of students: 1 Ba/Ma
Description: We identified website owners that were affected by a hack on their website and sent them a notification. During the course of the notification process, we also identified several websites who seemingly remediated the hack before our notification. We now wanted to find out, how those website owners got aware of the hack. If they were notified by a third party, we would also like to know how and by whom they were notified and what their feelings were with respect to the notification.

Title: Cognitive Walkthrough for applying, installing, and using an S/MIME certificate at KIT
Number of students: 1-2 Ba/Ma
Description: The main application of S/MIME is the encryption and signing of e-mail messages. The KIT offers all members the opportunity to have S/MIME certificates issued and has recently started using a new process of the European research network GÉANT for this purpose. The aim of this work is to carry out a cognitive walkthrough with members of the KIT to apply for, set up and use S/MIME certificates and to identify problem areas and obstacles.

Title: Anti-phishing information presented in medias and anti-phishing channels (English only)
Number of students: 1 Ba
Description: Several different channels exists to disseminate information about phishing, be it recent major campaigns or more specific recommendations. Some of these are through social networks accounts, others are specific webpages created "ad hoc" by certain organizations (e.g., Action Fraud in the UK, the BSI). The goal of this topic is to conduct a media review of several channels, collect the data, and compare it with results from a previous iteration of this same topic.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

V	**Praktikum Security, Usability and Society (Master)** 2512555, WS 24/25, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)** **Blended (On-Site/Online)**

Content
English:

The Praktikum Security, Usability and Society will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on the WiWi portal and send an email with your chosen topic, plus a back-up one, to mattia.mossano@kit.edu . Topics are assigned first-come-first-served until all of them are filled. Topics in italics have been already assigned.

Application deadline 25.10.2024
Assignment 30.10.2024
Confirmation deadline 03.11.2024

Important dates:

Kick-off: 23.10.2024, 09:00 AM CET in Big Blue Button - Link and Kronenplatz 5.20, 3A-11.1

Report & code feedback deadline: 26.01.2025, 23:59 CET
Feedback on Report & code: 10.02.2025, 23:59 CET
Final report + code deadline: 17.02.2025, 23:59 CET

Presentation draft deadline: 23.02.2025, 23:59 CET
Feedback on presentation draft: 28.02.2025, 23:59 CET
Final presentation deadline: 07.03.2025, 23:59 CET

Presentation day: 11.03.2025, 09:00 CET

Topics:

Privacy Friendly Apps

In this area, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php . Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Title: NoPhish App Rework
Number of students: 2 Ba/Ma
Description: The NoPhish app was one of the first measures from the NoPhish concept. The app has been around for a long time and has not been updated since then. Accordingly, the task of the project is to make the app functional for the current Android version. The app is also to be optimized so that updates, e.g. new chapters, can be added easily.

Designing Security User studies

These topics are related to how to set up and conduct user studies of various types. Online studies, interviews and lab studies are possible. At the end of the semester, the students present a report / paper and a talk in which they present their methodologies and the results of small pre-studies.

Title: Usability of Password Managers in Virtual Reality
Number of students: 2 Ma
Description: The pre-dominant form of authentication in Virtual Reality (VR) are passwords. Passwords create a burden for users in the VR environment because of special input methods and the virtual keyboard [Stephenson, S. et al (2022). SoK: Authentication in Augmented and Virtual Reality]. Password Managers (PMs) can support the user with handling this problem [Mayer, P. et al. (2022). Why Users (Don't) Use Password Managers at a Large Educational Institution]. They offer auto-filling features, store credentials in an overview or generate complex and secure passwords. Especially in the VR context, where typing a password is slow and complex, PMs can be beneficial. We want to explore the different PMs in VR and test the usability to find challenges and possible solutions.

Title: IT-Security and Privacy Studies in the health sector
Number of students: 1 Ba/Ma
Description: Cyberattacks in the healthcare sector are on the rise and medical facilities are increasingly becoming the target of hacker attacks. This often affects sensitive patient data or, in the event of a cyberattack, patient care. The German Federal Office for Information Security (BSI) reports that "[t]he security situation of the IT infrastructure of medical practices in Germany [...] has hardly been studied to date." The aim of the work is to find out which scientific studies already exist in the field of IT security and privacy and which best practices can be derived from these studies, e.g. on the subject of recruitment, study design or consideration of special needs.

Title: Understanding Privacy and Security Risk Awareness Among Sports Science Students at KIT
Number of students: 1 Ba/Ma
Description: Privacy and Security Awareness in Data Handling: The key issue is that many sports science students may not fully understand the privacy and security risks involved in handling sensitive data. As students increasingly deal with personal and research-related information, gaps in their awareness of data protection, such as risks of data breaches or misuse, can lead to significant vulnerabilities. The aim of the task is to design a survey that assesses their current understanding of these risks, helping to identify areas where further education or guidance is needed.

Run Usable Security Studies and Results Analysis

These topics are related to run and analyze the results of user-studies. Online studies, interviews and lab studies are all possible, depending on the topic. At the end of the semester, the students present a report / paper with the analyses conducted and a talk in which they present the results.

Title: Visualization of Eye Gaze Patterns during Authentication Tasks
Number of students: 1 Ba/Ma
Description: In this project, students will analyze and visualize eye gaze data collected during two specific authentication tasks: the Dot Task and the Slider Task. The primary objective is to represent subjects' eye movements visually, enhancing the understanding of gaze patterns during the authentication process. *Dot Task Visualization:* For the Dot Task, participants were instructed to focus on a sequence of dots displayed on a screen. The dataset includes the positions of these dots and the corresponding gaze locations of the subjects. The student's task is to create a dynamic visualization that not only represents these positions accurately but also illustrates the sequence in which the dots were focused on by the subjects. *Slider Task Visualization:* The Slider Task involved presenting participants with a series of images, for which both the images' locations on the screen and the subjects' gaze locations are recorded. The challenge is to develop a heatmap visualization based on this data, effectively demonstrating the concentration and dispersion of gaze points across different images.

Title: Phishing Advice from Organizations (English Only)
Number of students: 1 Ba/Ma
Description: Many companies distribute information on how to recognize phishing via various channels such as e-mails, e.g. Amazon or Telekom. The question arises as to how helpful these tips are in reality. Are they too specific to the context of the company or so abstractly formulated that they are of no real help to users? The aim of the work is to collect various hints and then compare them with the hints of the NoPhish concept in order to find differences and similarities between the hints and the concept.

Title: How do website owners become aware that their website was hacked?
Number of students: 1 Ba/Ma
Description: We identified website owners that were affected by a hack on their website and sent them a notification. During the course of the notification process, we also identified several websites who seemingly remediated the hack before our notification. We now wanted to find out, how those website owners got aware of the hack. If they were notified by a third party, we would also like to know how and by whom they were notified and what their feelings were with respect to the notification.

Title: Cognitive Walkthrough for applying, installing, and using an S/MIME certificate at KIT
Number of students: 1-2 Ba/Ma
Description: The main application of S/MIME is the encryption and signing of e-mail messages. The KIT offers all members the opportunity to have S/MIME certificates issued and has recently started using a new process of the European research network GÉANT for this purpose. The aim of this work is to carry out a cognitive walkthrough with members of the KIT to apply for, set up and use S/MIME certificates and to identify problem areas and obstacles.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

V

Practical lab Security, Usability and Society (Bachelor)

2512554, SS 2025, 3 SWS, Language: English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

In the lab-course “Security, Usability and Society”, students deal with practical and interdisciplinary topics from the field of IT security and privacy at the cutting edge of society. In addition to the programming of data-saving apps, the development or implementation of user studies can also be possible tasks in this course.

The course can be credited towards the KASTEL certificate. Further information about the KASTEL certificate can be found on the SECUSO website: https://secuso.aifb.kit.edu/Studium_und_Lehre.php

Prerequisites:

The internship is aimed at Bachelor's and Master's students from the Industrial Engineering and Management, Business Informatics and Computer Science degree programs as well as related degree programs.

Organization:

There are two mandatory attendance dates: The kick-off is scheduled for the first week of the lectures, and the final presentations will take place in the second to last week of lectures. Additional dates will be arranged individually with the supervisors. All in-person lectures will be held in English. The main components of the course is the work on the respective topic, a final presentation and a final report. After consultation with the supervisor, all components can be either completed in German or English.

If you have any questions about the course or the registration, please contact contact@secuso.org.

Registration:

The topics for the course as well as the registration is organized via the WiWi-Portal. To reserve a place and choose a topic, students register for the course in the WiWi-Portal. A description of the current topics as well as important dates and deadlines can also be found there.

Please note that the number of topics is limited and topics are allocated in the order of registration.

V	**Praktikum Security, Usability and Society (Master)** 2512555, SS 2025, 3 SWS, Language: English, Open in study portal	**Practical course (P)** **Blended (On-Site/Online)**

Content

In the lab-course "Security, Usability and Society", students deal with practical and interdisciplinary topics from the field of IT security and privacy at the cutting edge of society. In addition to the programming of data-saving apps, the development or implementation of user studies can also be possible tasks in this course.

The course can be credited towards the KASTEL certificate. Further information about the KASTEL certificate can be found on the SECUSO website: https://secuso.aifb.kit.edu/Studium_und_Lehre.php

Prerequisites:

The internship is aimed at Bachelor's and Master's students from the Industrial Engineering and Management, Business Informatics and Computer Science degree programs as well as related degree programs.

Organization:

There are two mandatory attendance dates: The kick-off is scheduled for the first week of the lectures, and the final presentations will take place in the second to last week of lectures. Additional dates will be arranged individually with the supervisors. All in-person lectures will be held in English. The main components of the course is the work on the respective topic, a final presentation and a final report. After consultation with the supervisor, all components can be either completed in German or English.

If you have any questions about the course or the registration, please contact contact@secuso.org.

Registration:

The topics for the course as well as the registration is organized via the WiWi-Portal. To reserve a place and choose a topic, students register for the course in the WiWi-Portal. A description of the current topics as well as important dates and deadlines can also be found there.

Please note that the number of topics is limited and topics are allocated in the order of registration.

T 5.14 Course: Advanced Lab Sociotechnical Information Systems Development (Master) [T-WIWI-111125]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
WT 24/25	2512401	Practical Course Sociotechnical Information Systems Development (Master)	3 SWS	Practical course / Online	Sunyaev, Leiser
Exams					
WT 24/25	7900143	Advanced Lab Development of Sociotechnical Information Systems (Master)			Sunyaev

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites
None

Workload
135 hours

T 5.15 Course: Advanced Machine Learning [T-WIWI-109921]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr. Abdolreza Nazemi

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2540535	Advanced Machine Learning	2 SWS	Lecture	Nazemi
ST 2025	2540536	Exercise Advanced Machine Learning	1 SWS	Practice	Nazemi
Exams					
WT 24/25	7900253	Advanced Machine Learning (Nachklausur SoSe 2024)			Geyer-Schulz
ST 2025	7900227	Advanced Machine Learning			Geyer-Schulz

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Advanced Machine Learning

2540535, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content

In recent years, the volume, variety, velocity, veracity, and variability of available data have increased due to improvements in computational and storage power. The rise of the Internet has made available large sets of data that allow us to use and merge them for different purposes. Data science helps us to extract knowledge from the continually-increasing large datasets. This course will introduce students to a wide range of machine learning and statistical techniques such as deep learning, LASSO, and support vector machine. You will get familiar with text mining, and the tools you need to analyze the various facets of data sets in practice. Students will learn theory and concepts with real data sets from different disciplines such as marketing, finance, and business.

Tentative Course Outline:

- Introduction
- Statistical Inference
- Shrinkage Methods
- Model Assessment and Selection
- Tree-based Machine Learning Algorithms
- Dimensionality Reduction
- Neural Networks and Deep Learning
- Natural Language Processing with Deep Learning
- Support Vector Machine

Time of attendance

- Attending the lecture: 13 x 90min = 19h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m

The student will learn

- A wide range of machine learning algorithms and their weaknesses.
- The fundamental issues and challenges: data, high-dimension, train, model selection, etc.
- How to imply machine learning algorithms for real-world applications.
- The fundamentals of deep learning, main research activities, and on-going research in this field.

Literature

- Alpaydin, E. (2014). Introduction to Machine Learning. Third Edition, MIT Press.
- De Prado, M. L. (2018). Advances in Financial Machine Learning. John Wiley & Sons.
- Goodfellow, I., Bengio, Y., and A. Courville (2017). Deep Learning. MIT Press. (online available)
- Hastie, T., Tibshirani, R., and J. Friedman (2009). Elements of Statistical Learning. Second Edition. Springer. (online available)
- Leskovec, J., Rajaraman, A., Ullman, J. D., (2014). Mining of Massive Datasets. Cambridge University Press. (online available)
- Witten, I. H., Eibe, F., Hall, M. A., Pal, C. J. (2016). Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann.

T 5.16 Course: Advanced Machine Learning and Data Science [T-WIWI-111305]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105659 - Advanced Machine Learning and Data Science

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each term	5

Exams			
WT 24/25	7900291	Advanced Machine Learning and Data Science	Ulrich

Competence Certificate
The assessment is carried out in form of a written thesis based on the course "Advanced Machine Learning and Data Science".

Annotation
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning. Please apply via the link: https://portal.wiwi.kit.edu/forms/form/fbv-ulrich-msc-project.

Workload
270 hours

T 5.17 Course: Advanced Management Accounting [T-WIWI-102885]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2579907	Advanced Management Accounting	4 SWS	Lecture / 🗣	Wouters, Dickemann, Letmathe
Exams					
WT 24/25	79-2579907-M	Advanced Management Accounting			Wouters

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (30 min) (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None.

Recommendation
The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

Annotation
This course is held in English. Lectures and tutorials are integrated.

The course is compulsory and must be examined.

Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters∂kit.edu).

Workload
135 hours

Below you will find excerpts from events related to this course:

V Advanced Management Accounting

2579907, WS 24/25, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

This course is held in English. Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

Inhalt:

- The course addresses several topics where management accounting is strongly related to marketing, finance, or organization and strategy, such as customer value propositions, financial performance measures, managing new product development, and technology investment decisions.

Learning objectives:

- Students will be able to consider advanced management accounting methods in an interdisciplinary way and to apply these to managerial decision-making problems in operations and innovation.
- They will also be able to identify relevant research results on such methods.

Examination:

- The assessment consists of an oral exam (30 min) taking place in the recess period (according to § 4 (2) No. 2 of the examination regulation).
- The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Required prior Courses:

- The course is compulsory and must be examined.

Recommendations:

- The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

Workload:

- The total workload for this course is approximately 135 hours. For further information see German version.

Literature

Literature is mostly made available via ILIAS.

T 5.18 Course: Advanced Statistics [T-WIWI-103123]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101637 - Analytics and Statistics
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2550552	Advanced Statistical Techniques, Including Multivariate and Simulation Methods	2 SWS	Lecture / 🗣	Grothe
WT 24/25	2550553	Exercises and Computer Labs in Advanced Statistical Techniques	2 SWS	Practice / 🗣	Kaplan
Exams					
WT 24/25	7900289	Advanced Statistical Techniques, Including Multivariate and Simulation Methods			Grothe
ST 2025	7900253	Advanced Statistical Techniques, Including Multivariate and Simulation Methods			Grothe

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered only for repeaters.

Prerequisites
None

Workload
135 hours

Below you will find excerpts from events related to this course:

V Advanced Statistical Techniques, Including Multivariate and Simulation Methods

2550552, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Skript zur Vorlesung

T 5.19 Course: Advanced Stochastic Optimization [T-WIWI-106548]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Irregular	2

Events					
WT 24/25	2500089	Advanced Stochastic Optimization	2 SWS	Lecture / 🖥	Rebennack
WT 24/25	2550468	Übung zu Advanced Stochastic Optimization	1 SWS	Practice / 🧩	Rebennack
Exams					
WT 24/25	7900025	Advanced Stochastic Optimization			Rebennack
ST 2025	7900034	Advanced Stochastic Optimization			Rebennack

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (20 minutes). The exam is offered every semester.

Prerequisites
None.

Recommendation
It is recommended to attend the lecture "Introduction to Stochastic Optimization" before attending the lecture "Advanced Stochastic Optimization".

Annotation
Lectures and tutorials are offered irregularly.

Workload
135 hours

T 5.20 Course: Advanced Topics in Digital Management [T-WIWI-111912]

Responsible:	Prof. Dr. Petra Nieken
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2025	2573016	Advanced Topics in Digital Management	2 SWS	Colloquium (K / 🗣	Nieken, Mitarbeiter

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment. The following aspects are included:

- Regular and active participation in the course dates
- Presentation of a given research topic.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Recommendation
We recommend visiting the course Incentives in Organization before taking this course.
The course is strongly recommended for students interested in empirical research in the areas digital HRM, personnel economics, and leadership and those who are interest in an academic career path.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Advanced Topics in Digital Management

2573016, SS 2025, 2 SWS, Language: English, Open in study portal

Colloquium (KOL)
On-Site

Content

The students will discuss and analyze selected research papers in the areas digital HRM, personnel economics, and leadership with a focus on digital management. The students will present research papers and discuss research methods and designs as well as content. They will develop an own research design on a predefined topic.

Aim

The student

- Looks into current research topics in the areas HRM, personnel economics, and leadership with a focus on digital management and AI.
- Analyzes research papers in detail and evaluates the research outcomes.
- Trains their presentation skills and discussion skills.
- Practices scientific debating.
- Learns to critically evaluate research methods and trains the scientific discussion culture.
- Gains deeper knowledge in the area of digital HRM and management.
- Learns to evaluate research designs and takes into account the ethical dimension of research.
- Learns how to develop an own research design and idea.

Notes

Due to the interactive nature of the course, the number of participants is limited. If you are interested, please contact Prof. Nieken by email.

Workload

The total workload for this course is approximately 90 hours.

Lecture: 30 hours

Preparation: 45 hours

Exam preparation: 15 hours

Literature

Selected research papers

Organizational issues

Geb. 05.20, Raum 2A-25, Termine werden bekannt gegeben

T 5.21 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

Responsible: Prof. Dr. Johannes Brumm
Prof. Dr. Kay Mitusch

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101406 - Network Economics
M-WIWI-101500 - Microeconomic Theory
M-WIWI-101502 - Economic Theory and its Application in Finance
M-WIWI-107010 - Economics in a Connected World
M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
ST 2025	2520527	Advanced Topics in Economic Theory	2 SWS	Lecture / 🗣	Mitusch, Brumm
ST 2025	2520528	Übung zu Advanced Topics in Economic Theory	1 SWS	Practice / 🗣	Pegorari, Corbo, Mitusch, Brumm

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

Prerequisites
None

Recommendation
This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

Below you will find excerpts from events related to this course:

V Advanced Topics in Economic Theory

2520527, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Die Veranstaltung wird in englischer Sprache angeboten:

The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.

T 5.22 Course: Advanced Topics in Human Resource Management [T-WIWI-111913]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2573014	Advanced Topics in Human Resource Management	2 SWS	Colloquium (K / 🗣	Nieken, Mitarbeiter

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment.The following aspects are included:

- Regular and active participation in the course dates
- Presentation of a given research topic.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Recommendation
We recommend visiting the course Incentives in Organization before taking this course.
The course is strongly recommended for students interested in empirical research in the areas HRM, personnel economics, and leadership and those who are interest in an academic career path.

Annotation
Teaching and learning format: Colloquium

Workload
90 hours

Below you will find excerpts from events related to this course:

V Advanced Topics in Human Resource Management — **Colloquium (KOL) On-Site**
2573014, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

The students will discuss and analyze selected research papers in the areas HRM, personnel economics, and leadership. The students will present research papers and discuss research methods and designs as well as content. They will develop an own research design on a predefined topic.

Aim

The student

- Looks into current research topics in the areas HRM, personnel economics, and leadership.
- Analyzes research papers in detail and evaluates the research outcomes.
- Trains their presentation skills and discussion skills.
- Practices scientific debating.
- Learns to critically evaluate research methods and trains the scientific discussion culture.
- Gains deeper knowledge in the area of HRM.
- Learns to evaluate research designs and takes into account the ethical dimension of research.
- Learns how to develop an own research design and idea.

Notes

Due to the interactive nature of the course, the number of participants is limited. If you are interested, please contact Prof. Nieken by email.

Workload

The total workload for this course is approximately 90 hours.

Lecture: 30 hours

Preparation: 45 hours

Exam preparation: 15 hours

Literature

Selected research papers

Organizational issues

siehe Homepage

T 5.23 Course: AI Innovation Ecosystems [T-WIWI-113849]

Responsible: Dr. Daniela Beyer
Jennifer Scheydt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2500049	AI Innovation Ecosystems	2 SWS	Seminar / 📱	Beyer, Weissenberger-Eibl
Exams					
WT 24/25	7900355	AI Innovation Ecosystems			Weissenberger-Eibl, Beyer

Legend: 📱 Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
Non exam assessment consisting of:

- (A) Discussion of literature on innovation ecosystems (15%)
  - Read 1 article / book chapter
  - Summarize core results in an excerpt
  - present
- (B) active participation in all 4 events
- (C) Presentation on an area of Cyber Valley or IPAI Heilbronn [in the group] (30%)
- (D) Preparation of a guided interview that can be conducted with a representative of IPAI / Cyber Valley [in the group] (15%)
- (E) Elaboration of the findings from C and D for an evaluation of a partial aspect of the IPAI / Cyber Valley [term paper in the semester-free period - approx. 15 pages in the group - based on the findings presented and the interview] (40%)

Prerequisites
None

Recommendation
It is recommended that the lecture: Innovation Management: Concepts, Strategies and Methods has already been attended.

Workload
90 hours

Below you will find excerpts from events related to this course:

V AI Innovation Ecosystems

2500049, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Online

Content
This research seminar uses the example of three innovation clusters in Baden-Württemberg to analyse innovation ecosystems and their potential special features in the field of artificial intelligence. The practical seminar benefits from expert input, but also places a clear focus on research methods and scientific work. A toolbox will be developed together, including literature reviews and interview techniques, which will later facilitate the work on the Master's thesis.
Firstly, the concept of innovation ecosystems is examined. Despite the frequently used term, the state of the art is still relatively open and an overview can be developed together. Then, using the example of the AI Health Innovation Cluster, a cluster is presented and its political history, structure and goal (achievement) are analysed. In the following two sessions, the IPAI and Cyber Valley will be analysed by experts and groups of students.
Since the students will be responsible for much of the seminar themselves, in addition to practical and methodological inputs, a preliminary meeting will take place on 31 October (6-7 pm) to allow sufficient preparation time. The seminar will take place virtually.

T 5.24 Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

Responsible: Dr.-Ing. Marcus Gohl
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134150	Gas, lubricating oil and operating media analysis in drive train development	2 SWS	Lecture / 🗣	Gohl
Exams					
WT 24/25	76-T-MACH-105173	Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines			Gohl, Koch
ST 2025	76--T-Mach-105173	Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines			Gohl

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral examination, duration approx. 25 min, no aids

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Gas, lubricating oil and operating media analysis in drive train development

2134150, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Die Vorlesungsunterlagen werden vor jeder Veranstaltung an die Studenten verteilt.

T 5.25 Course: Analysis Tools for Combustion Diagnostics [T-MACH-105167]

Responsible: Jürgen Pfeil
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134134	Analysis tools for combustion diagnostics	2 SWS	Lecture / 🗣	Pfeil
Exams					
WT 24/25	76-T-MACH-105167	Analysis Tools for Combustion Diagnostics			Koch
ST 2025	76-T-MACH-105167	Analysis Tools for Combustion Diagnostics			Koch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination, Duration: 25 min., no auxiliary means

Prerequisites
none

Below you will find excerpts from events related to this course:

V Analysis tools for combustion diagnostics
2134134, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Skript, erhältlich in der Vorlesung

T 5.26 Course: Application of Social Science Methods (WiWi) [T-GEISTSOZ-109052]

Responsible: Prof. Dr. Gerd Nollmann
Organisation: KIT Department of Humanities and Social Sciences
Part of: M-GEISTSOZ-101169 - Sociology

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each term	2

Events					
ST 2025	5011006	Gender Pay Gap	2 SWS	Seminar / 🖥	Nollmann
ST 2025	5011008	Decomposition and Regression Analysis	2 SWS	Seminar / 🖥	Nollmann
Exams					
WT 24/25	7400048	Application of Social Science Methods (WiWi)			Nollmann

Legend: 🖥 Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

5.27 Course: Applied Econometrics [T-WIWI-111388]

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-107010 - Economics in a Connected World
M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2520020	Applied Econometrics	2 SWS	Lecture / 🗣	Krüger, Eberl
WT 24/25	2520021	Tutorial in Applied Econometrics	2 SWS	Practice / 🗣	Eberl, Krüger
Exams					
WT 24/25	7900251	Applied Econometrics			Krüger
ST 2025	7900007	Applied Econometrics			Krüger

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (90 min).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Applied Econometrics
2520020, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
The course starts with a concise review of core econometric topics (in particular, the linear regression model). It then presents methods for causal inference: The potential outcomes approach, methods for analyzing randomized controlled trials, and methods for analyzing observational data (e.g., regression discontinuity). Empirical examples and R code are used to illustrate the methodological concepts.

Learning goals

Students understand the properties of various econometric estimators and research designs, and can implement econometric estimators using R software.

Workload

The total workload for this course (4.5 credit points) is approximately 135 hours.

Literature
The following book is the main reference for the course:

Ding, P. (2024). A First Course in Causal Inference. Routledge.

Further literature will be announced in class.

T 5.28 Course: Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services [T-WIWI-110339]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	2

Events					
ST 2025	2511032	Applied Informatics - Internet Computing	2 SWS	Lecture / 🗣	Lins, Kannengießer, Schmidt-Kraepelin, Sturm, Thiebes
ST 2025	2511033	Übungen zu Angewandte Informatik - Internet Computing	1 SWS	Practice / ✲	Lins, Kannengießer, Schmidt-Kraepelin, Sturm, Thiebes, Guse, Rank
Exams					
WT 24/25	79AIFB_AI-IC_B4	Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services			Sunyaev
ST 2025	79AIFB_AI2	Applied Informatics - Internet Computing (Registration until 16.09.2025)			Sunyaev

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The examination will be offered for the last time in the summer semester 2025 for first-time students. The last examination opportunity (only for repeaters) is in the winter semester 2025/2026. The lecture"Applied Computer Science - Internet Computing" (Prof. Dr. A. Sunyaev) will be replaced by the new lecture "Applied Computer Science - Cybersecurity" (Prof. Dr. M. Volkamer).

Success is assessed in the form of a written examination (60 minutes) in accordance with §4(2),1 SPO.

Successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

A grade bonus can be earned for successful participation in the exercises by submitting correct solutions to 50% of the exercises set. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None

Annotation
The lecture "Applied Computer Science - Internet Computing" (Prof. Dr. A. Sunyaev) will be held for the last time in the summer semester 2025 and will then be replaced by the new lecture "Applied Computer Science - Cyber Security" (Prof. Dr. M. Volkamer).

Workload
135 hours

Below you will find excerpts from events related to this course:

V Applied Informatics - Internet Computing

2511032, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The lecture Applied Computer Science - Internet Computing provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).

In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:

- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence

Learning objectives:

The student learns about basic concepts and emerging technologies of distributed systems and internet computing. Practical topics will be deepened in lab classes.

Recommendations:

Knowledge of content of the module [WI1INFO].

Workload:

The total workload for this course is approximately 135-150 hours.

Literature

Wird in der Vorlesung bekannt gegeben

5.29 Course: Applied material flow simulation [T-MACH-112213]

Responsible: Dr.-Ing. Marion Baumann
Organisation: KIT Department of Mechanical Engineering

Part of:
M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics
M-WIWI-102805 - Service Operations
M-WIWI-102832 - Operations Research in Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2117054	Applied material flow simulation	3 SWS	Lecture / Practice (/	Baumann
Exams					
WT 24/25	76-T-MACH-112213	Applied material flow simulation			Baumann, Furmans
WT 24/25	76-T-MACH-112214	Applied material flow simulation			Baumann, Furmans

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites
None

Recommendation

- Basic statistical knowledge and understanding
- Knowledge of a common programming language (Java, Python, ...)
- Recommended course: T-WIWI-102718 - Discrete Event Simulation in Production and Logistics

Workload
135 hours

Below you will find excerpts from events related to this course:

Applied material flow simulation
2117054, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

Learning Content:

- Methods of modeling a simulation such as:
  - Discrete-event simulation
  - Agent based simulation
- Design of a simulation model of a material flow system
- Data exchange in simulation models
- Verification and validation of simulation models
- Execution of simulation studies
- Statistical evaluation and parameter study

This is an application-oriented course in which the course contents are applied and deepened using the Anylogic software.

Learning Goals:

Students are able to:

- select the appropriate simulation modeling method depending on a modeling objective and build a suitable simulation model for material flow systems,
- extend a simulation model in a meaningful way with data import and export,
- verify and validate a simulation model,
- conduct a simulation study efficiently and with meaningful results, and
- design and conduct a parameter study and statistically analyze and evaluate the results.

Requirements:

- Basic knowledge of the Java programming language

Recommendations:

- Basic statistical skills
- Recommended course: T-WIWI-102718 - Discrete Event Simulation in Production and Logistics

Workload for 4,5 ECTS (135 h):

- regular attendance: 21 hours
  self-study: 114 hours

Organizational issues

- **Im Wintersemester 2024/2025 ist die Veranstaltung auf maximal 30 Teilnehmer beschränkt.**
- **Die Anmeldung ist durch Beitritt zum ILIAS-Kurs und Ausfüllen des Anmeldungsformulars (erforderliche Felder beim Beitritt zum ILIAS-Kurs) möglich.**
- **Die Anmeldung ist vom 01.09.2024 bis zum 30.09.2024 möglich.**

Literature

Borshev, A. (2022): The Big Book of Simulation Modeling - Multimethod Modeling with AnyLogic 8, https://www.anylogic.de/resources/books/big-book-of-simulation-modeling/.

Grigoryev, I. (2021): AnyLogic8 in Three Days, 5. Aufl., https://www.anylogic.de/resources/books/free-simulation-book-and-modeling-tutorials/.

Gutenschwager, K. et. al. (2017): Simulation in Produktion und Logistik, Springer Vieweg, Berlin.

VDI (2014): Simulation von Logistik-, Materialfluss- und Produktionssystemen - Grundlagen. VDI Richtlinie 3633, Blatt 1, VDI-Verlag, Düsseldorf.

VDI (2016): Simulation von Logistik-, Materialfluss- und Produktionssystemen - Simulation und Optimierung. VDI Richtlinie 3633, Blatt 12, VDI-Verlag, Düsseldorf

T 5.30 Course: Artificial Intelligence for Autonomous Driving [T-WIWI-112966]

Responsible: Prof. Dr. Alexey Vinel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Competence Certificate
The assessment of this course is a written examination (60 min) or an oral exam (20 min).

The exam takes place every semester and can be repeated at every regular examination date.

Workload
135 hours

T 5.31 Course: Artificial Intelligence in Production [T-MACH-112115]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105968 - Artificial Intelligence in Production
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Events					
WT 24/25	2149921	Artificial Intelligence in Production	2 SWS	Lecture / 🗣	Fleischer
Exams					
WT 24/25	76-T-MACH-112115	Artificial Intelligence in Production			Fleischer
ST 2025	76-T-MACH-112115	Artificial Intelligence in Production			Fleischer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (90 min)

Prerequisites
none

Workload
150 hours

Below you will find excerpts from events related to this course:

V Artificial Intelligence in Production

2149921, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The module AI in Production is designed to teach students the practical, holistic integration of machine learning and artificial intelligence methods in production. The course is oriented towards the phases of the CRISP-DM process with the aim of developing a deep understanding of the necessary steps and content-related aspects (methods) within the individual phases. In addition to teaching the practical aspects of integrating the most important machine learning methods, the focus is primarily on the necessary steps for data generation and data preparation as well as the implementation and validation of the methods in an industrial environment.

The lecture"Artificial Intelligence in Production" deals with the theoretical basics in a practical context. Here, the six phases of the CRISP-DM process are run through sequentially and the necessary basics for the implementation of the respective phases are taught. The course first deals with the data sources that are prevalent in the production environment. Subsequently, possibilities for target-oriented data acquisition as well as data transfer and data storage are introduced. Possibilities for data filtering and data preprocessing are discussed and production-relevant aspects are pointed out. The course then covers in detail the necessary algorithms and procedures for implementing AI in production, before techniques and fundamentals for making the models permanent in production (deployment) are discussed.

Learning Outcomes:

The students

- understand the relevance for the application of AI in production and know the main drivers and challenges.
- will understand the CRISP-DM process for implementing AI projects in manufacturing. Students will be able to name the main data sources, data ingestion methods, communication architectures, models and methods for data processing.
- will understand the main machine learning techniques and be able to contrast and select them in the context of industrial issues.
- are able to assess whether a specific problem in the context of production can be solved in a target-oriented manner using machine learning methods, as well as what the necessary steps are for implementation.
- are able to assess the most important challenges and name possible approaches to solve them.
- are able to apply the phases of the CRISP-DM to a problem in production. Students will know the steps necessary to build a data pipeline and will be able to do so theoretically in the context of a real-world use case.
- are able to evaluate the results of common deep learning methods and, based on this, to theoretically elaborate and theoretically apply proposed solutions (from the field of machine learning).

Workload:

MACH:
regular attendance: 31,5 hours
self-study: 88,5 hours
WING:
regular attendance: 31,5 hours
self-study: 118,5 hours

Organizational issues

Vorlesungstermine freitags 14:00 Uhr, begleitet durch Online-Programmierübungen.

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature

Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.32 Course: Artificial Intelligence in Service Systems [T-WIWI-108715]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101448 - Service Management
M-WIWI-101506 - Service Analytics
M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2595650	Artificial Intelligence in Service Systems	1.5 SWS	Lecture / Blended	Kühl, Spitzer, Holstein
WT 24/25	2595651	Übung zu Artificial Intelligence in Service Systems	1.5 SWS	Practice / On-Site	Kühl, Spitzer, Holstein
Exams					
WT 24/25	7900033	Artificial Intelligence in Service Systems			Satzger
ST 2025	7900204	Artificial Intelligence in Service Systems			Satzger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (60 min). Successful completion of the exercises is a prerequisite for admission to the written exam.

Prerequisites
None

Annotation
The course will be offered in the form of a flipped classroom concept starting in winter semester 2022/2023. The lecture will be recorded in advance and made available online. During the exercise classes, the contents of the lecture will be discussed and applied as part of programming exercises.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Artificial Intelligence in Service Systems

2595650, WS 24/25, 1.5 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Artificial Intelligence (AI) and the application of machine learning is becoming more and more popular to solve relevant business challenges — both within isolated entities but also within co-creating systems (like value chains). However, it is not only essential to be familiar with precise algorithms but rather a general understanding of the necessary steps with a holistic view—from real-world challenges to the successful deployment of an AI-based solution. As part of this course, we teach the complete lifecycle of an AI project focusing on supervised machine learning challenges. We do so by also introducing the use of Python and the required packages like scikit-learn with exemplary data and use cases. We then take this knowledge to the more complex case of service systems with different entities (e.g., companies) who interact with each other and show possibilities on how to derive holistic insights. Apart from the technical aspects necessary when developing AI within service systems, we also shed light on the collaboration of humans and AI in such systems (e.g., with the support of XAI), topics of ethics and bias in AI, as well as AI's capabilities on being creative.

Students of this course will be able to understand and implement the complete lifecycle of a typical Artificial Intelligence use case with supervised machine learning. Furthermore, they understand the importance and the means of applying AI and Machine Learning within service systems, which allows multiple, independent entities to collaborate and derive insights. Besides technical aspects, they will gain an understanding of the broader challenges and aspects when dealing with AI. Students will be proficient with typical Python code for AI challenges.

Organizational issues

The course will be offered in the form of a flipped classroom concept starting in winter semester 2022/2023. The lecture will be recorded in advance and made available online. During the exercise classes, the contents of the lecture will be discussed and applied as part of programming exercises.

Literature

- Baier, L., Kühl, N., & Satzger, G. (2019). How to cope with change?-preserving validity of predictive services over time. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Cawley, G. C., & Talbot, N. L. (2010). On over-fitting in model selection and subsequent selection bias in performance evaluation. The Journal of Machine Learning Research, 11, 2079-2107.
- Fink, O., Netland, T., & Feuerriegel, S. (2021). Artificial intelligence across company borders. arXiv preprint arXiv:2107.03912.
- Gama, J., Žliobaitė, I., Bifet, A., Pechenizkiy, M., & Bouchachia, A. (2014). A survey on concept drift adaptation. ACM computing surveys (CSUR), 46(4), 1-37.
- Hemmer, P., Schemmer, M., Vössing, M., & Kühl, N. (2021). Human-AI Complementarity in Hybrid Intelligence Systems: A Structured Literature Review. PACIS 2021 Proceedings.
- Hirt, R., & Kühl, N. (2018). Cognition in the Era of Smart Service Systems: Inter-organizational Analytics through Meta and Transfer Learning. In 39th International Conference on Information Systems, ICIS 2018; San Francisco Marriott MarquisSan Francisco; United States; 13 December 2018 through 16 December 2018.
- Holstein, J., Spitzer, P., Hoell, M., Vössing, M., & Kühl, N. (2024). Understanding Data Understanding: A Framework to Navigate the Intricacies of Data Analytics. In European Conference on Information Systems (ECIS 2024), Paphos, Cyprus, 13-19 June, 2024.
- Kühl, N., Goutier, M., Hirt, R., & Satzger, G. (2019, January). Machine Learning in Artificial Intelligence: Towards a Common Understanding. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Kühl, N., Hirt, R., Baier, L., Schmitz, B., & Satzger, G. (2021). How to Conduct Rigorous Supervised Machine Learning in Information Systems Research: The Supervised Machine Learning Report Card. Communications of the Association for Information Systems, 48(1), 46.
- Maleshkova, M., Kühl, N., & Jussen, P. (Eds.). (2020). Smart Service Management: Design Guidelines and Best Practices. Springer Nature.
- Martin, D., Hirt, R., & Kühl, N. (2019). Service Systems, Smart Service Systems and Cyber-Physical Systems—What's the difference? Towards a Unified Terminology. 14. Internationale Tagung Wirtschaftsinformatik 2019 (WI 2019), Siegen, Germany, February 24-27.
- Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2019). A survey on bias and fairness in machine learning. arXiv preprint arXiv:1908.09635.
- Schemmer, M., Bartos, A., Spitzer, P., Hemmer, P., Kühl, N., Liebschner, J., & Satzger, G. (2023). Towards Effective Human-AI Decision-Making: The Role of Human Learning in Appropriate Reliance on AI Advice. In Proceedings of the 44th International Conference on Information Systems (ICIS2023), Hyderabad, India.
- Schöffer, J., Machowski, Y., & Kühl, N. (2021). A Study on Fairness and Trust Perceptions in Automated Decision Making. In Joint Proceedings of the ACM IUI 2021 Workshops, April 13–17, 2021, College Station, USA.
- Spitzer, P., Kühl, N., Goutier, M., Kaschura, M., & Satzger, G. (2024). Transferring Domain Knowledge with (X) AI-Based Learning Systems. In European Conference on Information Systems (ECIS 2024), Paphos, Cyprus, 13-19 June, 2024.
- Zahn, M. V., Feuerriegel, S., & Kühl, N. (2021). The cost of fairness in AI: Evidence from e-commerce. Business & information systems engineering.
-

T 5.33 Course: Artificial Intelligence in Service Systems II: Generative AI Applications & Adoption [T-WIWI-114209]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101448 - Service Management
M-WIWI-101506 - Service Analytics
M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2595501	Artificial Intelligence in Service Systems - Generative AI Applications and Adoption	3 SWS	Lecture / 🗣	Holstein, Spitzer, Satzger

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of an examination of another type. The following aspects are included in the assessment:

- Collaborative development of a prototype as a group task
- Group presentation of the developed prototype
- Group report detailing the prototype and its development

Further details on the organization of the performance and the points system for the assessment will be announced in the lecture.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-105778 - Service Analytics A must not have been started.
2. The course T-WIWI-111219 - Artificial Intelligence in Service Systems - Applications in Computer Vision must not have been started.

Annotation
This course is admission restricted (see https://dsi.win.kit.edu/index.php). You can apply for this course via the Wiwi-Portal.
The course replaces T-WIWI-111219 "Artificial Intelligence in Service Systems - Applications in Computer Vision" as of summer semester 2025.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Artificial Intelligence in Service Systems - Generative AI Applications and Adoption
2595501, SS 2025, 3 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

---We renamed this course from "Artificial Intelligence in Service Systems - Applications in Computer Vision" to "Artificial Intelligence in Service Systems - Generative AI Applications and Adoption" ---

Learning objectives

This course provides deepens the students's theoretical knowledge and practical skills in developing AI-based services. It adds "state-of-the-art" generative AI technologies and the focus on integrating AI-based services into larger service systems and organizational workflows. Students will not only learn core theoretical concepts and frameworks, but also engage in team projects to gain hands-on experience in implementing and adapting these services for human adoption.

Description

This course builds on the course "Artificial Intelligence in Service Systems" (LV-Nr.: 2595650) and applies the "end-to-end" development of AI-based services to particular team projects with two key objectives: (1) capturing new Generative AI methods, but also (2) focus on the integration of the service in organizational workflows and the necessary adoption by humans. Starting with the fundamentals of generative AI, students work with Large Language Models (LLMs) and multimodal architectures to develop practical applications. Building on these implementations, the course investigates how to integrate these services into organizational workflows and information systems, focusing on user interaction, system transparency, and human-AI collaboration mechanisms.

Through a group project, students apply their learning by first implementing a technical artifact to address real-world challenges, then identifying and applying appropriate metrics to design and evaluate adoption while considering human factors such as user acceptance, trust, workflow integration, and ethical implications. This hands-on approach provides students with practical experience in both technical implementation and organizational integration of AI-based services.

Recommendations

The course is aimed at students in the Master's program with basic knowledge in statistics and applied programming in Python. Knowledge from the lecture Artificial Intelligence in Service Systems may be beneficial.

Additional information

- Group-based project work
- Flipped classroom format with pre-recorded lectures
- Three full-day block sessions for in-depth discussions and optional hands-on coding exercises

Literature

- Baltrušaitis, T., Ahuja, C. and Morency, L.P., 2018. Multimodal machine learning: A survey and taxonomy. *IEEE transactions on pattern analysis and machine intelligence*, *41*(2), pp.423-443
- Chang, Y., Wang, X., Wang, J., Wu, Y., Yang, L., Zhu, K., Chen, H, Yi, X., Wang, C., Wang, Y., Ye, W., Zhang, Y., Chang, Y., Yu, P, Yang, Q., and Xie, X. (2024). A Survey on Evaluation of Large Language Models. ACM Trans. Intell. Syst. Technol. 15, 3, Article 39 (June 2024), 45 pages.
- Fourney, A., Bansal, G., Mozannar, H., Tan, C., Salinas, E., Niedtner, F., Proebsting, G., Bassman, G., Gerrits, J., Alber, J. and Chang, P., 2024. Magentic-one: A generalist multi-agent system for solving complex tasks. *arXiv preprint arXiv:2411.04468*.
- Hemmer, P., Schemmer, M., Kühl, N., Vössing, M., & Satzger, G. (2024). Complementarity in Human-AI Collaboration: Concept, Sources, and Evidence. *arXiv preprint arXiv:2404.00029*.
- Kreuzberger, D., Kühl, N. and Hirschl, S., 2023. Machine learning operations (mlops): Overview, definition, and architecture. *IEEE access*, *11*, pp.31866-31879.
- Schemmer, M., Kuehl, N., Benz, C., Bartos, A., & Satzger, G. (2023, March). Appropriate reliance on AI advice: Conceptualization and the effect of explanations. In *Proceedings of the 28th International Conference on Intelligent User Interfaces* (pp. 410-422).
- Zhang, Y., Li, Y., Cui, L., Cai, D., Liu, L., Fu, T., Huang, X., Zhao, E., Zhang, Y., Chen, Y., Wang, L., Luu, A.T., Bi, W., Shi, F., & Shi, S. (2023). Siren's Song in the AI Ocean: A Survey on Hallucination in Large Language Models. *ArXiv, abs/2309.01219*.

T 5.34 Course: Asset Pricing [T-WIWI-102647]

Responsible: Prof. Dr. Martin Ruckes
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101480 - Finance 3
M-WIWI-101482 - Finance 1
M-WIWI-101483 - Finance 2
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2530555	Asset Pricing	2 SWS	Lecture / 🗣	Uhrig-Homburg, Müller
ST 2025	2530556	Asset Pricing	1 SWS	Practice / 🗣	Böll, Uhrig-Homburg, Müller
Exams					
WT 24/25	7900056	Asset Pricing			Uhrig-Homburg
ST 2025	7900110	Asset Pricing			Uhrig-Homburg, Thimme

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

Below you will find excerpts from events related to this course:

V Asset Pricing — **Practice (Ü) On-Site**

2530556, SS 2025, 1 SWS, Language: German, Open in study portal

T 5.35 Course: Auction Theory [T-WIWI-102613]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2520408	Auction Theory	2 SWS	Lecture	Ehrhart
WT 24/25	2520409	Auction Theory Exercise	1 SWS	Practice	Ehrhart
Exams					
WT 24/25	7900028	Auction Theory			Ehrhart
ST 2025	7900255	Auction Theory			Ehrhart

Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Auction Theory
2520408, WS 24/25, 2 SWS, Open in study portal

Lecture (V)

Literature

- Ehrhart , K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011
- Krishna, V.: Auction Theory, Academic Press, Second Edition, 2010
- Milgrom, P.: Putting Auction Theory to Work, Cambridge University Press, 2004
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999

T 5.36 Course: Automotive Engineering I [T-MACH-102203]

Responsible: Prof. Dr. Frank Gauterin
Dr.-Ing. Martin Gießler

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2113809	Automotive Engineering I	4 SWS	Lecture /	Gießler
Exams					
WT 24/25	76-T-MACH-102203	Automotive Engineering I			Gießler
ST 2025	76-T-MACH-102203	Automotive Engineering I			Gießler

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Written examination

Duration: 120 minutes

Auxiliary means: none

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-100092 - Automotive Engineering I must not have been started.

Below you will find excerpts from events related to this course:

V Automotive Engineering I

2113809, WS 24/25, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues

You will find the lecture material on ILIAS. To get the ILIAS password, KIT students refer to https://fast-web-01.fast.kit.edu/PasswoerterIlias/, students from eucor universities send an e-mail to martina.kaiser@kit.edu

Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.

Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

Literature

1. Robert Bosch GmbH: Automotive Handbook, 9th Edition, Wiley, Chichister 2015

2. Onori, S. / Serrao, L: / Rizzoni, G.: Hybrid Electric Vehicles - Energy Management Strategies, Springer London, Heidelberg, New York, Dordrecht 2016

3. Reif, K.: Brakes, Brake Control and Driver Assistance Systems - Function, Regulation and Components, Springer Vieweg, Wiesbaden 2015

4. Gauterin, F. / Gießler, M. / Gnadler, R.: Scriptum zur Vorlesung 'Automotive Engineering I', KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährlich aktualisiert

T 5.37 Course: Automotive Engineering I [T-MACH-100092]

Responsible: Dr.-Ing. Martin Gießler
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Language	Version
Written examination	6	Grade to a third	Each winter term	1 terms		3

Events					
WT 24/25	2113805	Automotive Engineering I	4 SWS	Lecture / 🗣	Gießler
WT 24/25	2113809	Automotive Engineering I	4 SWS	Lecture / 🗣	Gießler
Exams					
WT 24/25	76-T-MACH-100092	Automotive Engineering			Gießler
ST 2025	76-T-MACH-100092	Automotive Engineering			Gießler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination

Duration: 120 minutes

Auxiliary means: none

Prerequisites
The brick "T-MACH-102203 - Automotive Engineering I" is not started or finished. The bricks "T-MACH-100092 - Grundlagen der Fahrzeugtechnik I" and "T-MACH-102203 - Automotive Engineering I" can not be combined.

Workload
240 hours

Below you will find excerpts from events related to this course:

V Automotive Engineering I

2113805, WS 24/25, 4 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performance, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5. Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Kann nicht mit der Veranstaltung [2113809] kombiniert werden.

Can not be combined with lecture [2113809].

Literature

1. Mitschke, M. / Wallentowitz, H.: Dynamik der Kraftfahrzeuge, Springer Vieweg, Wiesbaden 2014

2. Pischinger, S. / Seiffert, U.: Handbuch Kraftfahrzeugtechnik, Springer Vieweg, Wiesbaden 2016

3. Gauterin, F. / Unrau, H.-J. / Gnadler, R.: Scriptum zur Vorlesung "Grundlagen der Fahrzeugtechnik I", KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährlich aktualisiert

V

Automotive Engineering I

2113809, WS 24/25, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

1. History and future of the automobile

2. Driving mechanics: driving resistances and driving performances, mechanics of longitudinal and lateral forces, active and passive safety

3. Drive systems: combustion engine, hybrid and electric drive systems

4. Transmission: clutches (e.g. friction clutch, visco clutch), transmission (e.g. mechanical transmission, hydraulic fluid transmission)

5.Power transmission and distribution: drive shafts, cardon joints, differentials

Learning Objectives:

The students know the movements and the forces at the vehicle and are familiar with active and passive safety. They have proper knowledge about operation of engines and alternative drives, the necessary transmission between engine and drive wheels and the power distribution. They have an overview of the components necessary for the drive and have the basic knowledge, to analyze, to evaluate, and to develop the complex system "vehicle".

Organizational issues

You will find the lecture material on ILIAS. To get the ILIAS password, KIT students refer to https://fast-web-01.fast.kit.edu/PasswoerterIlias/, students from eucor universities send an e-mail to martina.kaiser@kit.edu

Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.

Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

Literature

1. Robert Bosch GmbH: Automotive Handbook, 9th Edition, Wiley, Chichister 2015

2. Onori, S. / Serrao, L: / Rizzoni, G.: Hybrid Electric Vehicles - Energy Management Strategies, Springer London, Heidelberg, New York, Dordrecht 2016

3. Reif, K.: Brakes, Brake Control and Driver Assistance Systems - Function, Regulation and Components, Springer Vieweg, Wiesbaden 2015

4. Gauterin, F. / Gießler, M. / Gnadler, R.: Scriptum zur Vorlesung 'Automotive Engineering I', KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährlich aktualisiert

T 5.38 Course: Automotive Engineering II [T-MACH-102117]

Responsible: Dr.-Ing. Martin Gießler
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2114835	Automotive Engineering II	2 SWS	Lecture / 🗣	Gießler
ST 2025	2114855	Automotive Engineering II	2 SWS	Lecture / 🗣	Gießler
Exams					
WT 24/25	76-T-MACH-102117	Automotive Engineering II			Gießler
WT 24/25	76T-MACH-102117-2	Automotive Engineering II			Gießler
ST 2025	76-T-MACH-102117	Automotive Engineering II			Gießler

Legend: 📱 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Examination

Duration: 90 minutes

Auxiliary means: none

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Automotive Engineering II
2114835, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of designs

Learning Objectives:

The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Organizational issues
Kann nicht mit der Veranstaltung [2114855] kombiniert werden.

Can not be combined with lecture [2114855]

Literature

1. Heißing, B. / Ersoy, M.: Fahrwerkhandbuch: Grundlagen, Fahrdynamik, Komponenten, Systeme, Mechatronik, Perspektiven, Springer Vieweg, Wiesbaden, 2013

2. Breuer, B. / Bill, K.-H.: Bremsenhandbuch: Grundlagen - Komponenten - Systeme - Fahrdynamik, Springer Vieweg, Wiesbaden, 2017

3. Unrau, H.-J. / Gnadler, R.: Scriptum zur Vorlesung 'Grundlagen der Fahrzeugtechnik II', KIT, Institut für Fahrzeugsystemtechnik, Karlsruhe, jährliche Aktualisierung

V

Automotive Engineering II

2114855, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of the designs

Learning Objectives:

The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Literature
Elective literature:

1. Robert Bosch GmbH: Automotive Handbook, 9th Edition, Wiley, Chichester 2015
2. Heißing, B. / Ersoy, M.: Chassis Handbook - fundamentals, driving dynamics, components, mechatronics, perspectives, Vieweg+Teubner, Wiesbaden 2011
3. Gießler, M. / Gnadler, R.: Script to the lecture "Automotive Engineering II", KIT, Institut of Vehicle System Technology, Karlsruhe, annual update

T 5.39 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

Responsible: Dr. Gerd Gutekunst
Prof. Dr. Berthold Wigger

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2560134	Basics of German Company Tax Law and Tax Planning	3 SWS	Lecture / 🗣	Wigger, Gutekunst
Exams					
WT 24/25	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger
ST 2025	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5 h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course “Öffentliche Einnahmen” beforehand.

Below you will find excerpts from events related to this course:

V Basics of German Company Tax Law and Tax Planning
Lecture (V)
On-Site

2560134, WS 24/25, 3 SWS, Language: German, Open in study portal

Content
Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

T 5.40 Course: Basics of Production Automation [T-MACH-114049]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101298 - Automated Manufacturing Systems

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	2150703	Basics of Production Automation	3 SWS	Lecture / Practice (/	Fleischer
Exams					
ST 2025	76-T-MACH-114049	Basics of Production Automation			Fleischer

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
written exam (60 minutes)

Prerequisites
none

Workload
150 hours

Below you will find excerpts from events related to this course:

V Basics of Production Automation
2150703, SS 2025, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The lecture provides an overview of the structure and functioning of automated production systems. The functioning and application of fundamental elements for the realisation of automated production systems are taught. These include:

- Drive and control technology
- Handling technology for the handling of workpieces and tools
- Industrial robots
- Quality assurance in automated production plants
- Structures and design of manufacturing and assembly systems
- Introduction to project planning of automated production plants

An interdisciplinary consideration of these sub-areas reveals interfaces to Industry 4.0 approaches. The theoretical foundations are supplemented by practical application examples and live demonstrations in the Karlsruhe Research Factory. Within exercises, the contents of the lecture are deepened and applied to specific problems and tasks.

Learning Outcomes:

The students ...

- are able to name and describe the automation tasks in production plants and the components required for implementation.
- can select components from the areas of 'handling technique, 'industrial robots', 'sensor technology' and 'control & drive technology' for a given application.
- are able to compare different concepts of robotics and select the appropriate one for a given application.
- can assess the automation of production plants implemented on the basis of the examples given and apply them to new problems.
- know the process of planning automated production plants.

Workload:

MACH:
regular attendance: 32 hours
self-study: 88 hours
WING:
regular attendance: 32 hours
self-study: 118 hours

Organizational issues
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.41 Course: Bayesian Statistics for Analyzing Data [T-WIWI-113471]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105714 - Consumer Research

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each summer term	1 terms	1

Competence Certificate
Alternative exam assessment (assignments and active participation). Details will be communicated at the first day of class.

Annotation
Participation is limited to 10 participants. Registration is required for the course. If too many students register, students in higher semesters are selected first.

Workload
135 hours

T 5.42 Course: Behavioral Lab Exercise [T-WIWI-113095]

Responsible: Prof. Dr. Petra Nieken
Prof. Dr. Benjamin Scheibehenne

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105714 - Consumer Research

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2500040	Behavioral Lab Exercise	4.5 SWS	Seminar / 🗣	Scheibehenne, Nieken
Exams					
WT 24/25	7900368	Behavioral Lab Exercise			Nieken, Scheibehenne

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (presentation during the semester). Details will be communicated at the first day of class.

Annotation
In this class, students learn the core principles of psychological and economic experiments. The course covers topics ranging from design principles, to best-practices, preregistration, and analysis of the experimental data. Students will actively participate in the course by covering one selected topic in a talk. All students will discuss the topics together with the professors to develop solid knowledge about experimental design and analysis plans. In a second step, all students will develop a draft of an experimental design and analysis plan for their own topic and present it to the class. The students will get detailed feedback, enabling them to improve their drafts for future research.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Behavioral Lab Exercise

2500040, WS 24/25, 4.5 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
In this class, students learn the core principles of psychological and economic experiments. The course covers topics ranging from design principles, to best-practices, preregistration, and analysis of the experimental data. Students will actively participate in the course by covering one selected topic in a talk. All students will discuss the topics together with the professors to develop solid knowledge about experimental design and analysis plans. In a second step, all students will develop a draft of an experimental design and analysis plan for their own topic and present it to the class. The students will get detailed feedback enabling them to improve their drafts for future research.

T 5.43 Course: Behavioral Lab Exercise [T-WIWI-111806]

Responsible: Prof. Dr. Petra Nieken
Prof. Dr. Benjamin Scheibehenne

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Events					
WT 24/25	2500040	Behavioral Lab Exercise	4.5 SWS	Seminar / 🗣	Scheibehenne, Nieken
Exams					
WT 24/25	7900368	Behavioral Lab Exercise			Nieken, Scheibehenne

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment.

Recommendation
This class caters towards Master students who are interested in empirical research and in running lab experiments.

Annotation
The course will be offered for the first time in the winter semester 21/22.

Due to the interactive nature of the class, the number of participants is limited. If you are interested, please contact the teachers directly via email.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Behavioral Lab Exercise

2500040, WS 24/25, 4.5 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
In this class, students learn the core principles of psychological and economic experiments. The course covers topics ranging from design principles, to best-practices, preregistration, and analysis of the experimental data. Students will actively participate in the course by covering one selected topic in a talk. All students will discuss the topics together with the professors to develop solid knowledge about experimental design and analysis plans. In a second step, all students will develop a draft of an experimental design and analysis plan for their own topic and present it to the class. The students will get detailed feedback enabling them to improve their drafts for future research.

T 5.44 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I [T-MACH-100966]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101290 - BioMEMS

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2141864	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I	2 SWS	Lecture / 🗣	Guber, Ahrens
Exams					
WT 24/25	76-T-MACH-100966	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I			Guber
ST 2025	76-T-MACH-100966	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I			Guber

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam (75 Min.)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I

2141864, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
BioMEMS I-Klausur: Mo, 17.03.2025, 8:00 - 10:00; 10.11 Hertz-Hörsaal (ggf. auch 10.91 Redtenbacher-Hörsaal)

BioMEMS II-Klausur: Mo, 17.02.2025, 11:00 - 13:00; 10.11 Hertz-Hörsaal

BioMEMS III-Klausur: Do, 20.02.2025, 10:00 - 12:00; 10.11 Hertz-Hörsaal

Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011

T 5.45 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	2142883	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II	2 SWS	Lecture / 🗣	Guber, Ahrens
Exams					
WT 24/25	76-T-MACH-100967	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II			Guber
ST 2025	76-T-MACH-100967	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II			Guber

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam (75 Min.)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II
2142883, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Cristallisation
Microarrys
Tissue Engineering
Cell Chip Systems
Drug Delivery Systems
Micro reaction technology
Microfluidic Cells for FTIR-Spectroscopy
Microsystem Technology for Anesthesia, Intensive Care and Infusion
Analysis Systems of Person´s Breath
Neurobionics and Neuroprosthesis
Nano Surgery

Organizational issues
Zu jedem Vorlesungstermin werden via ILIAS die jeweiligen Folien im PDF-Format zur Verfügung gestellt.

schriftl. Prüfung: Mo, 08.09.2025, 8 - 10 Uhr; 10.11 Hertz-Hörsaal

Literature

Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II;
Springer-Verlag, 1994

M. Madou
Fundamentals of Microfabrication

T 5.46 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	2142879	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III	2 SWS	Lecture / 🗣	Guber, Ahrens
Exams					
WT 24/25	76-T-MACH-100968	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III			Guber
ST 2025	76-T-MACH-100968	BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III			Guber

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam (75 Min.)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III

2142879, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Examples of use in minimally invasive therapy
Minimally invasive surgery (MIS)
Endoscopic neurosurgery
Interventional cardiology
NOTES
OP-robots and Endosystems
License of Medical Products and Quality Management

Organizational issues
Zu jedem Vorlesungstermin werden via ILIAS die jeweiligen Folien im PDF-Format zur Verfügung gestellt.

schriftl. Prüfung: Mo, 22.09.2025, 10:30 - 12:30 Uhr; 10.11 Hertz-Hörsaal

Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

Buess, G.: Operationslehre in der endoskopischen Chirurgie, Band I und II;
Springer-Verlag, 1994

M. Madou
Fundamentals of Microfabrication

T 5.47 Course: Bond Markets [T-WIWI-110995]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2530560	Bond Markets	3 SWS	Lecture / Practice (/ 🗣	Uhrig-Homburg, Molnar
Exams					
WT 24/25	7900311	Bond Markets			Uhrig-Homburg
ST 2025	7900280	Bond Markets			Uhrig-Homburg

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (75min.)

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment).

Annotation
This course will be held in English.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Bond Markets
2530560, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The lecture "Bond Markets" deals with the national and international bond markets, which are an important source of financing for companies, as well as for the public sector. After an overview of the most important bond markets, different yield definitions are discussed. Based on this, the concept of the yield curve is presented. In addition, the theoretical and empirical relationships between ratings, default probabilities and spreads are analyzed. The focus will then be on questions regarding the valuation, measurement, management and control of credit risks.

The total workload for this course is approximately 135 hours (4.5 credits).

The assessment consists of a written exam (75min.) (according to §4(2), 1 SPO). A bonus can be earned by correctly solving at least 50% of the posed bonus exercices. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Students deepen their knowledge of national and international bond markets. They gain knowledge of the traded instruments and their key figures for describing default risk such as ratings, default probabilities or credit spreads.

Organizational issues
Die Veranstaltung wird freitags in der ersten Semesterhälfte am Campus B (Geb. 09.21) im Raum 124 angeboten. Die Klausur findet am 08.01.25 statt.

T 5.48 Course: Bond Markets - Models & Derivatives [T-WIWI-110997]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2530565	Bond Markets - Models & Derivatives	2 SWS	Block / 🗣	Grauer, Uhrig-Homburg
Exams					
WT 24/25	7900318	Bond Markets - Models & Derivatives			Uhrig-Homburg

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of success consists in equal parts of a written thesis and an oral exam including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.

Recommendation
Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.

Annotation
This course will be held in English.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Bond Markets - Models & Derivatives
2530565, WS 24/25, 2 SWS, Language: English, Open in study portal

Block (B)
On-Site

Content

- **Competence Certificate:** The assessment of success consists in equal parts of a written thesis and an oral exam (according to §4(2), 3 SPO) including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** Students deepen their knowledge of national and international bond markets. They are able to apply the knowledge they have gained about traded instruments and common valuation models for pricing derivative financial instruments.
- **Prerequisites:**
- **Content:** The lecture "Bond Markets – Models & Derivatives" deepens the content of the lecture "Bond Markets". The modelling of the dynamics of yield curves and the management of credit risks forms the theoretical foundation for the valuation of interest rate and credit derivatives to be discussed. In this course, students deal intensively with selected topics and acquire the relevant knowledge on their own.
- **Recommendation:** Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.
- **Workload:** The total workload for this course is approximately 90 hours (3.0 credits).

Organizational issues
Die Veranstaltung mit Seminarcharakter und dem Ziel, ein selbstgewähltes Themenfeld in Form einer schriftlichen Ausarbeitung eigenständig zu erarbeiten, findet in der 2. Semesterhälfte statt.

T 5.49 Course: Bond Markets - Tools & Applications [T-WIWI-110996]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2530562	Bond Markets - Tools & Applications	1 SWS	Block / 🗣	Uhrig-Homburg, Grauer
Exams					
WT 24/25	7900317	Bond Markets - Tools & Applications			Uhrig-Homburg
ST 2025	7900283	Bond Markets - Tools & Applications			Uhrig-Homburg

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an empirical case study with written elaboration and presentation. The main examination is offered once a year, re-examinations every semester.

Recommendation
Knowledge of the "Bond Markets" course is very helpful.

Annotation
This course will be held in English.

Workload
45 hours

Below you will find excerpts from events related to this course:

V Bond Markets - Tools & Applications
2530562, WS 24/25, 1 SWS, Language: English, Open in study portal

Block (B)
On-Site

Content

- **Competence Certificate:** The assessment consists of an empirical case study with written elaboration and presentation (according to $4(2), 3 SPO). The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** The students apply various methods in practice within the framework of a project-related case study. They are able to deal with empirical data and analyze them in a targeted manner.
- **Content:** The course "Bond Markets – Tools & Applications" includes a hands-on project in the field of national and international bond markets. Using empirical datasets, the students have to apply practical methods in order to analyze the data in a targeted manner.
- **Recommendation:** Knowledge of the "Bond Markets" course is very helpful.
- **Workload:** The total workload for this course is approximately 45 hours (1.5 credits).

Organizational issues
Die Veranstaltung findet in der ersten Semesterhälfte statt und beinhaltet eine eigenständige Projektarbeit im Umgang mit realen Bond Daten. Die Erfolgskontrolle erfolgt anhand einer schriftlichen Ausarbeitung und einer kurzen Präsentation.

T 5.50 Course: Boosting of Combustion Engines [T-MACH-105649]

Responsible: Dr.-Ing. Johannes Kech
Dr.-Ing. Heiko Kubach

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134153	Boosting of Combustion Engines	2 SWS	/ 🗣	Kech

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, 20 min

Prerequisites
none

Workload
120 hours

T 5.51 Course: Business Data Strategy [T-WIWI-106187]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540484	Business Data Strategy	2 SWS	Lecture / 🗣	Weinhardt, Hariharan
WT 24/25	2540485	Übung zu Business Data Strategy	1 SWS	Practice / 🗣	Weinhardt, Schulz
Exams					
WT 24/25	7900234	Business Data Strategy			Weinhardt

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulationand an alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. The grade isdetermined by 2/3 through the written exam and by 1/3 through the alternative exam assessment (e.g., presentation).

Prerequisites
None

Recommendation
Students should be familiar with basic concepts of business organisations, information systems, and programming. However, all material will be introduced, so no formal pre-conditions are applied.

Annotation
Limited number of participants.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Business Data Strategy
2540484, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
On-Site

Content
With new methods for capturing and using different types of data and industry's recognition that society's use of data is less than optimal, the need for comprehensive strategies is more important than ever before. Advances in cybersecurity and information sharing and the use of data in its raw form for decision making all add to the complexity of integrated processes, ownership, stewardship, and sharing. The life cycle of data in its entirety spans the infrastructure, system design, development, integration, and implementation of information-enabling solutions. This lecture focuses on teaching about these dynamics and tools to comprehend and manage them in organisation contexts. Given the increasing size and complexity of data, methods for the transformation and structured preparation are an important tool in the process of sense–making. Modern software solutions and programming languages provide frameworks for such tasks that form another part of this course ranging from conceptual systems modelling to data manipulation to automated generation of HTML reports and web-applications.

Organizational issues

Application/Registration

Attendance will be limited to 20-25 participants. Application/registration is therefore preliminary. After the application deadline has passed, positions will be allocated, based on evaluation of the previous study records. Applications are accepted only through the Wiwi-Portal: https://portal.wiwi.kit.edu/ys/8327

Anmeldung

Die Teilnehmeranzahl ist begrenzt (ca. 20-25 Plätze). Eine Anmeldung erfolgt deshalb zunächst unter Vorbehalt. Nach Ablauf der Anmeldefrist werden die Plätze zur Teilnahme, nach Einsicht der Vorleistungen im Studium vergeben. Die Anmeldung/Bewerbung erfolgt ausschließlich über das Wiwi-Portal: https://portal.wiwi.kit.edu/ys/8327

T 5.52 Course: Business Dynamics [T-WIWI-102762]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr Paul Glenn

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101409 - Electronic Markets
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540531	Business Dynamics	2 SWS	Lecture / 🗣	Geyer-Schulz, Glenn
WT 24/25	2540532	Exercise Business Dynamics	1 SWS	Practice / 🗣	Geyer-Schulz, Glenn
Exams					
WT 24/25	7979777	Business Dynamics (WS 2024/2025)			Geyer-Schulz
ST 2025	7900065	Business Dynamics (Nachklausur WS 2024/2025)			Geyer-Schulz

Legend: 🖥 Online, ♻ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Business Dynamics
2540531, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
Termine und Raum für die VL + Ü Business Dynamics (2540532):

Sa (26.10.2024), 09:00 bis 19:00, Geb. 05.20, Raum 1C-01
Sa (23.11.2024), 09:00 bis 19:00, Geb. 05.20, Raum 1C-01
Sa (25.01.2025), 09:00 bis 19:00, Geb. 05.20, Raum 1C-01
Sa (15.02.2025), 09:00 bis 19:00, Geb. 05.20, Raum 1C-01

Literature
John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

T 5.53 Course: Business Intelligence Systems [T-WIWI-105777]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101506 - Service Analytics
M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-104068 - Information Systems in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2540422	Business Intelligence Systems	3 SWS	Lecture /	Mädche
Exams					
WT 24/25	7900224	Business Intelligence Systems			Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
Basic knowledge on database systems is helpful.

Below you will find excerpts from events related to this course:

V Business Intelligence Systems

2540422, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

In most modern enterprises, Business Intelligence & Analytics (BI&A) Systems represent a core enabler of decision-making in that they supply up-to-date and accurate information about all relevant aspects of a company's planning and operations: from stock levels to sales volumes, from process cycle times to key indicators of corporate performance. Modern BI&A systems leverage beyond reporting and dashboards also advanced analytical functions. Thus, today, they also play a major role in enabling data-driven products and services. This course aims to introduce theoretical foundations, concepts, tools, and current practice of BI&A Systems from a managerial and technical perspective.

The course is complemented by an engineering capstone project, where students work in a team with real-world use cases and data in order to create a prototypical Business intelligence & Analytics system using state-of-the-art technologies (e.g., scikit-learn in Python or Microsoft Power BI).

Learning objectives

- Understand the theoretical foundations of key Business Intelligence & Analytics concepts supporting decision-making
- Explore key capabilities of state-of-the-art Business Intelligence & Analytics Systems
- Learn how to successfully implement and run Business Intelligence & Analytics Systems from multiple perspectives, e.g. architecture, data management, consumption, analytics
- Get hands-on experience by working with Business Intelligence & Analytics Systems with real-world use cases and data

Prerequisites

This course is limited to 50 places. The capacity limitation is due to the format of the accompanying engineering capstone project. Strong analytical abilities and profound skills in SQL and Python are required. Students have to apply with their CVs and transcripts of records via the WiWi-Portal. The first lecture will present all organizational details and the underlying registration process for the lecture and the capstone project. The teaching language is English.

Die Erfolgskontrolle erfolgt in Form einer Prüfungsleistung anderer Art (Form) nach § 4 Abs. 2 Nr. 3 SPO. Die Leistungskontrolle erfolgt in Form einer einstündigen Klausur und durch Durchführung eines Capstone Projektes. Details zur Ausgestaltung der Erfolgskontrolle werden im Rahmen der Vorlesung bekannt gegeben.

Literature

- Turban, E., Aronson, J., Liang T.-P., Sharda, R. 2008. "Decision Support and Business Intelligence Systems".
- Watson, H. J. 2014. "Tutorial: Big Data Analytics: Concepts, Technologies, and Applications," Communications of the Association for Information Systems (34), p. 24.
- Arnott, D., and Pervan, G. 2014. "A critical analysis of decision support systems research revisited: The rise of design science," Journal of Information Technology (29:4), Nature Publishing Group, pp. 269–293 (doi: 10.1057/jit.2014.16) .
- Carlo, V. (2009). "Business intelligence: data mining and optimization for decision making". Editorial John Wiley and Sons, 308-317.
- Chen, H., Chiang, R. H. L, and Storey, V. C. 2012. „Business Intelligence and Analytics: From Big Data to Big Impact," MIS Quarterly (36:4), pp. 1165-1188.
- Davenport, T. 2014. Big Data @ Work, Boston, MA: Harvard Business Review.
- Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term"
- Power, D. J. 2008. "Decision Support Systems: A Historical Overview," Handbook on Decision Support Systems, pp. 121–140 (doi: 10.1007/978-3-540-48713-5_7) .
- Sharma, R., Mithras, S., and Kankanhalli, A. 2014. „Transforming decision-making processes: a research agenda for understanding the impact of business analytics on organisations," European Journal of Information Systems (23:4), pp. 433-441.
- Silver, M. S. 1991. "Decisional Guidance for Computer-Based Decision Support," MIS Quarterly (15:1), pp. 105-122.

Further literature will be made available in the lecture.

T 5.54 Course: Business Planning [T-WIWI-102865]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2500109	Business Planning for Founders - Startup CFO	2 SWS	Seminar / 🗣	Terzidis, Rosales Bravo
ST 2025	2545109	Business Planning for Founders	2 SWS	Seminar / 🗣	Rosales Bravo, Terzidis
Exams					
WT 24/25	7900023	Business Planning for Founders			Terzidis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Business Planning for Founders - Startup CFO — **Seminar (S) On-Site**
2500109, WS 24/25, 2 SWS, Language: English, Open in study portal

Content

Content

Embark on a transformative journey into the dynamic realm of startup finance with our comprehensive course designed for Master's students interested in the task of aspiring to become future Chief Financial Officers (CFOs) or Chief Executive Officers (CEOs) in the startup. Particularly, students who previously attended classes on entrepreneurship or developed their business ideas in Design Thinking Seminars will work on the financial viability and, therefore, the potential for realizing their business ideas. The three-day seminar develops the financial literacy needed to start and operate an entrepreneurial venture, including analyzing and determining the cost and revenue structure of the firm and creating a financial strategy to execute the business plan successfully. Additionally, students will learn about the sources and conditions of different investment types and develop tailored fundraising strategies. The seminar is not restricted to the financial aspects but follows the Triple Bottom Line philosophy (3BL).

Throughout the course, real-world case studies and guest lectures, professional experts will provide valuable insights into the practical application of financial concepts.By the end of this course, you will be well-equipped to take on leadership roles in startups and startup ecosystems, armed with the managerial understanding required to drive success in dynamic and competitive markets.

Learning Objectives

Upon completion of this seminar, course participants will be able to

1. Analyze, forecast, and plan the cost structure and revenue streams of the venture project.
2. Reflect on the sustainability of a business based on the Triple Bottom Line theory.
3. Develop the essential financial statements for a startup.
4. Recall and reflect on investment strategies for startups.
5. Discover business stakeholders and prepare a tailored communication strategy.
6. Reflect on the role of information technology.
7. Apply negotiation techniques essential for securing favorable terms and agreements.
8. Have a brief overview of the related topic.

Credentials:

ONLY ONE of the two options - Business Planning for founders OR Business Planning for founders in the field of IT-Security - can be taken and credited under the in CAS mentioned partial credit, as they cover similar content. Registration must take place in the CAS for the respective examination.

Organizational issues

Registration is via the Wiwi-Portal.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

V	**Business Planning for Founders** 2545109, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content

Content

Embark on a transformative journey into the dynamic realm of startup finance with our comprehensive course designed for Master's students interested in the task of aspiring to become future Chief Financial Officers (CFOs) or Chief Executive Officers (CEOs) in the startup. Particularly, students who previously attended classes on entrepreneurship or developed their business ideas in Design Thinking Seminars will work on the financial viability and, therefore, the potential for realizing their business ideas. The three-day seminar develops the financial literacy needed to start and operate an entrepreneurial venture, including analyzing and determining the cost and revenue structure of the firm and creating a financial strategy to execute the business plan successfully. Additionally, students will learn about the sources and conditions of different investment types and develop tailored fundraising strategies. The seminar is not restricted to the financial aspects but follows the Triple Bottom Line philosophy (3BL).

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Learning Objectives

Upon completion of this seminar, course participants will be able to

1. Analyze, forecast, and plan the cost structure and revenue streams of the venture project.
2. Reflect on the sustainability of a business based on the Triple Bottom Line theory.
3. Develop the essential financial statements for a startup.
4. Recall and reflect on investment strategies for startups.
5. Discover business stakeholders and prepare a tailored communication strategy.
6. Reflect on the role of information technology.
7. Apply negotiation techniques essential for securing favorable terms and agreements.
8. Have a brief overview of the related topic.

Credentials:

ONLY ONE of the two options - Business Planning for founders OR Business Planning for founders in the field of IT-Security - can be taken and credited under the in CAS mentioned partial credit, as they cover similar content. Registration must take place in the CAS for the respective examination.

Organizational issues

Wednesday, 07.05.2025, 09:00 -17:00
Wednesday, 14.05.2025, 09:00 - 17:00,
Final Session: tbd

ATTENTION: The last session with the team pitches will probably take place on Thursday, 03.07.2025, 09:00 – 13:00, as part of the Wissenswoche Innovation, open to the public

Registration is via the Wiwi-Portal.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

T 5.55 Course: Business Process Modelling [T-WIWI-102697]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2511210	Business Process Modelling	2 SWS	Lecture / 🗣	Oberweis
WT 24/25	2511211	Exercise Business Process Modelling	1 SWS	Practice / 🗣	Oberweis, Schüler
Exams					
WT 24/25	79AIFB_MvG_C2	Business Process Modelling			Oberweis
ST 2025	79AIFB_MvG_B4	Business Process Modelling (Registration until 21.07.2025)			Oberweis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Business Process Modelling

2511210, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

Learning objectives:

Students

- describe goals of business process modeling and aplly different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analysing and assessing process modells to evaluate specific quality characteristics of the process model.

Recommendations:

Knowledge of course Applied Informatics I - Modelling is expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- M. Weske: Business Process Management: Concepts, Languages, Architectures. Springer 2012.
- F. Schönthaler, G.Vossen, A. Oberweis, T. Karl: Business Processes for Business Communities: Modeling Languages, Methods, Tools. Springer 2012.

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T 5.56 Course: Case Studies Seminar: Innovation Management [T-WIWI-102852]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2545105	Case studies seminar: Innovation management	2 SWS	Seminar / 🗣	Weissenberger-Eibl
Exams					
WT 24/25	7900237	Case Studies Seminar: Innovation Management			Weissenberger-Eibl

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessments (§4(2), 3 SPO).

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

Below you will find excerpts from events related to this course:

V Case studies seminar: Innovation management

2545105, WS 24/25, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course. A short introduction to presentation techniques is planned to help students prepare the seminar papers.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

T 5.57 Course: CATIA Advanced [T-MACH-105312]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	1

Events					
WT 24/25	2123380	Advanced CATIA	3 SWS	Project (P /	Rönnau, Mitarbeiter
Exams					
WT 24/25	76-T-MACH-105312	CATIA Advanced			Rönnau

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Assessment of another type. Design project and written documentation in team work and final presentation. Grading: Project work 3/5, documentation 1/5 and presentation 1/5.

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Advanced CATIA
2123380, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Project (PRO)
Blended (On-Site/Online)

Content
In this design project, students develop a product in small groups according to an agile approach using the 3DEXPERIENCE platform (CATIA V6) from Dassault Systèmes. The extended functionalities of the platform are addressed and model-based work is carried out.

The development process is traced from the idea to the finished model. The main focus is on independent solution finding, teamwork, function fulfillment, production and design. The project results are presented at the end of the semester.

Organizational issues
Siehe ILIAS zur Lehrveranstaltung

Literature
Keine / None

T 5.58 Course: CATIA CAD Training Course [T-MACH-102185]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Completed coursework (practical)	2	pass/fail	Each term	2

Events					
WT 24/25	2123358	CATIA CAD training course	2 SWS	Practical course / Blended	Rönnau, Mitarbeiter
Exams					
WT 24/25	76-T-MACH-102185	CATIA CAD Training Course			Rönnau

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Practical examination on CAD computer, duration: 60 min.

Prerequisites
None

Recommendation
Dealing with technical drawings is required.

Annotation
For the practical course attendance is compulsory.

Workload
50 hours

Below you will find excerpts from events related to this course:

V CATIA CAD training course

2123358, WS 24/25, 2 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

- Basics of CATIA such as user interface, handling etc.
- Production and processing of different model types
- Production of basic geometries and parts
- Generation of detailed drawings
- Integration of partial solutions in modules
- Working with constrains
- Strength analysis with FEM
- Kinematic simulation with DMU
- Dealing with CATIA Knowledgeware

Students are able to:

- create their own 3D geometric models in the CAD system CATIA and generate drawings due to the created geometry
- carry out FE-studies and kinematic simulations using the integrated CAE tools
- use advanced, knowledge-based functionalities of CATIA to automate the creation of geometry and thus to ensure the reusability of the models.

Organizational issues
Das Praktikum kann vorlesungsbegleitend absolviert werden oder als einwöchige Blockveranstaltung in der vorlesungsfreien Zeit. Weitere Informationen siehe ILIAS.

Literature
Praktikumskript

T 5.59 Course: Ceramic Processing Technology [T-MACH-102182]

Responsible: Dr. Joachim Binder
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Competence Certificate
The assessment consists of an oral exam (approx. 20 min) taking place at the agreed date.

Auxiliary means: none

The re-examination is offered upon agreement.

Prerequisites
none

T 5.60 Course: Characteristics of Transportation Systems [T-BGU-106609]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6232806	Properties of Means of Transport	2 SWS	Lecture / 🗣	Vortisch
Exams					
WT 24/25	8240106609	Characteristics of Transportation Systems			Vortisch

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.61 Course: Circular Economy – Challenges and Potentials [T-WIWI-114057]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2025	2581965	Circular Economy - Challenges and Potentials	2 SWS	Lecture / 🗣	Schultmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Workload
105 hours

Below you will find excerpts from events related to this course:

V Circular Economy - Challenges and Potentials

Lecture (V)
On-Site

2581965, SS 2025, 2 SWS, Language: English, Open in study portal

Content
Circular Economy (CE) is an economic system that on the one hand aims to minimize waste, emissions and resource consumption and on the other hand increase resource efficiency by keeping products and materials in use for as long as possible. Based on basic ideas and principles of CE this lecture tackles potentials and challenges for the design and operations of circular value chains and systems. Different research-orientied case studies reveal and illustrate the potential implementation as well as the limits and future needs of CE as a key element of sustainable industrial development.

Literature
Wird in der Lehrveranstaltung bekannt gegeben.

T 5.62 Course: Civil Engineering Structures and Regenerative Energies [T-BGU-111922]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6241810	Civil Engineering Structures and Regenerative Energies	2 SWS	Lecture / Practice (/ 🗣	Haghsheno, Mitarbeiter/innen
Exams					
WT 24/25	8240111922	Civil Engineering Structures and Regenerative Energies			Haghsheno

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 5.63 Course: CO2-Neutral Combustion Engines and their Fuels I [T-MACH-111550]

Responsible: Prof. Dr. Thomas Koch
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101275 - Combustion Engines I

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	5	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	2133113	CO2-neutral combustion engines and their fuels I	3 SWS	Lecture / Practice (/ 🗣	Koch
Exams					
WT 24/25	76-T-MACH-102194	CO2-neutral combustion engines and their fuels I			Kubach, Koch
ST 2025	76-T-MACH-102194	CO2-neutral combustion engines and their fuels I			Koch, Kubach

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
oral examination, Duration: 25 min., no auxiliary means

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V CO2-neutral combustion engines and their fuels I
2133113, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Introduction, Presentation of IFKM

Working Principle

Characteristic Parameters

Engine Parts

Drive Train

Fuels

Gasoline Engines

Diesel Engines

Hydrogen Engines

Exhaust Gas Emissions

Organizational issues
Übungstermine Donnerstags nach Bekanntgabe in der Vorlesung

T 5.64 Course: CO2-Neutral Combustion Engines and their Fuels II [T-MACH-111560]

Responsible: Prof. Dr. Thomas Koch
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2025	2134151	CO2-neutral combustion engines and their fuels II	3 SWS	Lecture / Practice (/ 🗣	Koch
Exams					
WT 24/25	76-T-MACH-104609	Combustion Engines, Hydrogen Engines and CO2 neutral Fuels II			Kubach, Koch
ST 2025	76-T-MACH-104609	Combustion Engines, Hydrogen Engines and CO2 neutral Fuels II			Koch, Kubach

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination, duration: 25 minutes, no auxiliary means

Prerequisites
none

Recommendation
Fundamentals of Combustion Engines II helpful

Workload
150 hours

Below you will find excerpts from events related to this course:

V CO2-neutral combustion engines and their fuels II

2134151, SS 2025, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

T 5.65 Course: Collective Intelligence in Human Judgment and Decision Making [T-WIWI-114186]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105714 - Consumer Research

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	2500026	Collective Intelligence in Human Judgment and Decision Making	2 SWS	Lecture / 🗣	Gradwohl

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment. Details will be discussed at the beginning of the course.

Recommendation
Willingness to engage with experimental research papers and basic mathematical models is required.

Annotation
This course covers the key ideas of collective intelligence, asking when it emerges and when it fails. Students will engage with classical and contemporary research papers about how we can combine information from different individuals. They learn to understand and discuss under which conditions combining judgments and decisions of multiple individuals produces collective intelligence and when it creates the risk to run into collective madness and herding.

After the course students can define and describe important concepts of collective intelligence and can name and describe experimental paradigms that are used to investigate it. They will practice their ability to read and understand research papers and to critically evaluate the claims in empirical and theoretical research papers.

Moreover, they can apply the concepts and ideas of collective intelligence to examples related to consumer behavior, management and their everyday lives. All lectures, materials, and assignments will be in English.

The number of participants is limited. The registration will take place via the Campus portal.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Collective Intelligence in Human Judgment and Decision Making

Lecture (V)
On-Site

2500026, SS 2025, 2 SWS, Language: English, Open in study portal

Content
This course covers the key ideas of collective intelligence, asking when it emerges and when it fails. Students will engage with classical and contemporary research papers about how we can combine information from different individuals. They learn to understand and discuss under which conditions combining judgments and decisions of multiple individuals produces collective intelligence and when it creates the risk to run into collective madness and herding.

After the course students can define and describe important concepts of collective intelligence and can name and describe experimental paradigms that are used to investigate it. They will practice their ability to read and understand research papers and to critically evaluate the claims in empirical and theoretical research papers. Moreover, they can apply the concepts and ideas of collective intelligence to examples related to consumer behavior, management and their everyday lives.

All lectures, materials, and assignments are in English. The number of participants is limited. The registration will take place via the Campus portal.

Grades will be determined based on different parts, including active participation and written assignments. Details will be discussed at the beginning of the course.

Organizational issues

Participation is limited to 20 participants. Registration via the campus portal is required for the course. If too many students register, students in higher semesters are selected first.

5.66 Course: Collective Perception in Autonomous Driving [T-WIWI-113363]

Responsible: Prof. Dr. Alexey Vinel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2511456	Collective Perception in Autonomous Driving	2 SWS	Lecture /	Bied, Zhao , Vinel
ST 2025	2511457	Exercise Collective Perception in Autonomous Driving	1 SWS	Practice /	Flores Comeca, Arockiasamy, Zhao , Bied
Exams					
WT 24/25	79AIFB_CPAD_B3	Collective Perception in Autonomous Driving			Vinel
ST 2025	79AIFB_CPAD_C3	Collective Perception in Autonomous Driving (Registration until 21.07.2025)			Vinel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The default assessment of this course is a written examination (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None.

Workload
135 hours

T 5.67 Course: Communication Systems and Protocols [T-ETIT-101938]

Responsible: Dr.-Ing. Jens Becker
Prof. Dr.-Ing. Jürgen Becker

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2025	2311616	Communication Systems and Protocols	2 SWS	Lecture / 🗣	Becker, Becker
ST 2025	2311618	Tutorial for 2311616 Communication Systems and Protocols	1 SWS	Practice / 🗣	Stammler
Exams					
WT 24/25	7311616	Communication Systems and Protocols			Becker, Becker
ST 2025	7311616	Communication Systems and Protocols			Becker, Becker

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites

none

T 5.68 Course: Competition in Networks [T-WIWI-100005]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101406 - Network Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2561204	Competition in Networks	2 SWS	Lecture / 🗘	Mitusch
WT 24/25	2561205	Übung zu Wettbewerb in Netzen	1 SWS	Practice / 🗘	Mitusch, Corbo
Exams					
WT 24/25	7900221	Competition in Networks			Mitusch

Legend: Online, 🗘 Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
None.

Recommendation
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Competition in Networks
2561204, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture

Literature
Literatur und Skripte werden in der Veranstaltung angegeben.

T 5.69 Course: Computational Economics [T-WIWI-102680]

Responsible: Prof. Dr. Pradyumn Kumar Shukla
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	3

Events					
WT 24/25	2590458	Computational Economics	2 SWS	Lecture / Blended	Shukla
WT 24/25	2590459	Excercises to Computational Economics	1 SWS	Practice / Blended	Shukla
Exams					
WT 24/25	79AIFB_CE_B1	Computational Economics			Shukla
ST 2025	79AIFB_CE_C6	Computational Economics (Registration until 21.07.2025)			Shukla

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Please note: the lecture will not take place in the winter semester 2023/2024. Also an exam cannot be offered.

Prerequisites
None

Annotation
The lecture is currently suspended. An exam cannot be offered.

Below you will find excerpts from events related to this course:

V Computational Economics
2590458, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Examining complex economic problems with classic analytical methods usually requires making numerous simplifying assumptions, for example that agents behave rationally or homogeneously. Recently, widespread availability of computing power gave rise to a new field in economic research that allows the modeling of heterogeneity and forms of bounded rationality: Computational Economics. Within this new discipline, computer based simulation models are used for analyzing complex economic systems. In short, an artificial world is created which captures all relevant aspects of the problem under consideration. Given all exogenous and endogenous factors, the modelled economy evolves over time and different scenarios can be analyzed. Thus, the model can serve as a virtual testbed for hypothesis verification and falsification.

Learning objectives:

The student

- understands the methods of Computational Economics and applies them on practical issues,
- evaluates agent models considering bounded rational behaviour and learning algorithms,
- analyses agent models based on mathematical basics,
- knows the benefits and disadvantages of the different models and how to use them,
- examines and argues the results of a simulation with adequate statistical methods,
- is able to support the chosen solutions with arguments and can explain them.

Literature

- R. Axelrod: "Advancing the art of simulation in social sciences". R. Conte u.a., Simulating Social Phenomena, Springer, S. 21-40, 1997.
- R. Axtel: "Why agents? On the varied motivations for agent computing in the social sciences". CSED Working Paper No. 17, The Brookings Institution, 2000.
- K. Judd: "Numerical Methods in Economics". MIT Press, 1998, Kapitel 6-7.
- A. M. Law and W. D. Kelton: "Simulation Modeling and Analysis", McGraw-Hill, 2000.
- R. Sargent: "Simulation model verification and validation". Winter Simulation Conference, 1991.
- L. Tesfation: "Notes on Learning", Technical Report, 2004.
- L. Tesfatsion: "Agent-based computational economics". ISU Technical Report, 2003.

Weiterführende Literatur:

- Amman, H., Kendrick, D., Rust, J.: "Handbook of Computational Economics". Volume 1, Elsevier North-Holland, 1996.
- Tesfatsion, L., Judd, K.L.: "Handbook of Computational Economics". Volume 2: Agent-Based Computational Economics, Elsevier North-Holland, 2006.
- Marimon, R., Scott, A.: "Computational Methods for the Study of Dynamic Economies". Oxford University Press, 1999.
- Gilbert, N., Troitzsch, K.: "Simulation for the Social Scientist". Open University Press, 1999.

T 5.70 Course: Computational Modelling of Judgments, Decisions and Cognition [T-WIWI-114185]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105714 - Consumer Research

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	2500119	Computational Modelling of Judgments, Decisions and Cognition	2 SWS	Others (sons / 🗣	Gradwohl

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment. There will be 4 assignments during the course of the semester. Each assignment will count 25% towards the final grade.

Recommendation
Basic programming skills (first experience with R or Python is advantageous), willingness to engage with maths and mathematical notation, calculus, and probability theory are required.

Annotation
This course enables students to develop a basic understanding of computational models in the study of human judgment, decision making and cognition. After this course students can describe why we use computational models of cognition and behavior, they will be able to list prominent models and some of their criticisms and weaknesses. Moreover, they will be capable of programming and understanding simple and more advanced computational models in mathematical notation and code.
After covering the main ideas of using computational models and preparing technical prerequisites, we will learn how to interpret models with tools like simulations and how to fit models to data.
All lectures, materials, and assignments are in English. The number of participants is limited. The registration will take place via the Campus portal.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Computational Modelling of Judgments, Decisions and Cognition

2500119, SS 2025, 2 SWS, Language: English, Open in study portal

Others (sonst.)
On-Site

Content
This course enables students to develop a basic understanding of computational models in the study of human judgment, decision making and cognition. After this course students can describe why we use computational models of cognition and behavior, they will be able to list prominent models and some of their criticisms and weaknesses. Moreover, they will be capable of programming and understanding simple and more advanced computational models in mathematical notation and code.

After covering the main ideas of using computational models and preparing technical prerequisites, we will learn how to interpret models with tools like simulations and how to fit models to data.

All lectures, materials, and assignments are in English. The number of participants is limited. The registration will take place via the Campus portal.

Organizational issues
Participation is limited to 15 participants. Registration via the campus portal is required for the course. If too many students register, students in higher semesters are selected first.

T 5.71 Course: Computational Risk and Asset Management [T-WIWI-102878]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105032 - Data Science for Finance

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	5

Competence Certificate
The module examination takes the form of an alternative exam assessment.
The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Prerequisites
None.

Recommendation
Basic knowledge of capital markt theory.

Workload
135 hours

5.72 Course: Computer Aided Data Analysis [T-GEISTSOZ-104565]

Responsible: Prof. Dr. Gerd Nollmann
Organisation: KIT Department of Humanities and Social Sciences
Part of: M-GEISTSOZ-101169 - Sociology

Type	Credits	Grading scale	Version
Completed coursework	0	pass/fail	1

Events					
WT 24/25	5000058	Decompositions and regression methods	2 SWS	Course (/	Nollmann
WT 24/25	5000059	The gender wage gap	2 SWS	Course (/	Nollmann
ST 2025	5011018	Computational Social Science: Topics and positions in the German Parliament (Part 2)	2 SWS	Seminar /	Banisch
Exams					
WT 24/25	7400278	Computer Aided Data Analysis			Nollmann, Teutsch
WT 24/25	7400353	Computer Aided Data Analysis			Nollmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Below you will find excerpts from events related to this course:

Computational Social Science: Topics and positions in the German Parliament (Part 2)

5011018, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
The course consists of two parts (5011018 and 5011002) that are ideally taken in parallel.

Organizational issues
The course consists of two parts (5011018 and 5011002) that are ideally taken in parallel.

See Ilias-course: 5011002 – Computational Social Science: Themen und Positionen im Deutschen Bundestag (Teil 1)

T 5.73 Course: Computer Contract Law [T-INFO-102036]

Responsible: Michael Menk
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2411604	Computer Contract Law	2 SWS	Lecture / 🗣	Menk
Exams					
WT 24/25	7500065	Computer Contract Law			Sattler, Matz
ST 2025	7500066	Computer Contract Law			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Below you will find excerpts from events related to this course:

V Computer Contract Law

2411604, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

Literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

Weiterführende Literatur

Ergänzende Literatur wird in den Vorlesungsfolien angegeben.

T 5.74 Course: Constitution and Properties of Protective Coatings [T-MACH-105150]

Responsible: Prof. Sven Ulrich
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2177601	Constitution and Properties of Protective Coatings	2 SWS	Lecture / 🗣	Ulrich
Exams					
WT 24/25	76-T-MACH-105150	Constitution and Properties of Protective Coatings			Ulrich
ST 2025	76-T-MACH-105150	Constitution and Properties of Protective Coatings			Ulrich

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (about 30 min)

no tools or reference materials

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Constitution and Properties of Protective Coatings

2177601, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

oral examination (about 30 min); no tools or reference materials

Teaching Content:

introduction and overview

concepts of surface modification

coating concepts

coating materials

methods of surface modification

coating methods

characterization methods

state of the art of industrial coating of tools and components

new developments of coating technology

regular attendance: 22 hours
self-study: 98 hours

Transfer of the basic knowledge of surface engineering, of the relations between constitution, properties and performance, of the manifold methods of modification, coating and characterization of surfaces.

Recommendations: none

Organizational issues

Falls die Vorlesung online stattfinden muss, bitte um Anmeldung unter sven.ulrich@kit.edu bis zum 22.10.24.

Den entsprechenden MS Teams Link erhalten Sie dann per E-Mail am 23.10.24.

Literature

Bach, F.-W.: Modern Surface Technology, Wiley-VCH, Weinheim, 2006

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed

T 5.75 Course: Constitution and Properties of Wearresistant Materials [T-MACH-102141]

Responsible: Prof. Sven Ulrich
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	3

Events					
ST 2025	2194643	Constitution and Properties of Wear resistant materials	2 SWS	Lecture / 🗣	Ulrich
Exams					
WT 24/25	76-T-MACH-102141	Constitution and Properties of Wearresistant Materials			Ulrich
ST 2025	76-T-MACH-102141	Constitution and Properties of Wearresistant Materials			Ulrich

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (about 30 min)

no tools or reference materials

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Constitution and Properties of Wear resistant materials
2194643, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The assessment consists of an oral exam (ca. 30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

Teaching Content:

introduction

materials and wear

unalloyed and alloyed tool steels

high speed steels

stellites and hard alloys

hard materials

hard metals

ceramic tool materials

superhard materials

new developments

regular attendance: 22 hours
self-study: 98 hours

Basic understanding of constitution of wear-resistant materials, of the relations between constitution, properties and performance, of principles of increasing of hardness and toughness of materials as well as of the characteristics of the various groups of wear-resistant materials.

Recommendations: none

Organizational issues

Die Blockveranstaltung findet in folgendem Zeitraum statt:

11.06.-13.06.2025: jeweils von 8:00-17:15 Uhr;

Ort: KIT-CN, Geb. 681, Raum 214

Anmeldung verbindlich bis zum 04.06.2025 unter sven.ulrich@kit.edu.

Nach der Anmeldung wird Ihnen im Falle einer Online-Veranstaltung der Link zur Vorlesung per E-Mail am 10.06.2025 mitgeteilt.

Literature

Laska, R. Felsch, C.: Werkstoffkunde für Ingenieure, Vieweg Verlag, Braunschweig, 1981

Schedler, W.: Hartmetall für den Praktiker, VDI-Verlage, Düsseldorf, 1988

Schneider, J.: Schneidkeramik, Verlag moderne Industrie, Landsberg am Lech, 1995

Kopien der Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed

T 5.76 Course: Construction Equipment [T-BGU-101845]

Responsible: Prof. Dr.-Ing. Sascha Gentes
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6243701	Construction Equipment	2 SWS	Lecture / 🗣	Gentes, Dörfler, Schneider
Exams					
WT 24/25	8240101845	Construction Equipment			Gentes, Schneider

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

5.77 Course: Control of Linear Multivariable Systems [T-ETIT-100666]

Responsible: Dr.-Ing. Mathias Kluwe
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101157 - Control Engineering II

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2303177	Control of Linear Multivariable Systems	3 SWS	Lecture / 🗣	Kluwe
WT 24/25	2303179	Control of Linear Multivariable Systems (Tutorial to 2303177)	1 SWS	Practice / 🗣	Fehn
Exams					
WT 24/25	7303177	Control of Linear Multivariable Systems			Kluwe
ST 2025	7303177	Control of Linear Multivariable Systems			Kluwe

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is checked as part of a written overall test (120 minutes) of the course.

Prerequisites
none

Recommendation
For a deeper understanding, basic knowledge of system dynamics and control technology is absolutely necessary, as taught in the ETIT Bachelor module "System Dynamics and Control Technology" M-ETIT-102181.

T 5.78 Course: Control of Mobile Machines [T-MACH-111821]

Responsible: Simon Becker
Prof. Dr.-Ing. Marcus Geimer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	3

Exams			
ST 2025	76-T-MACH-111821	Control of mobile machines	Becker, Geimer

Competence Certificate
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
A prerequisite for participation in the examination is the preparation of a semester report. T-MACH-111820 must be passed.

Workload
120 hours

T 5.79 Course: Control of Mobile Machines – Prerequisites [T-MACH-111820]

Responsible: Simon Becker
Prof. Dr.-Ing. Marcus Geimer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each summer term	1

Exams			
ST 2025	76-T-MACH-111820	Control of mobile machines - Advance	Becker, Geimer

Competence Certificate
Preparation of a report on the completion of the semester task

Prerequisites
none

5.80 Course: Control Technology [T-MACH-105185]

Responsible: Hon.-Prof. Dr. Christoph Gönnheimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	2

Events					
ST 2025	2150683	Control Technology	2 SWS	Lecture / 🗣	Gönnheimer
Exams					
WT 24/25	76-T-MACH-105185	Control Technology			Gönnheimer
ST 2025	76-T-MACH-105185	Control Technology			Gönnheimer

Legend: 📱 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V **Control Technology** — **Lecture (V) On-Site**
2150683, SS 2025, 2 SWS, Language: German, Open in study portal

Content
The lecture control technology gives an integral overview of available control components within the field of industrial production systems.
The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states.
The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems.
The lecture is very practice-oriented and illustrated with numerous examples from different branches.

The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Learning Outcomes:

The students …

- are able to name the electrical controls which occur in the industrial environment and explain their function.
- can explain fundamental methods of signal processing. This involves in particular several coding methods, error protection methods and analog to digital conversion.
- are able to choose and to dimension control components, including sensors and actors, for an industrial application, particularly in the field of plant engineering and machine tools. Thereby, they can consider both, technical and economical issues.
- can describe the approach for projecting and writing software programs for a programmable logic control named Simatic S7 from Siemens. Thereby they can name several programming languages of the IEC 1131.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature
Medien:
Skript zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).

T 5.81 Course: Convex Analysis [T-WIWI-102856]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
ST 2025	2550120	Convex Analysis	2 SWS	Lecture / 🗣	Stein
ST 2025	2550121	Exercises Convex Analysis	2 SWS	Practice / 🗣	Stein, Schwarze
Exams					
ST 2025	7900208_SS2025_HK	Convex Analysis			Stein

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

Below you will find excerpts from events related to this course:

V Convex Analysis
2550120, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Convex Analysis deals with properties of convex functions and convex sets, amongst others with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number a applications which are not covered by techniques from smooth optimization, e.g. approximation problems with respect to the Manhattan or maximum norms, classification problems or the theory of statistical estimates. The lecture develops along another, geometrically intuitive example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introduction to entropic smoothing and convexity
- Global error bounds
- Smoothness properties of convex functions
- The convex subdifferential
- Global Lipschitz continuity
- Descent directions and stationarity conditions

Remark:

Prior to the attendance of this lecture, it is strongly recommend to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

Learning objectives:

The student

- knows and understands the fundamentals of convex analysis,
- is able to choose, design and apply modern techniques of convex analysis in practice.

Literature

- J. Borwein, A. Lewis, Convex Analysis and Nonlinear Optimization: Theory and Examples (2 ed.), Springer, 2006
- S. Boyd, L. Vandenberghe, Convex Optimization, Cambridge University Press, 2004
- O. Güler, Foundations of Optimization, Springer, 2010
- J.-B. Hiriart-Urruty, C. Lemarechal, Fundamentals of Convex Analysis, Springer, 2001
- B. Mordukhovich, N.M. Nam, An Easy Path to Convex Analysis and Applications, Morgan & Claypool Publishers, 2014
- R.T. Rockafellar, Convex Analysis, Princeton University Press, 1970
- R.T. Rockafellar, R.J.B. Wets, Variational Analysis, Springer, Berlin, 1998

T 5.82 Course: Conveying Technology and Logistics [T-MACH-102135]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
WT 24/25	2119100	Fördertechnik und Logistiksysteme		Seminar / On-Site	Furmans
ST 2025	2119100	Fördertechnik und Logistiksysteme		Seminar / On-Site	Furmans
Exams					
WT 24/25	76-T-MACH-102135	Conveying Technology and Logistics			Furmans

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

Prerequisites
none

Workload
90 hours

Below you will find excerpts from events related to this course:

V Fördertechnik und Logistiksysteme
2119100, WS 24/25, SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content
The goal of the seminar is to deal with different topics related to the materials handling and logistics. Depending on the topic, the students can work on the either alone or in a group. At the end the results are presented and discussed with a final presentation. To prepare the work for the seminar an introductory event is scheduled at the beginning.

Organizational issues
Weiteres siehe Homepage

V Fördertechnik und Logistiksysteme
2119100, SS 2025, SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content
The goal of the seminar is to deal with different topics related to the materials handling and logistics. Depending on the topic, the students can work on the either alone or in a group. At the end the results are presented and discussed with a final presentation. To prepare the work for the seminar an introductory event is scheduled at the beginning.

Organizational issues
Ort: Gebäude 50.38, Raum 0.22, Termine siehe homepage

5.83 Course: Cooperative Autonomous Vehicles [T-WIWI-112690]

Responsible: Prof. Dr. Alexey Vinel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2511450	Cooperative Autonomous Vehicles	2 SWS	Lecture /	Vinel
ST 2025	2511451	Exercise Cooperative Autonomous Vehicles	1 SWS	Practice /	Vinel
Exams					
WT 24/25	79AIFB_CAV_A3	Cooperative Autonomous Vehicles			Vinel
ST 2025	79AIFB_CAV_B5	Cooperative Autonomous Vehicles (Registration until 21.07.2025)			Vinel

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The default assessment of this course is a written examination (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None.

Workload
135 hours

T 5.84 Course: Copyright [T-INFO-101308]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	24121	Copyright	2 SWS	Lecture / 🗣	Sattler
Exams					
WT 24/25	7500064	Copyright			Sattler
ST 2025	7500064	Copyright			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites
None.

Recommendation
None.

T 5.85 Course: Corporate Compliance [T-INFO-101288]

Responsible: Andreas Herzig
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2400087	Corporate Compliance	2 SWS	Lecture /	Herzig, Siddiq
Exams					
WT 24/25	7500063	Corporate Compliance			Sattler, Matz
ST 2025	7500063	Corporate Compliance			Sattler

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

5.86 Course: Corporate Risk Management [T-WIWI-109050]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.
Please note that the exam is only offered in the semester of the lecture as well as in the following semester.

Prerequisites
None

Recommendation
None

Annotation
The course will be held again in the summer term 2023 at the earliest. Please pay attention to the announcements on our website.

Workload
135 hours

T 5.87 Course: Critical Information Infrastructures [T-WIWI-109248]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	4

Competence Certificate
The alternative exam assessment consists of

- the preparation of a written elaboration as well as
- an oral examination as part of a presentation of the work.

Details of the grades will be announced at the beginning of the course.

The examination is only offered to first-time students in the winter semester, but can be repeated in the following summer semester.

Prerequisites
None.

Annotation
New lecture from winter semester 2018/2019.

Workload
150 hours

5.88 Course: Current Directions in Consumer Psychology [T-WIWI-111100]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105714 - Consumer Research

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each term	1 terms	2

Events					
WT 24/25	2540441	Current Directions in Consumer Psychology	2 SWS	Others (sons /	Scheibehenne
ST 2025	2540441	Current Directions in Consumer Psychology	2 SWS	Others (sons /	Scheibehenne
Exams					
WT 24/25	7900369	Current Directions in Consumer Psychology			Scheibehenne

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. Grading will be based on a continuous basis throughout the semester.

Prerequisites
Strong interest in research. Students who wish to write a master's thesis at our department will be given priority in the allocation of places.

Annotation
This class covers current research topics at the intersection between Psychology, Consumer Behavior, and Behavioral Economics. Based on weekly reading assignments of current scientific journal publications, students will get a first-hand experience of the ongoing topics and discussions at this exciting and dynamic area of research. The reading list will be announced at the first day of class and will be updated throughout the semester. Grades will be based on weekly participation throughout the semester including short oral presentation of papers in class, active engagement in discussions, and homework assignments. Due to the highly interactive format of this class the number of participants is limited.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Current Directions in Consumer Psychology

2540441, WS 24/25, 2 SWS, Language: English, Open in study portal

Others (sonst.)
Blended (On-Site/Online)

Content
NOTE: sign-up required via the WIWI Portal

This class covers current research topics at the intersection between Psychology, Consumer Behavior, and Behavioral Economics. Based on weekly reading assignments of current scientific journal publications, students will get a first-hand experience of the ongoing topics and discussions at this exciting and dynamic area of research. The reading list will be announced at the first day of class. Grades will be based on continuous participation throughout the semester including short oral presentation of papers in class, active engagement in discussions and homework assignments. This class will be taught in English.

Organizational issues
Participation is restricted to 6 participants. **Please sign up via the WIWI Portal!**

T 5.89 Course: Current Topics on BioMEMS [T-MACH-102176]

Responsible: Prof. Dr. Andreas Guber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101290 - BioMEMS

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	2

Events					
WT 24/25	2143873	Actual topics of BioMEMS	2 SWS	Seminar /	Guber, Ahrens
ST 2025	2143873	Actual topics of BioMEMS	2 SWS	Seminar /	Guber, Ahrens

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
active participation and own presentation (30 Min.)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Actual topics of BioMEMS
2143873, WS 24/25, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Organizational issues
Aktuell werden im Rahmen dieses Seminars nur Vorträge zu Abschlussarbeiten gehalten. Neue Themen nur auf Anfrage.

V Actual topics of BioMEMS
2143873, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content

- Short introduction to the basics of BioMEMS
- Selected aspects of biomedical engineering and life sciences
- Possible micro technical manufacturing processes
- Selected application examples from research and industry

The seminar includes (bio)medical engineering as well as biological and biotechnological topics in the context of engineering sciences

- Use of microtechnical components and systems in innovative medical products
- Use of microfluidic chip systems in applied biology and biotechnology

Organizational issues
Aktuell werden im Rahmen dieses Seminars nur Vorträge zu Abschlussarbeiten gehalten. Neue Themen nur auf Anfrage.

T 5.90 Course: Data Science for Business [T-WIWI-114089]

Responsible: Prof. Dr. Jella Pfeiffer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
WT 24/25	2540473	Business Data Analytics	2 SWS	Seminar / 🗣	Grote, Schulz, Motz
ST 2025	2540466	Data Science for Business (formerly Business Data Analytics: Applications and Tools)	2 SWS	Lecture / 🗣	Pfeiffer
ST 2025	2540467	Exercise Data Science for Business (formerly Business Data Analytics: Applications and Tools)	1 SWS	Practice / 🗣	Gutschow
Exams					
ST 2025	7900183	Data Science for Business			Pfeiffer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, x Cancelled

Competence Certificate
Success is monitored through ongoing elaborations and presentations of tasks and a written exam (60 minutes) at the end of the lecture period. Successful participation in the exercises is a prerequisite for admission to the written examination. The scoring scheme for the overall evaluation will be announced at the beginning of the course.
The number of participants is limited to 50, as this is the only way to ensure conscientious support for the case study. The selection of participants is based on a short letter of motivation (max. 2000 characters including spaces) in the faculty's portal.

Prerequisites
None

Recommendation
Knowledge of programming (particular python) and statistics is helpful.

Annotation
Together with the lecture, there is an exercise which takes place every second week.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Business Data Analytics
Seminar (S) On-Site
2540473, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

V Data Science for Business (formerly Business Data Analytics: Applications and Tools)
Lecture (V) On-Site
2540466, SS 2025, 2 SWS, Language: English, Open in study portal

Content
In the course "Data Science for Business":

- You will learn about essential Data Science methods, including clustering and classification techniques (e.g., random forests, SVMs).
- You will understand process models such as CRISP-DM.
- You will explore different types of data, including eye-tracking data, click data, neurophysiological data, sales data, and other business-related data.
- You will gain skills in data visualization and evaluation using programming languages and software tools.

V

Exercise Data Science for Business (formerly Business Data Analytics: Applications and Tools)

2540467, SS 2025, 1 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
In the course "Data Science for Business":

- You will learn about essential Data Science methods, including clustering and classification techniques (e.g., random forests, SVMs).
- You will understand process models such as CRISP-DM.
- You will explore different types of data, including eye-tracking data, click data, neurophysiological data, sales data, and other business-related data.
- You will gain skills in data visualization and evaluation using programming languages and software tools.

T 5.91 Course: Database Systems and XML [T-WIWI-102661]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	2

Events					
WT 24/25	2511202	Database Systems and XML	2 SWS	Lecture / 🗣	Oberweis
WT 24/25	2511203	Exercises Database Systems and XML	1 SWS	Practice / 🗣	Oberweis, Fritsch
Exams					
WT 24/25	79AIFB_DBX_A4	Database Systems and XML			Oberweis
ST 2025	79AIFB_DBX_A3	Database Systems and XML (Registration until 21.07.2025)			Oberweis

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The examination will be offered for the last time in the winter semester 2025/2026 for first-time students. The last examination opportunity (only for repeaters) is in the summer semester 2026. The assessment takes the form of a written examination (60 minutes) (in accordance with SPO § 4(2)).

Prerequisites
None

Annotation
The lecture will be held for the last time in the winter semester 2024/25.

Below you will find excerpts from events related to this course:

V Database Systems and XML

2511202, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly more important with the emergence of the extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing data base systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

Organisational Note:

We are in the process of transitioning the course "Datenbanksysteme und XML" to English. This semester, the **lecture will be held in German** and the **exercise sessions in English**. We will provide the German exercise materials from last semester as supplementary resources. In the exam, you can give answers in both English and German.

Learning objectives:

Students

- know the basics of XML and generate XML documents,
- are able to use XML database systems and to formulate queries to XML documents,
- know to assess the use of XML in operational practice in different application contexts.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Organizational issues
Liebe Studierende,

wir sind dabei, die Veranstaltung "Datenbanksysteme und XML" auf Englisch umzustellen. In diesem Semester findet die **Vorlesung auf deutsch** statt und die **Übung auf englisch**. Wir werden die deutschen Übungsunterlagen aus dem letzten Semester ergänzend zur Verfügung stellen. In der Klausur können sowohl englische als auch deutsche Antworten gegeben werden.

Viele Grüße
DBXML-Team

Dear Students,

We are in the process of transitioning the course "Datenbanksysteme und XML" to English. This semester, the **lecture will be held in German** and the **exercise sessions in English**. We will provide the German exercise materials from last semester as supplementary resources. In the exam, you can give answers in both English and German.

Best regards,
DBXML Team

Literature

- M. Klettke, H. Meyer: XML & Datenbanken: Konzepte, Sprachen und Systeme. dpunkt.verlag 2003
- H. Schöning: XML und Datenbanken: Konzepte und Systeme. Carl Hanser Verlag 2003
- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- R. Elmasri, S. B. Navathe: Grundlagen der Datenbanksysteme. 2009
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2008

Weitere Literatur wird in der Vorlesung bekannt gegeben.

V **Exercises Database Systems and XML**
2511203, WS 24/25, 1 SWS, Language: German/English, Open in study portal

Practice (Ü)
On-Site

Content
Organisational note:

We are in the process of transitioning the course "Datenbanksysteme und XML" to English. This semester, the **lecture will be held in German** and the **exercise sessions in English**. We will provide the German exercise materials from last semester as supplementary resources. In the exam, you can give answers in both English and German.

Organizational issues
Liebe Studierende,

wir sind dabei, die Veranstaltung "Datenbanksysteme und XML" auf Englisch umzustellen. In diesem Semester findet die **Vorlesung auf deutsch** statt und die **Übung auf englisch**. Wir werden die deutschen Übungsunterlagen aus dem letzten Semester ergänzend zur Verfügung stellen. In der Klausur können sowohl englische als auch deutsche Antworten gegeben werden.

Viele Grüße
DBXML-Team

Dear Students,

We are in the process of transitioning the course "Datenbanksysteme und XML" to English. This semester, the **lecture will be held in German** and the **exercise sessions in English**. We will provide the German exercise materials from last semester as supplementary resources. In the exam, you can give answers in both English and German.

Best regards,
DBXML Team

T 5.92 Course: Data-Driven Algorithms in Vehicle Technology [T-MACH-112126]

Responsible: Dr. Stefan Scheubner
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101265 - Vehicle Development
M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2113840	Data-Driven Algorithms in Vehicle Technology	2 SWS	Lecture / 🧩	Scheubner
Exams					
WT 24/25	7600001	Data-Driven Algorithms in Vehicle Technology			Scheubner
ST 2025	7600001	Data-Driven Algorithms in Vehicle Technology			Scheubner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Written Examination

Duration: 90 minutes

Workload
120 hours

Below you will find excerpts from events related to this course:

V Data-Driven Algorithms in Vehicle Technology

2113840, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Course Syllabus: Data-Driven Algorithms in Vehicle Technology
Motivation for the Course: Nowadays, engineers often develop technical systems using a combination of hard- and software. This is true especially for modern passenger vehicle development. In a digitalized world, such developments are built on knowledge gained from relevant data sources, e.g. the vehicle sensors. Therefore, engineers in automobile technology need qualifications from data science to successfully create new functionalities in the cars. To prevent remaining purely theoretical, the algorithms in this course are explained using a real-world problem of “EV Routing”. Students have the opportunity to test methods in Python with frequent exercises presented.
Goal of the Course: Students have a basic understanding of data-driven algorithms such as Markov Models, Machine Learning or Monte-Carlo Methods. The approach for building data-driven models in automobile technology are known to students and they are able to test algorithms in the programming language “Python”. Furthermore, students have learnt how to analyse the algorithm performance.
Content:
1. Introduction to function development as well as the prerequisites for the course (e.g. Fundamentals for running Python code)
2. Fundamentals for EV Routing and relevant data sources
3. Parameter estimation and state classification algorithms to determine the current situation of the vehicle
4. Learning methods for driver behaviour
5. Forecast algorithms to predict future energy consumption of an electric vehicle

Organizational issues

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Die erste VL am 22.10.24 um 14:00 Uhr findet in Präsenz am Campus Ost, Geb. 70.04, Raum 219 statt.

Alle weiteren Vorlesungsinhalte werden als Videoaufzeichnungen in ILIAS bereit gestellt. In regelmäßigen Abständen wird es Sprechstunden geben. Die genauen Termine erfahren Sie dann über den entsprechenden ILIAS Kurs

5.93 Course: Demand-Driven Supply Chain Planning [T-WIWI-110971]

Responsible: Dr. Iris Heckmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2550510	Demand-Driven Supply Chain Planning		Lecture / 🗣	Heckmann
Exams					
WT 24/25	7900031	Demand-Driven Supply Chain Planning			Heckmann
WT 24/25	7900373	Demand-Driven Supply Chain Planning			Heckmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam.

Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The course is planned to be held every winter term. The planned lectures and courses for the next three years are announced online.

Workload
135 hours

T 5.94 Course: Derivatives [T-WIWI-102643]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101482 - Finance 1
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2530550	Derivatives	2 SWS	Lecture / 🗣	Uhrig-Homburg, Thimme
ST 2025	2530551	Übung zu Derivate	1 SWS	Practice / 🗣	Dinger, Uhrig-Homburg, Thimme
Exams					
WT 24/25	7900051	Derivatives			Uhrig-Homburg
ST 2025	7900111	Derivatives			Uhrig-Homburg

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination or as an open-book examination (alternative exam assessment).

A bonus can be earned by correctly solving at least 50% of the posed bonus exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Derivatives
2530550, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature

- Hull (2012): Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition

Weiterführende Literatur:

Cox/Rubinstein (1985): Option Markets, Prentice Hall

5.95 Course: Design and Development of Mobile Machines [T-MACH-105311]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2113079	Design and Development of Mobile Machines	2 SWS	Lecture / 🗣	Geimer
Exams					
WT 24/25	76-T-MACH-105311	Design and Development of Mobile Machines			Geimer
ST 2025	76-T-MACH-105311	Design and Development of Mobile Machines			Geimer

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

A registration is mandatory, the details will be announced on the webpages of the *Institute of Vehicle System Technology / Institute of Mobile Machines*. In case of too many applications, attendance will be granted based on pre-qualification.

The course will be replenished by interestung lectures of professionals from leading hydraulic companies.

Prerequisites
Required for the participation in the examination is the preparation of a report during the semester. T-MACH-108887 must have been passed.

Recommendation
Knowledge in Fluid Power Systems

Annotation
After completion of the lecture, studens can:

- design working and travel drive train hydraulics of mobile machines and can derive characteristic key factors.
- choose and apply suitable state of the art designing methods succesfully
- analyse a mobile machines and break its structure down from a complex system to subsystems with reduced complexity
- identify and desrcibe interactions and links between subsystems of a mobile maschine
- present and document solutions of a technical problem according to R&D standards

The number of participants is limited.

Conent:

The working scenario of a mobile machine depends strongly on the machine itself. Highly specialised machines, e.g. pavers are also as common as universal machines with a wide range of applications, e.g. hydraulic excavators. In general, all mobile machines are required to do their intended work in an optimal way and satisfy various critera at the same time. This makes designing mobile machines to a great and interesting challenge. Nevertheless, usually key factors can be derived for every mobile machine, which affect all other machine parameters. During this lecture, those key factors and designing mobile machines accordingly will be adressed. To do so, an exemplary mobile machine will be discussed and designed in the lecture an as a semester project.

Literature:

See german recommendations

Workload
120 hours

Below you will find excerpts from events related to this course:

V

Design and Development of Mobile Machines

2113079, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

Wheel loaders and excavators are highly specialized mobile machines. Their function is to detach, pick up and deposit materials near by. Significant size for dimensioning of the machines is the content of their standard shovel. In this lecture the main steps in dimensioning a wheel loader or excavator are beeing thought. This includes among others:

- Defining the size and dimensions,
- the dimensioning of the electric drive train,
- the dimensioning of the primary energy supply,
- Determining the kinematics of the equipment,
- the dimension of the working hydraulics and
- Calculations of strength

The entire design process of these machines is strongly influenced by the use of standards and guidelines (ISO/DIN-EN). Even this aspect is dealt with.

The lecture is based on the knowledge from the fields of mechanics, strength of materials, machine elements, propulsion and fluid technique. The lecture requires active participation and continued collaboration.

Recommendations:

Knowledge in Fluid Technology (SoSe, LV 21093)

- regular attendance: 21 hours
- self-study: 99 hours

Literature

Keine.

5.96 Course: Design and Development of Mobile Machines - Advance [T-MACH-108887]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Jan Siebert

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each term	1

Exams			
WT 24/25	76-T-MACH-108887	Design and Development of Mobile Machines - Advance	Geimer
ST 2025	76-T-MACH-108887	Design and Development of Mobile Machines - Advance	Geimer

Competence Certificate
Preparation of semester report

Prerequisites
none

T 5.97 Course: Design and Operation of Industrial Plants and Processes [T-WIWI-114173]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	1

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

T 5.98 Course: Design Basics in Highway Engineering [T-BGU-106613]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100998 - Design, Construction, Operation and Maintenance of Highways

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6200408	Design Basics in Highway Engineering	2 SWS	Lecture / 🗣	Zimmermann, Stelzenmüller

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.99 Course: Design Thinking [T-WIWI-102866]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2545008	Design Thinking (Track 1)	2 SWS	Seminar / Blended	Terzidis, Malik, Jochem
ST 2025	2545008	Design Thinking (Track 1)	2 SWS	Seminar / On-Site	Osaro, Jochem, Terzidis
Exams					
WT 24/25	7900084	Design Thinking (Track 1)			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessments (§4(2), 3 SPO).

Prerequisites
None

Recommendation
None

Annotation
The seminar content will be published on the website of the institute.

Below you will find excerpts from events related to this course:

V Design Thinking (Track 1)
2545008, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Course Content:

Design Thinking is a user-centric innovation management method. The iterative process first analyzes the problem space and builds a sound understanding of the future users. Subsequently, ideas for the solution are generated, prototypes are created and tested by the user group. The result is a proven and validated product.

Learning Objectives
During the seminar, the students learn basic procedures for achieving user-centric innovations. These are concrete methods that start with the potential user of certain products and services. The method is problem-oriented and emphasizes the specific customer situation. After attending the seminar, the students have a clear understanding of the need to explore end-user needs and are able to independently apply the methods of Design Thinking for developing market-driven innovations at a basic level.

Credentials:

Registration is via the Wiwi portal.

ATTENTION: Creditability in the seminar module: The seminar is NOT credited in the seminar module! Crediting is only possible in the EXPERT MODULE ENTREPRENEURSHIP.

Organizational issues
Registration is via the Wiwi portal.

In the seminar you will work on a project in teams of 4-5 persons. The groups are formed in the seminar

V Design Thinking (Track 1)
2545008, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Content

Design Thinking is a user-centric innovation management method. The iterative process first analyzes the problem space and builds a sound understanding of the future users. Subsequently, ideas for the solution are generated, prototypes are created, and tested by the user group. The result is a proven and validated product.

Learning Objectives

During the seminar, the students learn basic procedures for achieving user-centric innovations. These are concrete methods that start with the potential user of certain products and services. The method is problem-oriented and emphasizes the specific customer situation. After attending the seminar, the students have a clear understanding of the need to explore end-user needs and are able to independently apply the methods of Design Thinking for developing market-driven innovations at a basic level.

Credentials:

ATTENTION: Creditability in the seminar module: The seminar is NOT credited in the seminar module! Crediting is only possible in the EXPERT MODULE ENTREPRENEURSHIP.

Organizational issues

ATTENTION: The seminar will take place outside in the city forest (about 10 minutes by bike from the city center). There will be an indoor option in case of bad weather. Detailed information about the location will be announced later.

Dates:

Mo, 26.05.2025; 09:30 - 17:00
Mo, 30.06.2025; 09:30 - 17:00
Mo, 21.07.2025; 09:00 - 13:00

Registration is via the Wiwi-Portal.

T 5.100 Course: Design Thinking in Practice [T-WIWI-113664]

Responsible: Jennifer Scheydt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Competence Certificate
Non exam assessment consisting of a presentation of the results and a seminar paper (written in the group).

The grade is composed of 70% of the grade for the written work and 30% of the grade for the presentation.

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

Workload
90 hours

T 5.101 Course: Designing Interactive Systems: Human-AI Interaction [T-WIWI-113465]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104068 - Information Systems in Organizations
M-WIWI-104080 - Designing Interactive Information Systems
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2540558	Designing Interactive Systems: Human-AI Interaction	3 SWS	Lecture /	Mädche, Seitz

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-108461 - Interactive Information Systems must not have been started.
2. The course T-WIWI-110851 - Designing Interactive Systems must not have been started.

Annotation
The course is held in english.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Designing Interactive Systems: Human-AI Interaction
2540558, SS 2025, 3 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

Description

Computers have evolved from batch processors towards highly interactive systems. With the rapid progress in the field of artificial intelligence, computers can now learn and adapt to their environment, simulate human intelligence processes as well as support or even take over tasks from humans. This offers great possibilities, but at the same time raises new challenges for the successful design of interactive systems.

The aim of this course is to introduce advanced concepts and theories as well as current practice of designing interactive systems. A specific focus is set on designing AI-based interactive systems for individuals and groups at work ranging from personal productivity assistants to AI-augmented virtual collaboration.

The course is complemented with hands-on exercises and a design capstone project in cooperation with an industry partner. In the project, students in a team effort apply state-of-the-art design methods & techniques and create an interactive system design prototype with a specific focus on human-AI interaction.

Learning objectives

- Explain what interactive systems are and how they can be conceptualized
- Describe the unique characteristics of human-AI interaction and their impact on designing interactive systems
- Understand the human-centered design process and know how to apply corresponding methods and tools
- Understand the concepts and theoretical foundations that guide the design of interactive systems
- Know key concepts, design principles and design methods for contemporary interactive systems focusing on on human-AI interaction
- Get hands-on experience by applying lecture content in a design capstone project

Prerequisites

No specific prerequisites are required for the lecture

Literature

Die Vorlesung basiert zu einem großen Teil auf

· Benyon, D. (2014). Designing interactive systems: A comprehensive guide to HCI, UX and interaction design (3. ed.). Harlow: Pearson.

Weiterführende Literatur wird in der Vorlesung bereitgestellt.

T 5.102 Course: Development of Hybrid Drivetrains [T-MACH-110817]

Responsible: Prof. Dr. Thomas Koch
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134155	Development of Hybrid Powertrains	2 SWS	Lecture / 🗣	Koch, Doppelbauer
Exams					
WT 24/25	76-T-MACH-110817	Development of hybrid drivetrains			Koch
ST 2025	76-T-MACH-110817	Development of hybrid drivetrains			Koch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 1 hour

Prerequisites
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V Development of Hybrid Powertrains
2134155, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Introduction and Goal
2. Alternative Powertrains
3. Fundamentals of Hybrid Powertrains
4. Fundamentals of Electric Components of Hybrid Powertrains
5. Interactions in Hybrid Powertrain Development
6. Overall System Optimization

T 5.103 Course: Development of Sustainable, Digital Business Models [T-WIWI-113663]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2500043	Development of Sustainable Digital Business Models	2 SWS	Seminar / 🗣	Weissenberger-Eibl
Exams					
WT 24/25	7900050	Development of Sustainable Business Models			Weissenberger-Eibl

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Non exam assessment. The final grade is composed 50% of the grade of the written paper (ca. 5 Pages /Person) and 50% of the presentation of the results.

Prerequisites
None

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- Personalentwicklung und Berufliche Ausbildung

Recommendation
Prior attendance of the course Innovation Management is recommended.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Development of Sustainable Digital Business Models

2500043, WS 24/25, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The topic of sustainability is becoming increasingly important for companies in Europe. For example, the demand for sustainable products has risen sharply in many sectors. More and more companies are obliged by guidelines and standards to report on the sustainability of their activities. At the same time, the digital transformation is progressing and offers companies opportunities to implement or communicate their plans digitally. The seminar examines how the topic of sustainability is anchored in the digital business modelling of companies.

Students first learn about the dimensions of business models and sustainability. The seminar then discusses various concepts from the literature that take sustainability into account in business modelling. Students develop their own approach to sustainable digital business modelling and apply it to selected company examples from different sectors. The results are 1) presented and discussed in presentations and 2) recorded in seminar papers.

T 5.104 Course: Digital Democracy [T-WIWI-113160]

Responsible: Jonas Fegert
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-101446 - Market Engineering
M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	00053	Übung zur Digital Democracy	1 SWS	Practice /	Stein
WT 24/25	2500045	Digital Democracy - Challenges and Opportunities of the Digital Society	2 SWS	Seminar /	Fegert, Stein, Bezzaoui, Pekkip
WT 24/25	2600052	Digital Democracy	2 SWS	Lecture /	Fegert
Exams					
WT 24/25	00059	Digital Democracy			Weinhardt

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Alternative exam assessment. The examination consists of two parts (presentation and oral exam). Details on the design of the exam will be announced at the beginning of the course.

Annotation
Limited to 25 students. Application (cover letter) via the Wiwi-portal.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Digital Democracy

2600052, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
The "Digital Democracy" Lecture deals with opportunities and challenges of democracy and participation in a digitalized world. Social networks and other platforms have become a central place for human interaction.

These technologies open up many possibilities to connect people, promote societal discourse, and organize social movements. On the other hand, they are also used to undermine democracy by extremist forces.

One example is the spread of disinformation through social media, which can undermine trust in democratic institutions and exacerbate divisions in society. Big tech actors pursue their own economically driven interests, some of which run counter to societal ones.

So to what extent can Internet platforms help strengthen social discourse? And what measures can be taken to promote the quality and diversity of discourse in the digital world? What role do big tech players play in digital democracy and how can their interests be reconciled with democratic principles? These and many more questions will be explored in the lecture. The lecture introduces theoretical foundations and evidence-based research on digital democracy. It will address the following questions: What characterizes deliberative democracies, how do democracies change, and what can damage them? How does social polarization emerge and what drives it - off- and online. Accordingly, different platform types and phenomena of disinformation, such as clickbait, will be presented. The last part of the lecture series will deal with the search for approaches and alternatives to these problems.

The exercise session connected to this lecture is conducted in cooperation with an NGO and applies the lecture content in a practical context: The formulation of a data-based policy recommendation.

Organizational issues
Die Teilnahme am Kurs ist auf 25 Plätze beschränkt, diese erfolgt über das Wiwi-Portal: https://portal.wiwi.kit.edu/ys/8373

Der Kick-off findet am Fr, 25.10.2024 um 09:00 im 11.40 Seminarraum 231 statt.

T 5.105 Course: Digital Health [T-WIWI-109246]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2511402	Digital Health	2 SWS	Lecture / Blended	Sunyaev, Thiebes, Schmidt-Kraepelin
Exams					
WT 24/25	7900068	Digital Health			Sunyaev

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §4(2),3 of the examination regulation. Details of the grading will be announced at the beginning of the course. The examination is only offered to first-time writers in the winter semester, but can be repeated in the following summer semester.

Prerequisites
None.

Workload
120 hours

T 5.106 Course: Digital Marketing [T-WIWI-112693]

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management
M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2571185	Digital Marketing	2 SWS	Lecture / 🗣	Kupfer
ST 2025	2571186	Digital Marketing Exercise	1 SWS	Practice / 🗣	Kopp
Exams					
ST 2025	7900064	Digital Marketing			Kupfer

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of an examination of another type. The following aspects are included in the assessment:

- Elaboration and presentation of a group task
- Written exam

Further details on the organization of the performance and the points system for the assessment will be announced in the lecture.

Prerequisites
None

Recommendation
Students are highly encouraged to actively participate in class.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Digital Marketing
2571185, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Students learn the theoretical foundations of digital marketing and its most important concepts. They develop an understanding both for the digital consumer and the digital environment. Special emphasis will be given to digital marketing strategies and practices, such as content marketing and influencer marketing. A tutorial offers the opportunity to apply the key learnings of the lecture as part of a group work.

The learning objectives are as follows:

- Getting to know the theoretical foundations of digital marketing
- Evaluating digital marketing strategies and practices (e.g., in the context of content marketing and influencer marketing)
- Fostering critical and analytical thinking skills and the application of knowledge to marketing problems
- Improving English skills

Total time required for 4.5 credit points: approx. 135 hours
Attendance time: 30 hours
Self-study: 105 hours

Organizational issues
Termine werden bekannt gegeben.

T 5.107 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

Responsible: Prof. Dr. Martin Klarmann
Anja Konhäuser

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105312 - Marketing and Sales Management
M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Events					
ST 2025	2571156	Digital Marketing and Sales in B2B	1 SWS	Others (sons /	Konhäuser

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

Prerequisites
None.

Annotation
This course will not take place in the summer term 2023, but is expected to be offered again on a regular basis starting in the summer term 2024.
Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing and Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed.For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu).Please note that only one of the 1.5-ECTS courses can be attended in this module.

Workload
45 hours

Below you will find excerpts from events related to this course:

V Digital Marketing and Sales in B2B

2571156, SS 2025, 1 SWS, Language: English, Open in study portal

Others (sonst.)
On-Site

Content
Learning Sessions:

The class gives insights into digital marketing strategies as well as the effects and potential of different channels (e.g., SEO, SEA, Social Media). After an overview of possible activities and leverages in the digital marketing field, including their advantages and limits, the focus will turn to the B2B markets. There are certain requirements in digital strategy specific to the B2B market, particularly in relation to the value chain, sales management and customer support. Therefore, certain digital channels are more relevant for B2B marketing than for B2C marketing.
Once the digital marketing and tactics for the B2B markets are defined, further insights will be given regarding core elements of a digital strategy: device relevance (mobile, tablet), usability concepts, website appearance, app decision, market research and content management. A major advantage of digital marketing is the possibility of being able to track many aspects of of user reactions and user behaviour. Therefore, an overview of key performance indicators (KPIs) will be discussed and relationships between these KPIs will be explained. To measure the effectiveness of digital activities, a digital report should be set up and connected to the performance numbers of the company (e.g. product sales) – within the course the setup of the KPI dashboard and combination of digital and non-digital measures will be shown to calculate the Return on Investment (RoI).

Presentation Sessions:

After the learning sessions, the students will form groups and work on digital strategies within a case study format. The presentation of the digital strategy will be in front of the class whereas the presentation will take 20 minutes followed by 10 minutes questions and answers.

- Understand digital marketing and sales approaches for the B2B sector
- Recognise important elements and understand how-to-setup of digital strategies
- Become familiar with the effectiveness and usage of different digital marketing channels
- Understand the effect of digital sales on sales management, customer support and value chain
- Be able to measure and interpret digital KPIs
- Calculate the Return on Investment (RoI) for digital marketing by combining online data with company performance data

time of presentness = 15 hrs.

private study = 30 hrs.

Organizational issues
Blockveranstaltung, Raum B5.26, Geb. 10.81, Termine werden noch bekannt gegeben

Literature
-

T 5.108 Course: Digital Services: Innovation & Business Models [T-WIWI-112757]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-101448 - Service Management
M-WIWI-102754 - Service Economics and Management
M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2595468	Digital Services: Innovation & Business Models	1.5 SWS	Lecture / Blended	Satzger, Benz, Schüritz, Heinz
ST 2025	2595469	Übung zu Digital Services: Innovation & Business Models	1.5 SWS	Practice / On-Site	Satzger, Benz, Schüritz, Heinz
Exams					
WT 24/25	7900039	Digital Services: Innovation & Business Models			Satzger
ST 2025	7900163	Digital Services: Innovation & Business Models			Satzger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (60 min.).

Prerequisites
None

Recommendation
None

Annotation
The course "Digital Services: Innovation & Business Models" replaces the course Service Innovation, based on a revised course concept and content. The focus will be on the closer integration of the topics of service innovation and digitalization. Previous foundational content (e.g., on service innovation challenges or human-centered innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Below you will find excerpts from events related to this course:

V Digital Services: Innovation & Business Models
2595468, SS 2025, 1.5 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

Leveraging data and digital technologies for business success is a key challenge for organizations as they need to

- get aware of the newly arising potential
- develop suitable digital services that are user-centric and individualized
- "servitize" their offering portfolio and business model
- transform their organizations

This course will equip students with concepts and methods to tackle this challenge along two dimensions: First, we will cover innovation as a concept as well as apply contemporary innovation methods (like Design Thinking, Open Innovation) to the services space. Second, we deal with leveraging innovation to develop new business models (including multi-partner concepts in platforms or ecosystems), to servitize existing business models (e.g., via product-service-systems), and to accordingly transform the organization.

The course links innovation and business model theories with practical examples and exercises. Students are asked to actively engage in the discussion.

Organizational issues

The course will be offered in the form of a flipped classroom concept. The lecture will be recorded in advance and made available online. During the "in presence" sessions, the contents of the lecture will be applied and expanded on.

Literature

- Böhmann, T./ Leimeister, J.M./ Möslein, K. (2014), Service Systems Engineering, Business & Information Systems Engineering, Vol. 6, No.2, 73-79.
- Cardoso, J., Fromm, H., Nickel, S., Satzger, G., Studer, R., & Weinhardt, C. (Eds.) (2015). Fundamentals of service systems (Vol. 12). Heidelberg: Springer.
- Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. John Wiley & Sons.
- Rogers, S. (2003). Diffusion of Innovations. 5. ed. New York: Free Press.
- Satzger, G., Benz, C., Böhmann, T., Roth, A. (2022). Servitization and Digitalization as Siamese Twins – Concepts and Research Agenda. Edvardsson/Tronvoll (eds.): The Palgrave Handbook of Service Management, 967-989.
- Uebernickel, F., Brenner, W., Pukall, B., Naef, T., & Schindlholzer, B. (2015). Design Thinking: Das Handbuch. Frankfurt am Main: Frankfurter Allgemeine Buch.
- Vargo, S.L., Lusch, R.F. (2017). Service-dominant logic 2025. Int. J. Res. Mark. 34, 46–67.
- Weill, P.; Woerner, S.L. (2018): "What's your Digital Business Model? – Six Questions to Help you Build the Next-Generation Enterprise". Boston, Massachusetts: Harvard Business Review Press.

V **Übung zu Digital Services: Innovation & Business Models**

2595469, SS 2025, 1.5 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content

Leveraging data and digital technologies for business success is a key challenge for organizations as they need to

- get aware of the newly arising potential
- develop suitable digital services that are user-centric and individualized
- "servitize" their offering portfolio and business model
- transform their organizations

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- Cardoso, J., Fromm, H., Nickel, S., Satzger, G., Studer, R., & Weinhardt, C. (Eds.) (2015). Fundamentals of service systems (Vol. 12). Heidelberg: Springer.
- Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. John Wiley & Sons.
- Rogers, S. (2003). Diffusion of Innovations. 5. ed. New York: Free Press.
- Satzger, G., Benz, C., Böhmann, T., Roth, A. (2022). Servitization and Digitalization as Siamese Twins – Concepts and Research Agenda. Edvardsson/Tronvoll (eds.): The Palgrave Handbook of Service Management, 967-989.
- Uebernickel, F., Brenner, W., Pukall, B., Naef, T., & Schindlholzer, B. (2015). Design Thinking: Das Handbuch. Frankfurt am Main: Frankfurter Allgemeine Buch.
- Vargo, S.L., Lusch, R.F. (2017). Service-dominant logic 2025. Int. J. Res. Mark. 34, 46–67.
- Weill, P.; Woerner, S.L. (2018): “What‘s your Digital Business Model? – Six Questions to Help you Build the Next-Generation Enterprise“. Boston, Massachusetts: Harvard Business Review Press.

T 5.109 Course: Digitalization from Product Concept to Production [T-MACH-113647]

Responsible: Dr.-Ing. Marc Wawerla
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2149702	Digitalization from Product Concept to Production	2 SWS	Lecture / 🗣	Wawerla
Exams					
WT 24/25	76-T-MACH-113647	Digitalization from Product Concept to Production			Wawerla

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative test achievement (graded):
- Written processing of a case study (weighting 50%) and
- Presentation of the results (ca. 10 min.) followed by a colloquium (ca. 30 min.), (weighting 50%)

Prerequisites
T-MACH-110176 may not have started.

Annotation
For organisational reasons, the number of participants for the course is limited. As a result, a selection process will take place. Further information for application can be found via: https://www.wbk.kit.edu/english/education.php.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Digitalization from Product Concept to Production
2149702, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.

Main topics of the lecture:

- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS

Learning Outcomes:

The students ...

- are capable to comment on the content covered by the lecture.
- are able to analyze and evaluate the suitability of digitalization technologies in the optical industry.
- are able to assess the applicability of methods such as disruptive innovation and agile project management.
- are able to appreciate the practical challenges to digitalization in industry.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues

Aus organisatorischen Gründen ist die Teilnehmeranzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Weitere Informationen zur Bewerbung sind unter https://www.wbk.kit.edu/studium-und-lehre.php zu finden.

For organisational reasons, the number of participants for the course is limited. As a result, a selection process will take place. Further information for application can be found via:
https://www.wbk.kit.edu/english/education.php.

T 5.110 Course: Digitalization in Facility and Real Estate Management [T-BGU-108941]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105592 - Digitalization in Facility Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	6	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6242907	Digitalization in Facility- and Real Estate Management	4 SWS	Lecture / Practice (/ 🗣	Lennerts, Mitarbeiter/innen
Exams					
WT 24/25	8246108941	Digitalization in Facility and Real Estate Management			Lennerts, Schmidt-Bäumler

Legend: 🖥 Online, ♲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
project work incl. report, appr. 15 pages, and presentation/colloquium, appr. 15 min

Prerequisites
none

Recommendation
none

Annotation
none

Workload
180 hours

T 5.111 Course: Digitization in the Railway System [T-MACH-113016]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106496 - Modern Mobility on Rails and Roads

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	4,5	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	2115920	Railway System Digitalisation	2 SWS	Lecture / 🗣	Jost, Cichon
Exams					
WT 24/25	76-T-MACH-106426	Railway System Digitalisation			Jost

Legend: 🖥 Online, 🔄 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral examination
Duration: approx. 20 minutes
No tools or reference material may be used during the exam.

Workload
135 hours

T 5.112 Course: Dimensioning of Material Flow Systems in Production and Logistics [T-MACH-113950]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each winter term	1 terms	1

Competence Certificate
The assessment (Prüfungsleistung anderer Art) consists of an oral examination and regular and active participation during the course.

Prerequisites
none

Recommendation

- The contents of the Bachelor course Material Flow Systems in Production and Logistics are assumed to be known and are necessary to follow the course.
- Basic statistical knowledge and understanding.
- Knowledge of a common programming language (Java, Python, ...).

Annotation
As part of the inverted classroom model, the theoretical content and exercises are taught entirely online. The face-to-face events on campus are used exclusively to apply the knowledge learnt in realistic scenarios.

Workload
120 hours

5.113 Course: Disassembly Process Engineering [T-BGU-101850]

Responsible: Prof. Dr.-Ing. Sascha Gentes
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	6243803	Dismantling Techniques	2 SWS	Lecture / Practice (/ 🗣	Gentes
Exams					
WT 24/25	8240101850	Disassembly Process Engineering			Gentes
ST 2025	8240101850	Disassembly Process Engineering			Gentes

Legend: 🖥 Online, ⚭ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.114 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible: Hon.-Prof. Dr. Sven Spieckermann
Organisation: KIT Department of Economics and Management
Part of: M-MACH-104888 - Advanced Module Logistics
M-WIWI-102805 - Service Operations
M-WIWI-102832 - Operations Research in Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2550488	Ereignisdiskrete Simulation in Produktion und Logistik	3 SWS	Lecture / 🗣	Spieckermann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written paper and an oral exam of about 30-40 min (alternative exam assessment).

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is planned to be held every summer term.

The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

V Ereignisdiskrete Simulation in Produktion und Logistik
2550488, SS 2025, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

Organizational issues
Den Bewerbungszeitraum finden Sie auf der Veranstaltungswebseite im Lehre-Bereich unter dol.ior.kit.edu

Literature

- Gutenschwager K., Rabe M., Spieckermann S. und S. Wenzel (2017): Simulation in Produktion und Logistik, Springer, Berlin.
- Banks J., Carson II J. S., Nelson B. L., Nicol D. M. (2010) Discrete-event system simulation, 5.Aufl., Pearson, Upper Saddle River.
- Eley, M. (2012): Simulation in der Logistik - Einführung in die Erstellung ereignisdiskreter Modelle unter Verwendung des Werkzeuges "Plant Simulation“, Springer, Berlin und Heidelberg
- Kosturiak, J. und M. Gregor (1995): Simulation von Produktionssystemen. Springer, Wien und New York.
- Law, A. M. (2015): Simulation Modeling and Analysis. 5th Edition, McGraw-Hill, New York usw.
- Liebl, F. (1995): Simulation. 2. Auflage, Oldenbourg, München.
- Noche, B. und S. Wenzel (1991): Marktspiegel Simulationstechnik. In: Produktion und Logistik. TÜV Rheinland, Köln.
- Pidd, M. (2004): Computer Simulation in Management Science. 5th Edition, Wiley, Chichester.
- Robinson S (2004) Simulation: the practice of model development and use. John Wiley & Sons, Chichester
- VDI (2014): Simulation von Logistik-, Materialfluß- und Produktionssystemen. VDI Richtlinie 3633, Blatt 1, VDI-Verlag, Düsseldorf.

T 5.115 Course: Drive Train of Mobile Machines [T-MACH-105307]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2113077	Drive Train of Mobile Machines	2 SWS	Lecture / 🗣	Geimer
WT 24/25	2113078	Exercise Drivetrain of Mobile Machines	1 SWS	Practice / 🗣	Geimer, Bargen-Herzog
Exams					
WT 24/25	76-T-MACH-105307	Drive Train of Mobile Machines			Geimer
ST 2025	76-T-MACH-105307	Drive Train of Mobile Machines			Geimer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The final assessment will be an oral examination (20 min) taking place during the recess period. The examination will be offered in ervery semester and can be repeated at any regular examination date.

Prerequisites
none

Recommendation

- General principles of mechanicals engineering
- Basic knowledge of hydraulics
- Interest in mobile machinery

Annotation
At the end of the lecture, participants can explain the structure and function of all discussed drive trains of mobile machines. They can analyze complex gearbox schematics and synthesize simple transmission functions using rough calculations.

Content:

In this course the different drive trains of mobile machinery will be discussed. The focus of this course is:

- mechanical gears
- torque converter
- hydrostatic drives
- power split drives
- electrical drives
- hybrid drives
- axles
- terra mechanics

Media: projector presentation

Literature: Download of lecture slides from ILIAS. Further literature recommendations during lectures.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Drive Train of Mobile Machines

Lecture (V)
On-Site

2113077, WS 24/25, 2 SWS, Language: German, Open in study portal

Content
In this course will be discussed the different drive train of mobile machinerys. The fokus of this course is:
- improve knowledge of fundamentals
- mechanical gears
- torque converter
- hydrostatic drives
- continuous variable transmission
- eletrical drives
- hybrid drives
- axles
- terra mechanic

Recommendations:

- general basics of mechanical engineering
- basic knowledge in hydraulics
- interest in mobile machines

- regular attendance: 21 hours
- self-study: 89 hours

Literature
Skriptum zur Vorlesung downloadbar über ILIAS

T 5.116 Course: Drying of Dispersions [T-CIWVT-111433]

Responsible: Prof. Dr.-Ing. Heike Karbstein
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each summer term	2

T 5.117 Course: Dynamic Macroeconomics [T-WIWI-109194]

Responsible: Prof. Dr. Johannes Brumm
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-107010 - Economics in a Connected World
M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	4

Events					
WT 24/25	2560402	Dynamic Macroeconomics	2 SWS	Lecture / 🧩	Brumm
WT 24/25	2560403	Übung zu Dynamic Macroeconomics	1 SWS	Practice / 🗣	Hußmann
Exams					
WT 24/25	7900261	Dynamic Macroeconomics			Brumm

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is a written exam (60 min.).

Prerequisites
None.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Dynamic Macroeconomics
2560402, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
This course addresses macroeconomic questions on an advanced level. The main focus of this course is on dynamic programming and its fundamental role in modern macroeconomics. In the first part of the course, the necessary mathematical tools are introduced as well as basic applications in labor economics, economic growth and business cycle analysis. In the second part of the course, these basic models are expanded to incorporate household heterogeneity in various forms: Models of economic inequality to analyze the distributional impact of tax policies and models of overlapping generations to analyze the impact of social security reforms or changes in government debt. Finally, advanced methods based on sparse grids or neural nets are introduced to solve high-dimensional models. The course pursues a hands-on approach so that students not only gain theoretical insights but also learn numerical tools to solve dynamic economic models using the programming language Python.

Literature
Literatur und Skripte werden in der Veranstaltung angegeben.

T 5.118 Course: Dynamic Systems of Technical Logistics [T-MACH-112113]

Responsible: Dr.-Ing. Martin Mittwollen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each summer term	1

Events					
ST 2025	2148605	Dynamic Systems of Technical Logistics	4 SWS	Lecture / Practice (/	Mittwollen

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of an oral exam (approx. 20min) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites
none

Recommendation
Knowledge out of **Basics of Technical Logistics -I** (LV 2117095) preconditioned.

Knowledge out of **Basics of Technical Logistics-II** (LV 2117098) recommended.

Workload
180 hours

Below you will find excerpts from events related to this course:

V Dynamic Systems of Technical Logistics

2148605, SS 2025, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Conveyor technology = motion = dynamics

Insight into the structure, mode of operation, dynamics and safety of materials handling equipment along the process chain of technical logistics from raw material extraction through processing, distribution, storage and order picking to shipping.
Bulk material mining, transport, handling, storage
Stability and tipping safety when turning, slewing, driving cranes
Overhead cranes - structure, dynamics, safety
Conveyors in material handling systems (belt, chain, AGV, EMS, ...)
Elevators - structure, dynamics, safety
Material flow systems - structure, basic elements, information flow
Storage and racking systems - structure, dynamics, order picking
Storage and retrieval systems - structure, dynamics, safety

Organizational issues
DSTL und DSTL-P sind zeitlich so gegliedert, dass zunächst unter Hinzunahme des Donnerstags-Zeitslots für das Projekt ausschließlich der Vorlesungs- und Übungsteil bis ca. Ende Juni gehalten wird. Der anschließende Zeitraum ist ausschließlich für die (optionale) Projektarbeit vorgesehen.

T 5.119 Course: Dynamic Systems of Technical Logistics - Project [T-MACH-112114]

Responsible: Dr.-Ing. Martin Mittwollen
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	1

Events					
ST 2025	2148606	Dynamic Systems of Technical Logistics - Project	2 SWS	Project (P / 🗣	Mittwollen

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Presentation of performed project and defense (30min) according to $4 (2), No. 3 of the examination regulation

Prerequisites
T-MACH-112113 (Dynamic Systems of Technical Logistics) must have been started.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Dynamic Systems of Technical Logistics - Project

2148606, SS 2025, 2 SWS, Language: German, Open in study portal

Project (PRO)
On-Site

Content
Conveyor technology = motion = dynamics
Course content:
The knowledge acquired in the lecture DSTL will be extended and deepened together with the previous knowledge from GTL I/II in the context of an independent project work based on an application case from the current research and project work at IFL. Analyses, research, design work, calculations and simulations are used.

Organizational issues
DSTL und DSTL-P sind zeitlich so gegliedert, dass zunächst unter Hinzunahme des Mittwochs-Zeitslots für die Vorlesung ausschließlich der Vorlesungs- und Übungsteil bis ca. Ende Juni gehalten wird. Der anschließende Zeitraum ist ausschließlich für die (optionale) Projektarbeit vorgesehen.

T 5.120 Course: Economic Decision Making [T-WIWI-114174]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management
M-WIWI-105714 - Consumer Research
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations
M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each winter term	1 terms	1

Competence Certificate
Alternative exam assessment. The grading includes the following aspects:

- a written exam (60 minutes)
- a presentation during the exercise.

The scoring system for the grading will be announced at the beginning of the course.

Prerequisites
Registration via the CAMPUS Portal is required for participation in the Übung. The Übung is a prerequisite for the exam.

Annotation
The judgments and decisions that we make can have long ranging and important consequences for our (financial) well-being and individual health. Hence, the goal of this lecture is to gain a better understanding of how people make judgments and decisions and the factors that influences their behavior. We will look into simple heuristics and mental shortcuts that decision makers use to navigate their environment, in particular so in an economic context. Following this, the lecture will provide an overview into social and emotional influences on decision making. In the second half of the semester we will look into some more specific topics including self-control, nudging, and food choice. The last part of the lecture will focus on risk communication and risk perception. We will address these questions from an interdisciplinary perspective at the intersection of Psychology, Behavioral Economics, Marketing, Cognitive Science, and Biology. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates.
The workload of the class is 4.5 ECTS. This consists of 3 ETCS for the lecture and 1.5 ETCS for the Übung. Details about the Übung will be communicated at the first day of the class.

Workload
135 hours

T 5.121 Course: Economics of Innovation [T-WIWI-112822]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-107010 - Economics in a Connected World
M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2560236	Economics of Innovation	2 SWS	Lecture / 🗣	Ott
ST 2025	2560237	Exercises of Economics of Innovation	1 SWS	Practice / 🗣	Ott, Mirzoyan
Exams					
WT 24/25	7900077	Economics of Innovation			Ott
ST 2025	7900107	Economics of Innovation			Ott

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Below you will find excerpts from events related to this course:

V Economics of Innovation

2560236, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

Learning objectives:

Students shall be given the ability to

- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- understand the relationships between market structure and the development of innovation
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Course content:

The course covers the following topics:

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Exam description:

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature

Auszug:

- Aghion, P., Howitt, P. (2009), The Economics of Growth, MIT Press, Cambridge MA.
- de la Fuente, A. (2000), Mathematical Methods and Models for Economists. Cambridge University Press, Cambridge, UK.
- Klodt, H. (1995), Grundlagen der Forschungs- und Technologiepolitik. Vahlen, München.
- Linde, R. (2000), Allokation, Wettbewerb, Verteilung - Theorie, UNIBUCH Verlag, Lüneburg.
- Ruttan, V. W. (2001), Technology, Growth, and Development. Oxford University Press, Oxford.
- Scotchmer, S. (2004), Incentives and Innovation, MIT Press.
- Tirole, Jean (1988), The Theory of Industrial Organization, MIT Press, Cambridge MA.

T 5.122 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsible: Prof. Dr. Patrick Jochem
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2025	2581006	Efficient Energy Systems and Electric Mobility	2 SWS	Lecture / 🗣	Jochem
Exams					
WT 24/25	7981006	Efficient Energy Systems and Electric Mobility			Fichtner

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Efficient Energy Systems and Electric Mobility
2581006, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.

- Understand the concept of energy efficiency as applied to specific systems
- Obtain an overview of the current trends in energy efficiency
- Be able to determine and evaluate alternative methods of energy efficiency improvement
- Overview of technical and economical stylized facts on electric mobility
- Judging economical, ecological and social impacts through electric mobility

Organizational issues
Termine: 09.05., 23.05., 06.06., 27.06., 11.07., 25.07., 01.08.

Literature
Wird in der Vorlesung bekanntgegeben.

T 5.123 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540454	eFinance: Information Systems for Securities Trading	2 SWS	Lecture / 🗣	Weinhardt
WT 24/25	2540455	Übungen zu eFinance: Information Systems for Securities Trading	1 SWS	Practice / 🗣	Motz, Motz
Exams					
WT 24/25	7900182	eFinance: Information Engineering and Management for Securities Trading			Weinhardt
ST 2025	7900269	eFinance: Information Systems for Securities Trading			Weinhardt

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-102600 - eFinance: Information Engineering and Management for Securities Trading must not have been started.

Annotation
The course"eFinance: Information Systems for Securities Trading" covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.

Workload
135 hours

Below you will find excerpts from events related to this course:

V eFinance: Information Systems for Securities Trading — **Lecture (V) On-Site**
2540454, WS 24/25, 2 SWS, Language: English, Open in study portal

Literature

- Picot, Arnold, Christine Bortenlänger, Heiner Röhrl (1996): "Börsen im Wandel". Knapp, Frankfurt
- Harris, Larry (2003): "Trading and Exchanges - Market Microstructure for Practitioners"". Oxford University Press, New York

Weiterführende Literatur:

- Gomber, Peter (2000): "Elektronische Handelssysteme - Innovative Konzepte und Technologien". Physika Verlag, Heidelberg
- Schwartz, Robert A., Reto Francioni (2004): "Equity Markets in Action - The Fundamentals of Liquidity, Market Structure and Trading". Wiley, Hoboken, NJ

5.124 Course: Electronics and EMC [T-ETIT-100723]

Responsible: Dr. Martin Sack
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101163 - High-Voltage Technology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2307378	Electronics and EMC	2 SWS	Lecture / 🗣	Sack
Exams					
WT 24/25	7307378	Electronics and EMC			Sack
ST 2025	7307378	Electronics and EMC			Sack

Legend: 🖥 Online, 🔄 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.125 Course: Emerging Trends in Digital Health [T-WIWI-110144]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

Workload
135 hours

T 5.126 Course: Emerging Trends in Internet Technologies [T-WIWI-110143]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

Workload
135 hours

5.127 Course: Emissions into the Environment [T-WIWI-102634]

Responsible:	Ute Karl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2581962	Emissions into the Environment	2 SWS	Lecture / On-Site	Karl
Exams					
WT 24/25	7981962	Emissions into the Environment			Schultmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Recommendation
None

Workload
105 hours

Below you will find excerpts from events related to this course:

Emissions into the Environment

2581962, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Emission sources/emission monitoring/emission reduction: The lecture gives an overview of relevant emissions of air pollutants and greenhouse gases, emission monitoring and pollutant abatement options together with relevant legal regulations at national and international level. In addition, the fundamentals of circular economy, waste management and recycling are explained.

Structure:

Air pollution control

- Introduction, terms and definitions
- Sources of air pollutants
- Legal framework of air quality control
- Technical measures to reduce air pollutant emissions

Circular economy, recycling and waste management

- Waste collection and logistics
- Dual systems for packaging waste
- Recycling
- Thermal and biological waste treatment
- Final waste disposal

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.128 Course: Employment Law [T-INFO-111436]

Responsible: Dr. Alexander Hoff
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	24668	Employment Law	2 SWS	Lecture / 🗣	Hoff
Exams					
WT 24/25	7500001	Employment Law			Sattler, Matz
ST 2025	7500082	Employment Law			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.129 Course: Energetic Refurbishment [T-BGU-111211]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Dr.-Ing. Harald Schneider

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction
M-BGU-105592 - Digitalization in Facility Management
M-BGU-106453 - Facility Management in Hospitals for Industrial Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6240903	Energetic Refurbishment	1 SWS	Lecture / 🗣	Kropp, Münzl, Schneider
Exams					
WT 24/25	8240111211	Energetic Refurbishment			Lennerts, Schneider

Legend: 📱 Online, ❁ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
45 hours

T 5.130 Course: Energy and Environment [T-WIWI-102650]

Responsible: Ute Karl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology
M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	2

Events					
ST 2025	2581003	Energy and Environment	2 SWS	Lecture / 🗣	Karl
Exams					
WT 24/25	7900302	Energy and Environment NEW			Karl
WT 24/25	7981003	Energy and Environment			Fichtner

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None.

Workload
105 hours

Below you will find excerpts from events related to this course:

V Energy and Environment
2581003, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The lecture focuses on the environmental impacts arising from fossil fuels use and on the methods for the evaluation of such impacts. The first part of the lecture describes the environmental impacts of air pollutants and greenhouse gases as well as technical measures for emission control. The second part covers methods of impact assessment and their use in environmental communication as well as methods for the scientific support of emission control strategies.

The topics include:

- Fundamentals of energy conversion
- Formation of air pollutants during combustion
- Technical measures to control emissions from fossil-fuel combustion processes
- External effects of energy supply (life cycle analyses of selected energy systems)
- Environmental communication on energy services (e.g. electricity labelling, carbon footprint)
- Integrated Assessment Modelling to support the European Clean Air Strategy
- Cost-effectiveness analyses and cost-benefit analyses for emission control strategies
- Monetary valuation of external effects (external costs)

Literature
Die Literaturhinweise sind in den Vorlesungsunterlagen enthalten (vgl. ILIAS)

T 5.131 Course: Energy and Process Technology I [T-MACH-102211]

Responsible: Prof. Dr.-Ing. Hans-Jörg Bauer
Prof. Dr. Ulrich Maas
Dr.-Ing. Corina Schwitzke
Dr. Amin Velji

Organisation: KIT Department of Mechanical Engineering

Institute of Thermal Turbomachinery

Part of: M-MACH-101296 - Energy and Process Technology I

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each winter term	1

Events					
WT 24/25	2157961	Energy and Process Technology I	6 SWS	Lecture / Practice (/ 🗣	Bauer, Mitarbeiter, Wagner, Maas, Schwitzke, Wirbser, Reichel
Exams					
WT 24/25	76-T-MACH-102211	Energy and Process Technology I			Bauer, Wirbser, Schwitzke, Wagner
ST 2025	76-T-MACH-102211	Energy and Process Technology I			Bauer, Wirbser, Schwitzke, Pritz, Wagner

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
none

Workload
270 hours

Below you will find excerpts from events related to this course:

V Energy and Process Technology I

2157961, WS 24/25, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The last thrid of the lecture deals with the topic **Thermal Turbomachinery**. The basic principles, the functionality and the scope of application of gas and steam tubrines for the generation of electrical power and propulsion technology are addressed.

The students are able to:

- describe and calculate the basic physical-technical processes
- apply the mathematical and thermodynamical description
- reflect on and explain the diagrams and schematics
- comment on diagrams
- explain the functionality of gas and steam turbines and their components
- name the applications of thermal turbomachinery and their role in the field of electricity generation and propulsion technology

T 5.132 Course: Energy and Process Technology II [T-MACH-102212]

Responsible: Prof. Dr. Ulrich Maas
Dr.-Ing. Corina Schwitzke

Organisation: KIT Department of Mechanical Engineering

Institute of Thermal Turbomachinery

Part of: M-MACH-101297 - Energy and Process Technology II

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Events					
ST 2025	2170832	Energy and Process Technology II	6 SWS	Lecture / Practice (/ 🗣	Schwitzke, Pritz, Maas, Wirbser, Schmid
Exams					
WT 24/25	76-T-MACH-102212	Energy and Process Technology II			Schwitzke, Wirbser, Bauer, Wagner
ST 2025	76-T-MACH-102212	Energy and Process Technology II			Wirbser, Schwitzke, Bauer, Pritz, Wagner

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
none

Workload
270 hours

Below you will find excerpts from events related to this course:

V Energy and Process Technology II
2170832, SS 2025, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
Thermal Turbomaschinery - In the first part of the lecture deals with energy systems. Questions regarding global energy resources and their use, especially for the generation and provision of electrical energy, are addressed. Common fossile and nuclear power plants for the centralized supply with electrical power as well as concepts of power-heat cogeneration for the decentralized electrical power supply by means of block-unit heat and power plants, etc. are discussed. Moreover, the characteristics and the potential of renewable energy conversion concepts, such as wind and hydro-power, photovoltaics, solar heat, geothermal energy and fuel cells are compare and evaluated. The focus is on the description of the potentials, the risks and the economic feasibility of the different strategies aimed to protect resources and reduce CO2 emissions.

The students are able to:

- discuss and evaluate energy resources and reserves and their utility
- review the use of energy carriers for electrical power generation
- explain the concepts and properties of power-heat cogeneration, renewable energy conversion and fuel cells and their fields of application
- comment on and compare centralized and decentralized supply concepts
- calculate the potentials, riskis and economic feasibility of different strategies aiming at the protection of resources and the reduction of CO2 emissions
- name and judge on the options for solar energy utilization
- discuss the potential of geothermal energy and its utilization

T 5.133 Course: Energy Efficient Intralogistic Systems [T-MACH-105151]

Responsible: Dr.-Ing. Meike Kramer
Dr. Frank Schönung

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2117500	Energy efficient intralogistic systems	2 SWS	Lecture / 🗣	Kramer, Schönung
Exams					
WT 24/25	76-T-MACH-105151	Energy Efficient Intralogistic Systems			Kramer

Legend: 🖥 Online, ❋ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral, 30 min. examination dates after the end of each lesson period.

Prerequisites
none

Recommendation
The content of course "Basics of Technical Logistics I" (T-MACH-109919) should be known.

Annotation
Visit the IFL homepage of the course for the course dates and/or possible limitations of course participation.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Energy efficient intralogistic systems
2117500, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The content of course "Basics of Technical Logistics" should be knownn.

Literature
Keine.

T 5.134 Course: Energy Market Engineering [T-WIWI-107501]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101411 - Information Engineering
M-WIWI-101446 - Market Engineering
M-WIWI-101451 - Energy Economics and Energy Markets
M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2540464	Energy Market Engineering	2 SWS	Lecture / Blended	Weinhardt, Miskiw
ST 2025	2540465	Übung zu Energy Market Engineering	1 SWS	Practice / On-Site	Semmelmann
Exams					
WT 24/25	7900127	Energy Market Engineering			Weinhardt

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Recommendation
None

Annotation
Former course title until summer term 2017: T-WIWI-102794 "eEnergy: Markets, Services, Systems".

The lecture has also been added in the IIP Module *Basics of Liberalised Energy Markets*.

Below you will find excerpts from events related to this course:

V Energy Market Engineering
2540464, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

The lecture "Energy Market Engineering" addresses the design and analysis of energy markets considering current developments and challenges. A particular focus is on the integration of renewable energies and the associated market mechanisms and regulations.

Specifically, the following topics are covered:

- **Introduction to Market Engineering**: What design elements do markets and specifically auctions have in general, and what influence does this have on participant behavior.
- **Introduction to Energy Markets**: Fundamentals and current trends in the energy system, including climate change and the expansion of renewable energies.
- **Market Design and Products**: Various pricing models such as nodal pricing, zonal pricing, and the structure of capacity markets.
- **Grid Expansion, Distribution Networks, and Flexibility Markets**: Analysis of distribution network markets and the role of flexibility options like demand response and storage technologies.
- **Intermittent Generation and Grid Stability**: Challenges posed by fluctuating renewable energies and strategies to ensure grid stability.
- **Digitalization and Market Transparency**: The role of digitalization in improving market transparency and efficiency, including the use of smart metering systems and data-driven approaches.
- **Current Research Projects and Developments**: Presentation of ongoing research projects and their significance for the future design of energy markets.

Organizational issues

Die Vorlesung findet hybrid statt, mit Videos die während des Semester von den Studierenden eigenständig durchgearbeitet werden und einer Blockveranstaltung im Juli, welche die Vorlesungsinhalte anreichert und vertieft. Mehr Infos in der Auftaktverantsaltung in Präsenz in der ersten Vorlesungswoche.

Literature

- Erdmann G, Zweifel P. *Energieökonomik, Theorie und Anwendungen*. Berlin Heidelberg: Springer; 2007.
- Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX *. *Zeitschrift für Energiewirtschaft*. 2008:147-161.
- Stoft S. *Power System Economics: Designing Markets for Electricity*. IEEE; 2002.,
- Ströbele W, Pfaffenberger W, Heuterkes M. *Energiewirtschaft: Einführung in Theorie und Politik*. 2nd ed. München: Oldenbourg Verlag; 2010:349.

T 5.135 Course: Energy Networks and Regulation [T-WIWI-107503]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2540494	Energy Networks and Regulation	2 SWS	Lecture / 🗣	Rogat, Miskiw
WT 24/25	2540495	Übung zu Energy Networks and Regulation	1 SWS	Practice / 🗣	Rogat, Miskiw
Exams					
WT 24/25	7900198	Energy Networks and Regulation			Weinhardt

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of an oral examination (in accordance with §4(2), 1 SPO).
The examination is offered in the semester of the lecture.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Energy Networks and Regulation — **Lecture (V) On-Site**
2540494, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

Learning Goals

The student,

- understands the business model of a network operator and knows its central tasks in the energy supply system,
- has a holistic overview of the interrelationships in the network economy,
- understands the regulatory and business interactions,
- is in particular familiar with the current model of incentive regulation with its essential components and understands its implications for the decisions of a network operator
- is able to analyse and assess controversial issues from the perspective of different stakeholders.

Content of teaching

The lecture “Energy Networks and Regulation” provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator’s abilities to deal with the massive challenges lying ahead (“Energiewende”, redispatch, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO
- Objectives of regulation: Fair price calculation and high standard access conditions
- The functioning of incentive regulation
- First major amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily?) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

Literature

Linnemann, M. (2024). Energiewirtschaft für (Quer-)Einsteiger: Einmaleins der Stromwirtschaft. Deutschland: Springer Fachmedien Wiesbaden.

Averch, H.; Johnson, L.L (1962). Behavior of the firm under regulatory constraint, in: American Economic Review, 52 (5), S. 1052 – 1069.

Bundesnetzagentur (2006): Bericht der Bundesnetzagentur nach § 112a EnWG zur Einführung der Anreizregulierung nach § 21a EnWG, http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Anreizregulierung/BerichtEinfuehrgAnreizregulierung.pdf?__blob=publicationFile&v=3.

Bundesnetzagentur (2015): Evaluierungsbericht nach § 33 Anreizregulierungsverordnung, https://www.bmwi.de/Redaktion/DE/Downloads/A/anreizregulierungsverordnung-evaluierungsbericht.pdf?__blob=publicationFile&v=1.

Filippini, M.; Wild, J.; Luchsinger, C. (2001) : Regulierung der Verteilnetzpreise zu Beginn der Marktöffnung. Erfahrungen in Norwegen und Schweden, Bundesamt für Energie, Bern, http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/34/066/34066585.pdf.

Gómez, T. (2013): Monopoly Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 151 – 198, Springer-Verlag, London.

Gómez, T. (2013): Electricity Distribution, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 199 – 250, Springer-Verlag, London.

Pérez-Arriaga, I.J. (2013): Challenges in Power Sector Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 647 – 678, Springer-Verlag, London.

Rivier, M.; Pérez-Arriaga, I.J.; Olmos, L. (2013): Electricity Transmission, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 251 – 340, Springer-Verlag, London.

T 5.136 Course: Energy Trading and Risk Management [T-WIWI-112151]

Responsible: N.N.
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	2

Events					
ST 2025	2581020	Energy Trading and Risk Management	2 SWS	Lecture / 🗣	Kraft, Fichtner, Beranek
Exams					
WT 24/25	7981020	Energy Trading and Risk Management			Fichtner

Legend: 🖥 Online, ♲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The lecture "Energiehandel und Risikomanagement" will be held in English under the title "Energy Trading and Risk Management" from the summer semester 2022. The examination for the English-language lecture will be offered in English from the summer semester 2022.
The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment).

Prerequisites
None

Recommendation
None

Workload
105 hours

Below you will find excerpts from events related to this course:

V Energy Trading and Risk Management

2581020, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

1. Introduction to Markets, Mechanisms and Interaction
2. Electricity Trading (platforms, products, mechanisms)
3. Balancing Energy Markets and Congestion Management
4. Coal Markets (reserves, supply, demand, and transport)
5. Investments and Capacity Markets
6. Oil and Gas Markets (supply, demand, trade, and players)
7. Trading Game
8. Risk Management in Energy Trading

Organizational issues
Termine 14-täglich nach Vereinbarung

Literature

Weiterführende Literatur:

Burger, M., Graeber, B., Schindlmayr, G. (2007): *Managing energy risk: An integrated view on power and other energy markets*, Wiley&Sons, Chichester, England

EEX (2010): *Einführung in den Börsenhandel an der EEX auf Xetra und Eurex*, www.eex.de

Erdmann, G., Zweifel, P. (2008), Energieökonomik, Theorie und Anwendungen, Springer, ISBN: 978-3-540-71698-3

Hull, J.C. (2006): *Options, Futures and other Derivatives*, 6. Edition, Pearson Prentice Hall, New Jersey, USA

Borchert, J., Schlemm, R., Korth, S. (2006): *Stromhandel: Institutionen, Marktmodelle, Pricing und Risikomanagement (Gebundene Ausgabe)*, Schäffer-Poeschel Verlag

www.riskglossary.com

T 5.137 Course: Engine Measurement Techniques [T-MACH-105169]

Responsible: Dr.-Ing. Sören Bernhardt
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134137	Engine measurement techniques	2 SWS	Lecture / 🗣	Bernhardt
Exams					
ST 2025	76-T-MACH-105169	Engine Measurement Techniques			Koch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination, Duration: 0,5 hours, no auxiliary means

Prerequisites
none

Recommendation
T-MACH-102194 Combustion Engines I

Workload
120 hours

Below you will find excerpts from events related to this course:

V Engine measurement techniques — **Lecture (V) On-Site**
2134137, SS 2025, 2 SWS, Language: German, Open in study portal

Literature

1. Grohe, H.:Messen an Verbrennungsmotoren
2. Bosch: Handbuch Kraftfahrzeugtechnik
3. Veröffentlichungen von Firmen aus der Meßtechnik
4. Hoffmann, Handbuch der Meßtechnik
5. Klingenberg, Automobil-Meßtechnik, Band C

T 5.138 Course: Engineering Hydrology [T-BGU-108943]

Responsible: PD Dr.-Ing. Uwe Ehret
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6200617	Engineering Hydrology	2 SWS	Lecture / Practice (/	Ehret
Exams					
WT 24/25	8230108943	Engineering Hydrology			Ehret
ST 2025	8230108943	Engineering Hydrology			Ehret

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 5.139 Course: Engineering Interactive Systems: AI & Wearables [T-WIWI-113460]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540420	Engineering Interactive Systems: AI & Wearables	3 SWS	Lecture /	Mädche
Exams					
WT 24/25	7900195	Engineering Interactive Systems: AI & Wearables			Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Annotation
The course is held in English.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Engineering Interactive Systems: AI & Wearables
2540420, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature
Siehe Englische Literatur

T 5.140 Course: Entrepreneurship [T-WIWI-102864]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management
M-WIWI-105010 - Student Innovation Lab (SIL) 1

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each term	1

Events					
WT 24/25	2545001	Entrepreneurship	2 SWS	Lecture / Blended	Terzidis, Dang
ST 2025	2545001	Entrepreneurship	2 SWS	Lecture / Blended	Terzidis, Dang
Exams					
WT 24/25	7900045	Entrepreneurship			Terzidis
WT 24/25	7900229	Entrepreneurship			Terzidis
ST 2025	7900002	Entrepreneurship			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Students are offered the opportunity to earn a grade bonus through separate assignments. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by a maximum of one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the lecture.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Entrepreneurship
2545001, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

The lecture as an obligatory part of the module "Entrepreneurship" introduces the basic concepts of entrepreneurship. Important concepts and empirical facts are presented that relate to the conception and implementation of newly founded companies.

The focus here is on the introduction to methods for generating innovative business ideas, for transferring patents into business concepts and general principles of business modelling and business planning. In particular approaches such as Lean Startup and Effectuation as well as concepts for the financing of young enterprises are treated.

A "KIT Entrepreneurship Talk" is part of each session, in which experienced founder and entrepreneur personalities report on their experiences in practice of the establishment of an enterprise. Dates and speakers will be announced on the EnTechnon homepage.

Learning objectives:

The studentsare introduced to the topic Entrepreneurship. After successful attendance of the meeting they are to have an overview of the subranges of the Entrepreneurships and be able to understand basic concepts of the Entrepreneurships and apply key concepts.

Workload:

Total effort with 3 credit points: approx. 90 hours
Presence time: 30 hours
Pre- and postprocessing of the LV: 45.0 hours
Exam and exam preparation: 15.0 hours

Examination:

The assessment of success takes place in the form of a written examination (60 min.) (according to §4(2), 1 SPO). The grade is the grade of the written exam.

A grade bonus can be earned through successful participation in a case study in the Entrepreneurship lecture. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to 0.3 or 0.4.The bonus only applies if you have passed the exam with at least a 4.0. More details will be provided in the lecture. Participation in the case study is voluntary.

Exam date: tba

Organizational issues

VL findet jeweils Mo, 15:45 - 19:00 an folgenden Terminen statt:
21.10.2024
28.10.2024
04.11.2024
11.11.2024
18.11.2024
25.11.2024
02.12.2024
09.12.2024 (Prep Session 13:30 - 14:30)

Literature

Aulet, Bill (2013): Disciplined Entrepreneurship. 24 Steps to a Successful Startup. Hoboken: Wiley.

R.C. Dorf, T.H. Byers: Technology Ventures – From Idea to Enterprise., (McGraw Hill 2008)

Füglistaller, Urs, Müller, Christoph and Volery, Thierry (2008): Entrepreneurship

Hisrich, Robert D.; Ramadani, Veland (2017): Effective entrepreneurial management. Strategy, planning, risk management, and organization. Cham, Switzerland: Springer.

Ries, Eric (2011): The Lean Startup.

Osterwalder, Alexander (2010): Business Model Generation.

V **Entrepreneurship**
2545001, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

The lecture as a compulsory part of the module "Entrepreneurship" introduces the basic concepts of entrepreneurship. Important concepts and empirical facts are introduced, which relate to the conception and implementation of newly founded companies.

The focus here is on introducing methods for generating innovative business ideas, translating patents into business concepts, and general principles of business modeling and business planning. In particular, approaches such as Lean-Startup and Effectuation as well as concepts for financing young companies are covered.

A "KIT Entrepreneurship Talk" is part of each session, in which experienced founder and entrepreneur personalities report on their experiences in the practice of the establishment of an enterprise. Dates and speakers will be announced on the EnTechnon homepage.

Learning objectives:

The students will be introduced to the topic of entrepreneurship. After successful attendance of the course they should have an overview of the sub-areas of entrepreneurship and be able to understand basic concepts of entrepreneurship and apply key concepts.

Workload:

The total effort with 3 credit points: approx. 90 hours
Presence time: 30 hours
Pre- and postprocessing of the LV: 45.0 hours
Exam and exam preparation: 15.0 hours

Examination:

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation)

A grade bonus can be earned by successfully participating in a case study as part of the Entrepreneurship lecture. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to 0.3 or 0.4. The bonus only applies if you have passed the exam with at least a 4.0. More details will be provided in the lecture. Participation in the case study is voluntary.

Exam dates: tbd

Organizational issues

VL findet jeweils Di, 15:45 - 19:00 an folgenden Terminen statt:

22.04.2025
29.04.2025
06.05.2025
13.05.2025
20.05.2025
27.05.2025
03.06.2025 (inkl. Prep Session)

17.06.2025 (Klausur)

Literature

Füglistaller, Urs, Müller, Christoph und Volery, Thierry (2008): Entrepreneurship

Ries, Eric (2011): The Lean Startup

Osterwalder, Alexander (2010): Business Model Generation

Aulet, Bill (2013): Disciplined Entrepreneurship. 24 Steps to a Successful Startup. Hoboken: Wiley.

R.C. Dorf, T.H. Byers: Technology Ventures – From Idea to Enterprise., (McGraw Hill 2008)

Hisrich, Robert D.; Ramadani, Veland (2017): Effective entrepreneurial management. Strategy, planning, risk management, and organization. Cham, Switzerland: Springer.

T 5.141 Course: Entrepreneurship Research [T-WIWI-102894]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2025	2545002	Entrepreneurship Research	2 SWS	Seminar / 🗣	Malik

Legend: 🖥 Online, ❀ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The performance review is done via a so called other methods of performance review (term paper) (alternative exam assessment). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar.

Prerequisites
None

Recommendation
None

Annotation
The topics will be prepared in groups. The presentation of the results is done during a a block period seminar at the end of the semester. Students have to be present all day long during the seminar.

Below you will find excerpts from events related to this course:

V Entrepreneurship Research

2545002, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Content

In this course, the students choose from various relevant and current research topics in entrepreneurship and independently develop a topic that suits them in small teams. Initially, there is an introduction to standard methods such as systematic literature review, design science, qualitative and quantitative data analysis, and more. The seminar topic must be scientifically prepared and presented in 15-20 pages as part of a written elaboration. The seminar results are presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives

The foundations of independent scholarly work (literature review, argumentation + discussion, citation of literature sources, application of qualitative, quantitative, and simulation methods) are developed as part of the written elaboration. The competencies acquired in the seminar can be utilized in preparing for a potential master's thesis. Therefore, the seminar is mainly aimed at students who intend to write their thesis at the Chair of Entrepreneurship and Technology Management and wish to gain substantial experience in entrepreneurship research.

Organizational issues
Thursday, 08.05.2025, 10.00-16.00
Thursday, 05.06.2025, 10.00-16.00
Thursday, 10.07.2025, 09.00-12.00

Registration is via the Wiwi-Portal.

Literature
Will be announced in the seminar.

T 5.142 Course: Entrepreneurship Seasonal School [T-WIWI-113151]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2500215	Entrepreneurship Seasonal School	2 SWS	Block /	Weimar
Exams					
WT 24/25	7900146	Entrepreneurship Seasonal School			Terzidis

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The grade is composed of the presentation and the written elaboration. Details on the design of the examination will be announced in the course.

Prerequisites
The Seasonal School is intended for advanced bachelor's and all master's students (all disciplines). Participation in the selection process is a prerequisite.

Recommendation
Basic knowledge of business administration, attendance of the lecture Entrepreneurship as well as openness and interest in intercultural exchange are recommended. Solid knowledge of the English language is an advantage.

Annotation
Entrepreneurship Seasonal School

Workload
90 hours

Below you will find excerpts from events related to this course:

V Entrepreneurship Seasonal School

2500215, WS 24/25, 2 SWS, Language: English, Open in study portal

Block (B)
On-Site

Content

During the Entrepreneurship Seasonal School, students develop a business model based on innovative technologies and social problems in workshops in international teams for one week.

Course Content:

The Entrepreneurship Seasonal School brings together students from different universities to spend a week strengthening their knowledge of digital entrepreneurship in healthcare. Experience the life of an entrepreneur and learn how to attain resources to realize a product vision. During one week, you will develop a range of entrepreneurial competences crucial for establishing a successful venture. Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. By gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

In WS 2023/24 the one-week program is being hosted by the Karlsruhe Institute of Technology, with co-teaching support from the Eucor partners University of Basel and the University of Strasbourg.

In the seminar you will work on a project in teams of max. 5 persons.

Learning Objectives:

After attending the event, you will be able to...

- describe the role of entrepreneurship
- develop innovative and technology-based solutions for societal problems,
- develop a viable business model for a problem,
- present a business idea to a panel of judges,
- and be empowered to work independently in multidisciplinary and multicultural teams

Organizational issues

Expected date: 17.02.25 – 21.02.25, Details will be announced later. Registration via wiwi portal.

T 5.143 Course: Environmental and Resource Policy [T-WIWI-102616]

Responsible: Rainer Walz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2560548	Environmental and Ressource Policy	2 SWS	Lecture / Practice (	Walz
Exams					
WT 24/25	7900252	Environmental and Resource Policy			Walz

Competence Certificate
See German version

Recommendation
It is recommended to already have knowledge in the area of industrial organization and economic policy. This knowledge may be acquired in the courses*Introduction to Industrial Organization* [2520371] and*Economic Policy*[2560280].

Below you will find excerpts from events related to this course:

V Environmental and Ressource Policy

Lecture / Practice (VÜ)

2560548, SS 2025, 2 SWS, Language: German, Open in study portal

Literature
Weiterführende Literatur:

Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg
OECD: Environmental Performance Review Germany, Paris

T 5.144 Course: Environmental Communication [T-BGU-101676]

Responsible: Dr. rer. nat. Charlotte Kämpf
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each term	1 terms	2

Events					
WT 24/25	6224905	Environmental Communication	2 SWS	Seminar / 🗣	Kämpf
ST 2025	6224905	Environmental Communication	2 SWS	Seminar / 🗣	Kämpf
Exams					
WT 24/25	8244101676	Environmental Communication			Kämpf

Legend: 🖥 Online, ♻ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Non exam assessment (following §4(2), 3 of the examination regulation).

Prerequisites
Examination Prerequisite Environmental Communication must be passend.

Recommendation
None

Annotation
none

Workload
135 hours

T 5.145 Course: Environmental Economics and Sustainability [T-WIWI-102615]

Responsible: Prof. Dr. Rainer Walz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2521547	Umweltökonomik und Nachhaltigkeit (mit Übung)	2 SWS	Lecture / Practice (	Walz
Exams					
WT 24/25	7900250	Environmental Economics and Sustainability			Walz

Competence Certificate
See German version

Prerequisites
None

Recommendation
It is recommended to already have knowledge in the area of macro- and microeconomics. This knowledge may be acquired in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014].

Workload
90 hours

T 5.146 Course: Environmental Law [T-BGU-111102]

Responsible: Dr. Urich Smeddinck
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6111177	Environmental Law	2 SWS	Lecture / 🗣	Smeddinck
Exams					
WT 24/25	8262111102_1	Environmental Law			Smeddinck
WT 24/25	8262111102_2	Environmental Law			Smeddinck

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam with 120 min

Prerequisites
None

Annotation
None

Workload
90 hours

T 5.147 Course: EU Data Protection Law [T-INFO-113887]

Responsible: Gustavo Gil Gasiola
Organisation: KIT Department of Informatics
Part of: M-INFO-106754 - Public Economic and Technology Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2424019	EU Data Protection Law	2 SWS	Lecture / 🗣	Gil Gasiola
Exams					
WT 24/25	7500378	EU Data Protection Law			Zufall

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites
None

Annotation
Competency Goals:

Students are able to comprehend the EU data protection regulation, including the General Data Protection Regulation and related EU data regulations.

They know the foundations of data protection rules, including fundamental concepts (e.g., “personal data”, “processing”, “data subject”). They are also familiar with the principles of personal data processing (lawfulness, limited purpose, transparency, accountability) as well as the rights of the data subject.

They can identify the main obligations of the controller and the processor.

Students understand the conditions for the transfer of personal data to third countries.

They can identify the other regulations that govern data in the European Union.

Students are able to read and understand legal text related to data regulation.

They can understand and solve simple data protection cases.

Content:

The General Data Protection Regulation (GDPR) of the European Union is a milestone in protecting individuals from the unlawful use of their data. In a data-driven society, economy, and government, this protection has become essential to guarantee fundamental rights. In addition to its direct impact on the legal systems of all Member States, the GDPR has a major influence on third countries that have adopted similar regulations (e.g. Switzerland, Argentina, Brazil, South Africa, and many others). In this way, the EU Data Protection Regulation has established itself as the “gold standard” of data protection, providing guidance to address the challenges posed by new technologies and new ways of creating, using and sharing personal data. Understanding the structure of data protection in the EU is therefore essential to grasp its impact on individual rights, public administration, business models, and even technological development.
This lecture aims to provide a structured overview of the EU Data Protection Regulation, and to offer tools to understand the regulatory structure of the EU Data Regulation. The lecture will cover the following topics:

- Introduction to EU law
- Development of the EU data protection regulation
- Legal structure of data protection in the EU
- Role of national and sectoral laws
- Data protection as fundamental right
- Principles of data protection
- Lawfulness of personal data processing
- Anonymization and pseudonymization of personal data
- Special categories of personal data
- Rights of the data subject
- Transfer of personal data to third countries
- Responsibility of the controller and the processor
- Security of personal data and personal data breach
- Open Data Directive
- Data Governance Act
- Data Act

Workload

- Attendance time to the lectures = 15 x 90 min = 22 h 30 min
- Self-study during the semester = 47 h 30 min
- Preparation for the exam = 20 h
- Total = 90 h

Below you will find excerpts from events related to this course:

V	**EU Data Protection Law** 2424019, WS 24/25, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **On-Site**

Content
Module:

EU Data Protection Law

Module Responsible:

Dr. iur. Gustavo Gil Gasiola

Program of Study:

Master **Business Informatic (Wirtschaftsinformatik)**

Area of Specialization
Wahlpflichtbereich
For Master modules only

Recurrence

Each winter term
Duration
One term
Academic Level
1 - 4:
Level 4: Master Program of Study
Credit points = ECTS
3 ECTS
We usually have a module for each course (lecture, seminar, practical course).
Language:

English

Competency Goals:
Students are able to comprehend the EU data protection regulation, including the General Data Protection Regulation and related EU data regulations.

They know the foundations of data protection rules, including fundamental concepts (e.g., “personal data”, “processing”, “data subject”). They are also familiar with the principles of personal data processing (lawfulness, limited purpose, transparency, accountability) as well as the rights of the data subject.

They can identify the main obligations of the controller and the processor.

Students understand the conditions for the transfer of personal data to third countries.

They can identify the other regulations that govern data in the European Union.

Students are able to read and understand legal text related to data regulation.

They can understand and solve simple data protection cases.

Content:

The General Data Protection Regulation (GDPR) of the European Union is a milestone in protecting individuals from the unlawful use of their data. In a data-driven society, economy, and government, this protection has become essential to guarantee fundamental rights. In addition to its direct impact on the legal systems of all Member States, the GDPR has a major influence on third countries that have adopted similar regulations (e.g. Switzerland, Argentina, Brazil, South Africa, and many others). In this way, the EU Data Protection Regulation has established itself as the “gold standard” of data protection, providing guidance to address the challenges posed by new technologies and new ways of creating, using and sharing personal data. Understanding the structure of data protection in the EU is therefore essential to grasp its impact on individual rights, public administration, business models, and even technological development.

This lecture aims to provide a structured overview of the EU Data Protection Regulation, and to offer tools to understand the regulatory structure of the EU Data Regulation. The lecture will cover the following topics:

- Introduction to EU law
- Development of the EU data protection regulation
- Legal structure of data protection in the EU
- Role of national and sectoral laws
- Data protection as fundamental right
- Principles of data protection
- Lawfulness of personal data processing
- Anonymization and pseudonymization of personal data
- Special categories of personal data
- Rights of the data subject
- Transfer of personal data to third countries
- Responsibility of the controller and the processor
- Security of personal data and personal data breach
- Open Data Directive
- Data Governance Act
- Data Act

Workload

- Attendance time to the lectures = 15 x 90 min = 22 h 30 min
- Self-study during the semester = 47 h 30 min
- Preparation for the exam = 20 h
- Total = 90 h

Annotation:

Prerequisites:

Competency certificate:

The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

If the assessment is an examination of another type, the deadline for redraw must be set. These partial achievements can only be repeated once and are to be graded.

Course works are not graded and can be repeated indefinitely, if not otherwise specified.

Recommendations:

Organizational issues

Diese Vorlesung findet immer Montags von 13:00 - 14:30 Uhr im Seminarraum Nr. 313 in der Vinenz-Prießnitz-Straße 3, in KA, statt.

This lecture finds place every Monday from 13:00 to 14:30 h in our seminar room no 313, Vincenz-Prießnitz-Straße 3, in Karlsruhe.

T 5.148 Course: European and International Law [T-INFO-101312]

Responsible: Ulf Brühann
Organisation: KIT Department of Informatics
Part of: M-INFO-106754 - Public Economic and Technology Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	24666	Europäisches und Internationales Recht	2 SWS	Lecture / 🗣	Brühann
Exams					
WT 24/25	7500048	European and International Law			Zufall
ST 2025	7500084	European and International Law			Zufall

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Below you will find excerpts from events related to this course:

V Europäisches und Internationales Recht

24666, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The course will be held in German.
The total workload for this course unit is 90 hours for 3 credit points, of which 22.5 hours are spent in attendance.

Organizational issues
Die drei folgenden Blockveranstaltungen finden jeweils im Seminarraum Nr. 313 (Geb. 07.08) statt:

Montag, den 28.04.2025, 09:30 - 17:00 (Mittagspause wird flexibel gehalten)

Montag, den 02.06.2025, 09:30 - 17:00 (Mittagspause wird flexibel gehalten)

Montag, den 07.07.2025, 09:30 - 17:00 Uhr (Mittagspause wird flexibel gehalten).

Literature
Literatur wird in der Vorlesung angegeben.
Weiterführende Literatur
Erweiterte Literaturangaben werden in der Vorlesung bekannt gegeben.

T 5.149 Course: Examination Prerequisite Environmental Communication [T-BGU-106620]

Responsible: Dr. rer. nat. Charlotte Kämpf
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	0	pass/fail	Each term	1 terms	1

Events					
WT 24/25	6224905	Environmental Communication	2 SWS	Seminar / 🗣	Kämpf
ST 2025	6224905	Environmental Communication	2 SWS	Seminar / 🗣	Kämpf
Exams					
WT 24/25	8244106620	Examination Prerequisite Environmental Communication			Kämpf

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
2 literature annotations, appr. 150 words each, and
short presentation, appr. 10 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
45 hours

T 5.150 Course: Excursions: Membrane Technologies [T-CIWVT-110864]

Responsible: Prof. Dr. Harald Horn
Dr.-Ing. Florencia Saravia

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101122 - Water Chemistry and Water Technology II

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each summer term	1

Events					
ST 2025	2233011	Membrane Technologies in Water Treatment - Excercises	1 SWS	Practice /	Horn, Saravia, und Mitarbeitende
Exams					
ST 2025	7233011	Excercises for Membrane Technologies			Horn, Saravia

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

T 5.151 Course: Excursions: Water Supply [T-CIWVT-110866]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101121 - Water Chemistry and Water Technology I

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1	pass/fail	Each winter term	1

Exams			
WT 24/25	7232006	Excursions: Water Supply	Horn, Hille-Reichel

5.152 Course: Exercise Transportation Data Analysis [T-BGU-113671]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	0	pass/fail	Each winter term	1 terms	1

Events					
WT 24/25	6232901	Empirical Data in Transportation	2 SWS	Lecture / Practice (/ 🗣	Kagerbauer
Exams					
WT 24/25	8245113671	Exercise Transportation Data Analysis			Kagerbauer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Exercise to qualitative and quantitative analyses of travel surveys, appr. 2 pages

Prerequisites
none

Recommendation
none

Annotation
none

Workload
10 hours

T 5.153 Course: Exercise Transportation Data Analysis [T-BGU-113971]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Completed coursework	0	pass/fail	Each summer term	1 terms	1

Events					
ST 2025	6232802	Traffic Management and Telematics	2 SWS	Lecture / Practice (/	Vortisch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
programming exercise with Python

Prerequisites
none

Recommendation
none

Annotation
will be offered newly as examination prerequisite as from summer term 2025

Workload
10 hours

5.154 Course: Exercises in Civil Law [T-INFO-102013]

Responsible: Dr. Yvonne Matz
Organisation: KIT Department of Informatics
Part of: M-INFO-101191 - Commercial Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each term	3

Events					
WT 24/25	2424011	Commercial and Corporate Law	2 SWS	Lecture / 🗣	Danek
WT 24/25	2424017	Exercises in Civil Law	2 SWS	Lecture / 🗣	Sattler
ST 2025	24504	Advanced Civil Law	2 SWS	Lecture / 🗣	Matz
ST 2025	24506	Exercises in Civil Law	2 SWS	Lecture / 🗣	Sattler, Bosbach
ST 2025	24926	Case Studies in Civil Law	2 SWS	Practice / 🗣	Bosbach
Exams					
WT 24/25	7500108	Commercial Law			Sattler
ST 2025	7500093	Wirtschaftsprivatrecht			Sattler

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None.

T 5.155 Course: Experimental Economics [T-WIWI-102614]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101505 - Experimental Economics
M-WIWI-103118 - Data Science: Data-Driven User Modeling
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540489	Experimental Economics	2 SWS	Lecture / 🗣	Knierim
WT 24/25	2540493	Übung zu Experimental Economics	1 SWS	Practice / 🗣	del Puppo
Exams					
WT 24/25	7900096	Experimental Economics			Weinhardt

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min).

Prerequisites
None

Annotation
The lecture will be taught in English.

Below you will find excerpts from events related to this course:

V Experimental Economics
2540489, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2. Aufl. 2006.
- Handbook of Experimental Economics; J. Kagel, A. Roth; Princeton University Press, 1995.
- Experiments in Economics; J.D. Hey; Blackwell Publishers, 1991.
- Experimental Economics; D.D. Davis, C.A. Holt; Princeton University Press, 1993.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.

T 5.156 Course: Experimental Lab Class in Welding Technology, in Groups [T-MACH-102099]

Responsible: Dr.-Ing. Stefan Dietrich
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each winter term	3

Events					
WT 24/25	2173560	Welding Lab Course, in groupes	3 SWS	Practical course / 🗣	Dietrich, Schulze
Exams					
WT 24/25	76-T-MACH-102099	Experimental Lab Class in Welding Technology, in Groups			Dietrich

Legend: 🖥 Online, ✥ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Lab Course Report

Annotation
The lab takes place at the beginning of the winter semester break once a year. The registration is possible during the lecture period via iam-wk-lehre@iam.kit.edu at the IAM – WK. The lab is carried out in the Handwerkskammer Karlsruhe.

You need sturdy shoes and long clothes!

Workload
120 hours

Below you will find excerpts from events related to this course:

V Welding Lab Course, in groupes
2173560, WS 24/25, 3 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
The lab takes place at the beginning of the winter semester break once a year. The registration is possible during the lecture period in the secretariat of the Institute of Applied Materials (IAM – WK). The lab is carried out in the Handwerkskammer Karlsruhe.

learning objectives: The students are capable to name a survey of current welding processes and their suitability for joining different metals. The students can evaluate the advantages and disadvantages of the individual procedures. The students have weld with different welding processes.

requirements:

You need sturdy shoes and long clothes!

workload:

regular attendance: 31,5 hours
preparation: 8,5 hours
lab report: 80 hours

Organizational issues

Die Anmeldung erfolgt durch den Beitritt in den ILIAS-Kurs.

Die Lehrveranstaltung "Experimentelles schweißtechnisches Praktikum" findet dieses Jahr wieder in der Woche vom 03.-07. März 2025 statt. Der Veranstaltungsort ist die

Bildungsakademie Handwerkskammer Karlsruhe
Hertzstr. 177
76187 Karlsruhe

Die Gruppeneinteilung in die beiden Gruppen findet Anfang Februar statt!

- Gruppe 1. Montag 7.30 Uhr bis Mittwoch 12.00 Uhr
- Gruppe 2. Mittwoch 13.00 Uhr bis Freitag 15.00 Uhr

Sollte aufgrund anderer LV oder Prüfungen für Sie nur eine der beiden Gruppen in Frage kommen, melden Sie sich bitte rechtzeitig unter iam-wk-lehre@iam.kit.edu

Bitte bringen Sie festes und geschlossenes Schuhwerk (optimalerweise Arbeitsschuhe) und lange und entbehrliche Hosen sowie Oberteile mit, da wir uns die Hände schmutzig machen und mit flüssigem, umherfliegendem Metall konfrontiert sein werden. Für die Mittagspause können Sie sich selbst versorgen oder auch in der Mensa der Bildungsakademie essen.

Literature

wird im Praktikum ausgegeben

T 5.157 Course: Extraordinary Additional Course in the Module Cross-Functional Management Accounting [T-WIWI-108651]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment depends on which extraordinary course becomes part of the module "Cross-Functional Management Accounting".

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Prerequisites
None

Annotation
The pupose of this placeholder is to make it possible zu include an extraordinary course in the module "Cross-Functional Management Accounting". Proposals for specific courses have to be approved in advance by the module coordinator.

T 5.158 Course: Extrusion Technology in Food Processing [T-CIWVT-112174]

Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering
M-CIWVT-101120 - Principles of Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2211310	Extrusion Technology in Food Processing	2 SWS	Lecture / 🗣	Emin
Exams					
WT 24/25	7200062	Extrusion Technology in Food Processing			Emin
ST 2025	7211310	Extrusion Technology in Food Processing			Emin

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an oral exam lasting about 20 minutes.

Prerequisites
None.

T 5.159 Course: Fabrication Processes in Microsystem Technology [T-MACH-102166]

Responsible: Dr. Klaus Bade
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	1

Events					
WT 24/25	2143882	Fabrication Processes in Microsystem Technology	2 SWS	Lecture / Blended	Bade
ST 2025	2143882	Fabrication Processes in Microsystem Technology	2 SWS	Lecture / On-Site	Bade
Exams					
WT 24/25	76-T-MACH-102166	Fabrication Processes in Microsystem Technology			Bade

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral examination, 20 minutes

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Fabrication Processes in Microsystem Technology
2143882, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature
M. Madou
Fundamentals of Microfabrication

CRC Press, Boca Raton, 1997

W. Menz, J. Mohr, O. Paul

Mikrosystemtechnik für Ingenieure

Dritte Auflage, Wiley-VCH, Weinheim 2005

L.F. Thompson, C.G. Willson, A.J. Bowden
Introduction to Microlithography
2nd Edition, ACS, Washington DC, 1994

V Fabrication Processes in Microsystem Technology
2143882, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The lecture offers an advanced understanding of manufacturing processes in microsystem technology. Basic aspects of microtechnological processing will be introduced. With examples from semiconductor microfabrication and microsystem technology the base processing steps for conditioning and finishing, patterning, removal are imparted. Nano-patterning is covered is also included and the micro-nano interface is discussed. By the help of typical processing steps elementary mechanisms, process execution, and equipment are explained. Additionally quality control, process control and environmental topics are included

Literature

M. Madou
Fundamentals of Microfabrication

CRC Press, Boca Raton, 1997

W. Menz, J. Mohr, O. Paul

Mikrosystemtechnik für Ingenieure

Dritte Auflage, Wiley-VCH, Weinheim 2005

L.F. Thompson, C.G. Willson, A.J. Bowden
Introduction to Microlithography
2nd Edition, ACS, Washington DC, 1994

T 5.160 Course: Facility and Real Estate Management II [T-BGU-111212]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-105592 - Digitalization in Facility Management
M-BGU-106453 - Facility Management in Hospitals for Industrial Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6242909	Facility and Real Estate Management II	1 SWS	Lecture / 🗣	Lennerts
Exams					
WT 24/25	8240111212	Facility and Real Estate Management II			Lennerts, Schmidt-Bäumler

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
45 hours

T 5.161 Course: Facility Management in Hospitals [T-BGU-108004]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106453 - Facility Management in Hospitals for Industrial Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	6	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6242905	Facility Management in Hospitals	4 SWS	Lecture / Practice (/ 🗣	Lennerts, Mitarbeiter/ innen
Exams					
WT 24/25	8240108004	Facility Management in Hospitals			Lennerts, Schmidt-Bäumler

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
term paper appr. 10 pages, with final presentation appr. 10 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
180 hours

T 5.162 Course: Failure of Structural Materials: Deformation and Fracture [T-MACH-102140]

Responsible: Prof. Dr. Peter Gumbsch
Dr. Daniel Weygand

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2181711	Failure of structural materials: deformation and fracture	3 SWS	Lecture / Practice (/ 🗣	Gumbsch, Weygand
Exams					
WT 24/25	76-T-MACH-102140	Failure of Structural Materials: Deformation and Fracture			Weygand, Gumbsch, Kraft
ST 2025	76-T-MACH-102140	Failure of Structural Materials: Deformation and Fracture			Weygand, Gumbsch

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam ca. 30 minutes

no tools or reference materials

Prerequisites
none

Recommendation
preliminary knowlegde in mathematics, mechanics and materials science

Workload
120 hours

Below you will find excerpts from events related to this course:

V Failure of structural materials: deformation and fracture
2181711, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

1. Introduction
2. linear elasticity
3. classification of stresses
4. Failure due to plasticity
    - tensile test
    - dislocations
    - hardening mechanisms
    - guidelines for dimensioning
5. composite materials
6. fracture mechanics
    - hypotheses for failure
    - linear elasic fracture mechanics
    - crack resitance
    - experimental measurement of fracture toughness
    - defect measurement
    - crack propagation
    - application of fracture mechanics
    - atomistics of fracture

The student

- has the basic understanding of mechanical processes to explain the relationship between externally applied load and materials strength.
- can explain the foundation of linear elastic fracture mechanics and is able to determine if this concept can be applied to a failure by fracture.
- can decribe the main empirical materials models for deformation and fracture and can apply them.
- has the physical understanding to describe and explain phenomena of failure.

preliminary knowlegde in mathematics, mechanics and materials science recommended

regular attendance: 22,5 hours
self-study: 97,5 hours

The assessment consists of an oral examination (ca. 30 min) according to Section 4(2), 2 of the examination regulation.

Organizational issues
Übungstermine werden in der Vorlesung bekannt gegeben!

Die Veranstaltung wird letztmals im Wintersemester 2025/2026 angeboten!

Literature

- Engineering Materials, M. Ashby and D.R. Jones (2nd Edition, Butterworth-Heinemann, Oxford, 1998); sehr lesenswert, relativ einfach aber dennoch umfassend, verständlich
- Mechanical Behavior of Materials, Thomas H. Courtney (2nd Edition, McGraw Hill, Singapur); Klassiker zu den mechanischen Eigenschaften der Werkstoffe, umfangreich, gut
- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe

T 5.163 Course: Failure of Structural Materials: Fatigue and Creep [T-MACH-102139]

Responsible: Dr. Patric Gruber
Prof. Dr. Peter Gumbsch

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2181715	Failure of Structural Materials: Fatigue and Creep	2 SWS	Lecture / 🗣	Gruber, Gumbsch
Exams					
WT 24/25	76-T-MACH-102139	Failure of Structural Materials: Fatigue and Creep			Gruber, Gumbsch
ST 2025	76-T-MACH-102139	Failure of Structural Materials: Fatigue and Creep			Gruber, Gumbsch

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam ca. 30 minutes

no tools or reference materials

Prerequisites
none

Recommendation
preliminary knowlegde in mathematics, mechanics and materials science

Workload
120 hours

Below you will find excerpts from events related to this course:

V Failure of Structural Materials: Fatigue and Creep

2181715, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1 Fatigue
1.1 Introduction
1.2 Lifetime
1.3 Fatigue Mechanisms
1.4 Material Selection
1.5 Notches and Shape Optimization
1.6 Case Studies: ICE-Accidents

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological DEsciption of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

The student

- has the basic understanding of mechanical processes to explain the relationships between externally applied load and materials strength.
- can describe the main empirical materials models for fatigue and creep and can apply them.
- has the physical understanding to describe and explain phenomena of failure.
- can use statistical approaches for reliability predictions.
- can use its acquired skills, to select and develop materials for specific applications.

preliminary knowlegde in mathematics, mechanics and materials science recommended

regular attendance: 22,5 hours
self-study: 97,5 hours

The assessment consists of an oral examination (ca. 30 min) according to Section 4(2), 2 of the examination regulation.

Organizational issues
Die Veranstaltung wird letztmals im Wintersemester 2025/2026 angeboten!

Literature

- Engineering Materials, M. Ashby and D.R. Jones (2nd Edition, Butterworth-Heinemann, Oxford, 1998); sehr lesenswert, relativ einfach aber dennoch umfassend, verständlich
- Mechanical Behavior of Materials, Thomas H. Courtney (2nd Edition, McGraw Hill, Singapur); Klassiker zu den mechanischen Eigenschaften der Werkstoffe, umfangreich, gut
- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
- Fatigue of Materials, Subra Suresh (2nd Edition, Cambridge University Press); Standardwerk über Ermüdung, alle Materialklassen, umfangreich, für Einsteiger und Fortgeschrittene

T 5.164 Course: Financial Analysis [T-WIWI-102900]

Responsible: Dr. Torsten Luedecke
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2530205	Financial Analysis	2 SWS	Lecture / 🗣	Luedecke
ST 2025	2530206	Übungen zu Financial Analysis	2 SWS	Practice / 🗣	Luedecke
Exams					
WT 24/25	7900059	Financial Analysis			Ruckes, Luedecke
ST 2025	7900075	Financial Analysis			Luedecke

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
See German version.

Prerequisites
None

Recommendation
Basic knowledge in corporate finance, accounting, and valuation is required.

Below you will find excerpts from events related to this course:

V Financial Analysis

2530205, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature

- Alexander, D. and C. Nobes (2017): Financial Accounting – An International Introduction, 6th ed., Pearson.
- Penman, S.H. (2013): Financial Statement Analysis and Security Valuation, 5th ed., McGraw Hill.

T 5.165 Course: Financial Econometrics [T-WIWI-103064]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2520022	Financial Econometrics I	2 SWS	Lecture / On-Site	Schienle, Buse
WT 24/25	2520023	Übungen zu Financial Econometrics I	2 SWS	Practice / On-Site	Schienle, Buse
Exams					
WT 24/25	7900123	Financial Econometrics II			Schienle
WT 24/25	7900126	Financial Econometrics			Schienle
ST 2025	7900223	Financial Econometrics			Schienle

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics"[2520016]

Annotation
The next lecture will take place in the winter semester 2022/23.

Below you will find excerpts from events related to this course:

V Financial Econometrics I
2520022, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Learning objectives:

The student

- shows a broad knowledge of fincancial econometric estimation and testing techniques
- is able to apply his/her technical knowledge using software in order to critically assess empirical problems

Content:

ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises

Requirements:

It is recommended to attend the course *Economics III: Introduction to Econometrics* [2520016] prior to this course.

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Literature

Taylor, S. J. (2005): "Asset Price Dynamics, Volatility, and Prediction", Princeton University Press.

Tsay, R. S. (2005): "Analysis of Financial Time Series: Financial Econometrics", Wiley, 2nd edition.

Cochrane, J. H. (2005): "Asset Pricing", revised edition, Princeton University Press.

Campbell, J. Y., A. W. Lo, and A. C. MacKinlay (1997): "The Econometrics of Financial Markets", Princeton University Press.

Hamilton, J. D. (1994): "Time Series Analysis", Princeton University Press.

Additional literature will be discussed in the lecture.

T 5.166 Course: Financial Econometrics II [T-WIWI-110939]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2521302	Financial Econometrics II	2 SWS	Lecture / 🗣	Schienle, Buse
ST 2025	2521303	Übung zu Financial Econometrics II	1 SWS	Practice / 🗣	Buse, Schienle
Exams					
ST 2025	7900081	Financial Econometrics II			Schienle

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination (90 minutes). If the number of participants is low, an oral examination will be held instead.

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Financial Econometrics"

Annotation
Course language is English
The next lecture will take place in the summer semester of 2023.

Workload
135 hours

T 5.167 Course: Financial Intermediation [T-WIWI-102623]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2
M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2530232	Financial Intermediation	2 SWS	Lecture / 🗣	Ruckes
WT 24/25	2530233	Übung zu Finanzintermediation	1 SWS	Practice	Ruckes, Benz
Exams					
WT 24/25	7900063	Financial Intermediation			Ruckes
ST 2025	7900078	Financial Intermediation			Ruckes

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Financial Intermediation
2530232, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
Terminankündigungen des Instituts beachten

Literature
Weiterführende Literatur:

- Hartmann-Wendels/Pfingsten/Weber (2014): Bankbetriebslehre, 6. Auflage, Springer Verlag.
- Freixas/Rochet (2008): Microeconomics of Banking, 2. Auflage, MIT Press.

T 5.168 Course: Fluid Power Systems [T-MACH-102093]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	2

Events					
WT 24/25	2114093	Fluid Technology	2 SWS	Lecture / 🗣	Geimer
Exams					
WT 24/25	76-T-MACH-102093	Fluid Power Systems			Geimer
WT 24/25	76-T-MACH-102094	Fluid Power Systems			Geimer
ST 2025	76-T-MACH-102093	Fluid Power Systems			Geimer

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a oral exam taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
none

Annotation
Learning Objectives:

The student is able to

- apply and evaluate the physical principles of fluid technology,
- name common components and explain how they work,
- demonstrate the advantages and disadvantages of different components,
- dimension components for a given purpose
- and to calculate simple systems.

Contents:

In the area of hydrostatics, the following topics are covered

- Pressurized fluids,
- pumps and motors,
- valves,
- accessories and hydraulic circuits.

In the field of pneumatics, the following topics are covered

- Compressors,
- drives,
- valves and control systems.

Literature:

Lecture notes for the fluid technology lecture, downloadable via the ILIAS learning platform.

Workload
120 hours

Below you will find excerpts from events related to this course:

V

Fluid Technology

2114093, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

In the range of hydrostatics the following topics will be introduced:

- Hydraulic fluids
- Pumps and motors
- Valves
- Accessories
- Hydraulic circuits.

In the range of pneumatics the following topics will be introduced:

- Compressors
- Motors
- Valves
- Pneumatic circuits.

- regular attendance: 21 hours
- self-study: 92 hours

Literature

Skriptum zur Vorlesung *Fluidtechnik*
Institut für Fahrzeugsystemtechnik
downloadbar

T 5.169 Course: Food Chemistry Basics [T-CHEMBIO-109442]

Responsible: Prof. Dr. Mirko Bunzel
Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	6601	Grundlagen der Lebensmittelchemie I	2 SWS	Lecture / 🗣	Bunzel
Exams					
WT 24/25	71109442	Food Chemistry Basics			Bunzel
ST 2025	71109442	Food Chemistry Basics			Bunzel

Legend: 🖥 Online, ❄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

T 5.170 Course: Food Science and Functionality [T-CIWVT-111535]

Responsible: Prof. Dr. Bernhard Watzl
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2211810	Food Science and Functionality	2 SWS	Lecture / ✕	Seifert
Exams					
WT 24/25	7211810	Food Science and Functionality			Seifert

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
The examination is an oral examination with a duration of about 30 minutes (section 4 subsection 2 number 2 SPO).

Prerequisites
None

T 5.171 Course: Food Science and Functionality [T-CIWVT-108801]

Responsible: Dr. Stephanie Seifert
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101120 - Principles of Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
WT 24/25	2211810	Food Science and Functionality	2 SWS	Lecture / ✕	Seifert
Exams					
WT 24/25	7211810	Food Science and Functionality			Seifert

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
Learning control is an oral examination lasting approx. 30 minutes.

Prerequisites
None

5.172 Course: Foundry Technology [T-MACH-105157]

Responsible: Dr.-Ing. Daniel Günther
Dr.-Ing. Steffen Klan

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	3

Events					
ST 2025	2174575	Foundry Technology	2 SWS	Lecture / 🗣	Klan, Günther
Exams					
ST 2025	76-T-MACH-105157	Foundry Technology			Klan, Günther

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written exam of about 1 h.

Prerequisites
none

Recommendation
The lectures Materials Science I and Materials Science II should have been attended in advance.

Workload
120 hours

Below you will find excerpts from events related to this course:

V **Foundry Technology** — **Lecture (V) On-Site**
2174575, SS 2025, 2 SWS, Language: German, Open in study portal

Literature
Literaturhinweise werden in der Vorlesung gegeben

Reference to literature, documentation and partial lecture notes given in lecture

T 5.173 Course: Freight Transport [T-BGU-106611]

Responsible:	Dr. Eckhard Szimba Prof. Dr.-Ing. Peter Vortisch
Organisation:	KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of:	M-BGU-101064 - Fundamentals of Transportation M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6232809	Freight Transport	2 SWS	Lecture / Practice (/	Szimba
Exams					
WT 24/25	8245106611	Freight Transport			Vortisch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 5.174 Course: Fuels and Lubricants for Combustion Engines [T-MACH-105184]

Responsible: Hon.-Prof. Dr. Bernhard Ulrich Kehrwald
Dr.-Ing. Heiko Kubach

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2133108	Fuels and Lubricants for Combustion Engines	2 SWS	Lecture / 🗣	Kehrwald
Exams					
WT 24/25	76-T-MACH-105184	Fuels and Lubricants for Combustion Engines			Kehrwald
ST 2025	76-T-MACH-105184	Fuels and Lubricants for Combustion Engines			Kehrwald

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination, Duration: ca. 25 min., no auxiliary means

Prerequisites
none

Below you will find excerpts from events related to this course:

V Fuels and Lubricants for Combustion Engines

2133108, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
electric drives and fuel cell drives with the associated operating materials will also be presented

- Introduction, basics, primary energy and energy chains
- Illustrative chemistry of hydrocarbons
- Fossil fuels, exploration, processing, standards
- Operating materials not fossil, renewable, alternative
- Fuels, lubricants, coolants, AdBlue
- Laboratory analysis, testing, test benches and measurement technology
- Excursion to test fields for motorized drives from 0.5 to 3,500 kW

Literature
Skript

T 5.175 Course: Functional Ceramics [T-MACH-105179]

Responsible: Dr. Miriam Botros
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2126784	Functional Ceramics	2 SWS	Lecture / 🔀	Botros
Exams					
WT 24/25	76T-MACH-105179	Functional Ceramics			Botros, Hinterstein
ST 2025	76-T-MACH-105179	Functional Ceramics			Botros, Hinterstein

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (20 min) taking place at the agreed date.

Auxiliary means: none

The re-examination is offered upon agreement.

Prerequisites
none

T 5.176 Course: Fundamentals for Design of Motor-Vehicle Bodies I [T-MACH-102116]

Responsible: Dipl.-Ing. Horst Dietmar Bardehle
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	1,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2113814	Fundamentals for Design of Motor-Vehicles Bodies I	1 SWS	Lecture / 🗣	Bardehle
Exams					
WT 24/25	76-T-MACH-102116	Fundamentals for Design of Motor-Vehicle Bodies I			Bardehle
ST 2025	76-T-MACH-102116	Fundamentals for Design of Motor-Vehicle Bodies I			Bardehle, Knoch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral group examination

Duration: 30 minutes

Auxiliary means: none

Prerequisites
none

Workload
60 hours

Below you will find excerpts from events related to this course:

V Fundamentals for Design of Motor-Vehicles Bodies I

2113814, WS 24/25, 1 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. History and design

2. Aerodynamics

3. Design methods (CAD/CAM, FEM)

4. Manufacturing methods of body parts

5. Fastening technologie

6. Body in white / body production, body surface

Learning Objectives:

The students have an overview of the fundamental possibilities for design and manufacture of motor-vehicle bodies. They know the complete process, from the first idea, through the concept to the dimensioned drawings (e.g. with FE-methods). They have knowledge about the fundamentals and their correlations, to be able to analyze and to judge relating components as well as to develop them accordingly.

Organizational issues

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Termine und nähere Informationen: siehe ILIAS oder Institutshomepage

Dates and further information will be published on the homepage of the institute

Literature

1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

T 5.177 Course: Fundamentals for Design of Motor-Vehicle Bodies II [T-MACH-102119]

Responsible: Dipl.-Ing. Horst Dietmar Bardehle
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	1,5	Grade to a third	Each summer term	1

Events					
ST 2025	2114840	Fundamentals for Design of Motor-Vehicles Bodies II	1 SWS	Lecture / 🗣	Knoch
Exams					
WT 24/25	76-T-MACH-102119	Fundamentals for Design of Motor-Vehicle Bodies II			Bardehle
ST 2025	76-T-MACH-102119	Fundamentals for Design of Motor-Vehicle Bodies II			Bardehle, Knoch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral group examination

Duration: 30 minutes

Auxiliary means: none

Prerequisites
none

Workload
60 hours

Below you will find excerpts from events related to this course:

V Fundamentals for Design of Motor-Vehicles Bodies II
2114840, SS 2025, 1 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Body properties/testing procedures
2. External body-parts
3. Interior trim
4. Compartment air conditioning
5. Electric and electronic features
6. Crash tests
7. Project management aspects, future prospects

Learning Objectives:

The students know that, often the design of seemingly simple detail components can result in the solution of complex problems. They have knowledge in testing procedures of body properties. They have an overview of body parts such as bumpers, window lift mechanism and seats. They understand, as well as, parallel to the normal electrical system, about the electronic side of a motor vehicle. Based on this they are ready to analyze and to judge the relation of these single components. They are also able to contribute competently to complex development tasks by imparted knowledge in project management.

Organizational issues
Voraussichtliche Termine, nähere Informationen und evtl. Änderungen:

siehe Institutshomepage.

Scheduled dates, further Information and possible changes of date:

see homepage of the institute.

Literature

1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

T 5.178 Course: Fundamentals for Financial -Quant and -Machine Learning Research [T-WIWI-111846]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105894 - Foundations for Advanced Financial -Quant and -Machine Learning Research

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	see Annotations	1

Competence Certificate
The module examination is an alternative exam assessment with a maximum score of 100 points to be achieved. These points are distributed over 4 worksheets to be submitted during the semester. The worksheets cover the respective material of the module and are handed out, worked on and assessed in lecture weeks 3 (10 points), 6 (20 points), 9 (30 points) and 12 (40 points).

The module-wide exam (all 4 worksheets) must be taken in the same semester.

The worksheets are a mixture of analytical tasks and programming tasks with financial data.

Recommendation

- Strongly recommended to have good knowledge in financial econometrics (MLE, OLS, GLS, ARMA-GARCH), mathematics (differential equations, difference equations and optimization), investments (CAPM, factor models), asset pricing (SDF, SDF pricing), derivatives (Black-Scholes, risk-neutral pricing), and programming of statistical concepts (Java or R or Python or Matlab or C or ...)
- Strongly recommended to have a strong interest for interdisciplinary research work in statistics, programming, applied math and financial economics.
- Students lacking the prior knowledge might find the resources of the Chair helpful: www.youtube.com/c/cram-kit.

Annotation
Teaching and learning format: Lecture and exercise.

The course is offered every second year.

Workload
270 hours

T 5.179 Course: Fundamentals in the Development of Commercial Vehicles [T-MACH-111389]

Responsible: Christof Weber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	see Annotations	2

Events					
WT 24/25	2113812	Fundamentals in the Development of Commercial Vehicles I	1 SWS	Lecture / 🗣	Weber
ST 2025	2114844	Fundamentals in the Development of Commercial Vehicles II	1 SWS	Lecture / 🗣	Weber
Exams					
WT 24/25	76T-MACH-111389	Fundamentals in the Development of Commercial Vehicles			Weber
ST 2025	76T-MACH-111389	Fundamentals in the Development of Commercial Vehicles			Weber

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral group examination

Duration: appr. 30 minutes

Auxiliary means: none

Prerequisites
none

Annotation
Fundamentals in the Development of Commercial Vehicles I, WT

Fundamentals in the Development of Commercial Vehicles II, ST

Workload
120 hours

Below you will find excerpts from events related to this course:

V Fundamentals in the Development of Commercial Vehicles I
2113812, WS 24/25, 1 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Introduction, definitions, history
2. Development tools
3. Complete vehicle
4. Cab, bodyshell work
5. Cab, interior fitting
6. Alternative drive systems
7. Drive train
8. Drive system diesel engine
9. Intercooled diesel engines

Learning Objectives:

The students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers.

The students are able to develop parts and components. Furthermore they have knowledge about different cab concepts, the interior and the interior design process. Consequently they are ready to analyze and to judge concepts of commercial vehicles as well as to participate competently in the commercial vehicle development.

Organizational issues

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Termine und Nähere Informationen: siehe ILIAS oder Institutshomepage

Dates and further information will be published on the homepage of the institute.

Literature

1. Marwitz, H., Zittel, S.: ACTROS -- die neue schwere Lastwagenbaureihe von Mercedes-Benz, ATZ 98, 1996, Nr. 9

2. Alber, P., McKellip, S.: ACTROS -- Optimierte passive Sicherheit, ATZ 98, 1996

3. Morschheuser, K.: Airbag im Rahmenfahrzeug, ATZ 97, 1995, S. 450 ff.

V **Fundamentals in the Development of Commercial Vehicles II** — **Lecture (V) On-Site**

2114844, SS 2025, 1 SWS, Language: German, Open in study portal

Content

1. Gear boxes of commercial vehicles
2. Intermediate elements of the drive train
3. Axle systems
4. Front axles and driving dynamics
5. Chassis and axle suspension
6. Braking System
7. Systems
8. Excursion

Learning Objectives:

The students know the advantages and disadvantages of different drives. Furthermore they are familiar with components, such as transfer box, propeller shaft, powered and non-powered frontaxle etc. Beside other mechanical components, such as chassis, axle suspension and braking system, also electric and electronic systems are known. Consequently the student are able to analyze and to judge the general concepts as well as to adjust them precisely with the area of application.

Organizational issues

Genaue Termine sowie nähere Informationen und eventuelle Terminänderungen:

siehe Institutshomepage.

Literature

1.HILGERS, M.: Nutzfahrzeugtechnik lernen, Springer Vieweg, ISSN: 2510-1803

2.SCHITTLER, M.; HEINRICH, R.; KERSCHBAUM, W.: Mercedes-Benz Baureihe 500 – neue V-Motorengeneration für schwere Nutzfahrzeuge, MTZ 57 Nr. 9, S. 460 ff, 1996

3.Robert Bosch GmbH (Hrsg.): Bremsanalgen für Kraftfahrzeuge, VDI-Verlag, Düsseldorf, 1. Auflage, 1994

4.RUBI, V.; STRIFLER, P. (Hrsg. Institut für Kraftfahrwesen RWTH Aachen): Indiustrielle Nutzfahrzeugentwicklung, Schriftenreihe Automobiltechnik, 1993

5.TEUTSCH, R.; CHERUTI, R.; GASSER, R.; PEREIRA, M.; de SOUZA, A.; WEBER, C.: Fuel Efficiency Optimization of Market Specific Truck Applications, Proceedings of the 5th Commercial Vehicle Technology Symposium – CVT 2018

T 5.180 Course: Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

Responsible: Prof. Dr. Olaf Deutschmann
Prof. Dr. Jan-Dierk Grunwaldt
Dr.-Ing. Heiko Kubach
Hon.-Prof. Dr. Egbert Lox

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2134138	Fundamentals of catalytic exhaust gas aftertreatment	2 SWS	Lecture / 🗣	Lox, Grunwaldt, Deutschmann

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination, Duration approx. 25 min., no auxiliary means

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Fundamentals of catalytic exhaust gas aftertreatment

Lecture (V)
On-Site

2134138, SS 2025, 2 SWS, Language: German, Open in study portal

Organizational issues
Blockvorlesung, Termin und Ort werden auf Ilias sowie der Homepage des IFKM und ITCP bekannt gegeben.

T 5.181 Course: Fundamentals of National and International Group Taxation [T-WIWI-111304]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2560133	Fundamentals of National and International Group Taxation	3 SWS	Lecture / 🗣	Wigger, Gutekunst
Exams					
WT 24/25	790kobe	Fundamentals of National and International Group Taxation			Wigger
ST 2025	790kobe	Fundamentals of National and International Group Taxation			Wigger

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
It is recommended to attend the course “Basics of German Company Tax Law and Tax Planning” beforehand.

Workload
135 hours

T 5.182 Course: Gear Cutting Technology [T-MACH-102148]

Responsible: Hon.-Prof. Dr. Markus Klaiber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2149655	Gear Technology	2 SWS	Lecture / 🗣	Klaiber
Exams					
WT 24/25	76-T-MACH-102148	Gear Technology			Klaiber

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral Exam (20 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Gear Technology
2149655, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Learning Outcomes:

The students ...

- can describe the basic terms of gearings and are able to explain the imparted basics of the gearwheel and gearing theory.
- are able to specify the different manufacturing processes and machine technologies for producing gearings. Furthermore they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- can apply the basics of the gearing theory and manufacturing processes on new problems.
- are able to read and interpret measuring records for gearings. are able to make an appropriate selection of a process based on a given application
- can describe the entire process chain for the production of toothed components and their respective influence on the resulting workpiece properties.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Literature

Medien:

Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.183 Course: Global Logistics [T-MACH-111003]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-101282 - Global Production and Logistics
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2149600	Global Logistics	2 SWS	Lecture / 🗣	Furmans
Exams					
ST 2025	76-T-MACH-105159	Global Production and Logistics - Part 2: Global Logistics / New: Global Logistics			Furmans

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The success control takes place in form of a written examination (60 min) during the semester break (according to §4(2), 1 SPO). If the number of participants is low, an oral examination (according to §4 (2), 2 SPO) may also be offered.

Prerequisites
T-MACH-105159 - Global production and logistics - Part 2: Global logistics must not be started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Global Logistics — **Lecture (V) On-Site**
2149600, SS 2025, 2 SWS, Language: German, Open in study portal

Content
Content:

Characteristics of global trade

- Incoterms
- Customs clearance, documents and export control

Global transport and shipping

- Maritime transport, esp. container handling
- Air transport

Modeling of supply chains

- SCOR model
- Value stream analysis

Location planning in cross-border-networks

- Application of the Warehouse Location Problem
- Transport Planning

Inventory Management in global supply chains

- Stock keeping policies
- Inventory management considering lead time and shipping costs

Media:

presentations, black board

Workload:

regular attendance: 21 hours
self-study: 99 hours

Students are able to:

- assign basic problems of planning and operation of global supply chains and plan them with apropriate methods,
- describe requirements and characteristics of global trade and transport, and
- evaluate characteristics of the design from logistic chains regarding their suitability.

Exam:

The exam consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The main exam is offered every summer semester. A second date for the exam is offered in winter semester only for students that did not pass the main exam.

Literature
Weiterführende Literatur:

- Arnold/Isermann/Kuhn/Tempelmeier. HandbuchLogistik, Springer Verlag, 2002 (Neuauflage in Arbeit)
- Domschke. Logistik, Rundreisen und Touren,Oldenbourg Verlag, 1982
- Domschke/Drexl. Logistik, Standorte, OldenbourgVerlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Neumann-Morlock. Operations-Research,Hanser-Verlag, 1993
- Tempelmeier. Bestandsmanagement in SupplyChains, Books on Demand 2006
- Schönsleben. IntegralesLogistikmanagement, Springer, 1998

T 5.184 Course: Global Manufacturing [T-WIWI-112103]

Responsible: Dr. Henning Sasse
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2581956	Global Manufacturing	2 SWS	Lecture / 🔀	Sasse
Exams					
WT 24/25	7981956	Global Manufacturing			Schultmann

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Workload
105 hours

Below you will find excerpts from events related to this course:

V Global Manufacturing

2581956, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

- Fundamentals of international business
- Forms of international cooperation and value creation
- Site selection
- Cost driven internationalization and site selection
- Sales and customer driven internationalization and site selection
- Challenges, risks and risk mitigation
- Management of international production sites
- Types and case studies of international production

Organizational issues
Blockveranstaltung, siehe Homepage

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.185 Course: Global Optimization I [T-WIWI-102726]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2550134	Global Optimization I	2 SWS	Lecture / 🗣	Stein
Exams					
WT 24/25	7900004_WS2425_NK	Global Optimization I			Stein
ST 2025	7900205_SS2025_HK	Global Optimization I			Stein

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO). The successful completion of the exercises is required for admission to the written exam.

The exam is offered in the lecture of semester and the following semester.

The success check can be done also with the success control for "Global optimization II". In this case, the duration of the written exam is 120 min.

Prerequisites
None

Recommendation
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V Global Optimization I
2550134, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

5.186 Course: Global Optimization I and II [T-WIWI-103638]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Events					
ST 2025	2550134	Global Optimization I	2 SWS	Lecture / 🗣	Stein
ST 2025	2550135	Exercise to Global Optimization I	1 SWS	Practice / 🗣	Stein, Beck
ST 2025	2550136	Global Optimization II	2 SWS	Lecture / 🗣	Stein
Exams					
WT 24/25	7900006_WS2425_NK	Global Optimization I and II			Stein
ST 2025	7900207_SS2025_HK	Global Optimization I and II			Stein

Legend: 🖥 Online, ♲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V Global Optimization I

2550134, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Literature
O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

V **Global Optimization II** — **Lecture (V) On-Site**
2550136, SS 2025, 2 SWS, Language: German, Open in study portal

Content
In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature
O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

T 5.187 Course: Global Optimization II [T-WIWI-102727]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2550136	Global Optimization II	2 SWS	Lecture / 🗣	Stein
ST 2025	2550137	Exercise to Global Optimization II	1 SWS	Practice / 🗣	Stein, Beck
Exams					
WT 24/25	7900005_WS2425_NK	Global Optimization II			Stein
ST 2025	7900206_SS2025_HK	Global Optimization II			Stein

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of "Global optimization I". In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V Global Optimization II
2550136, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
- R. Horst, H. Tuy, Global Optimization, Springer, 1996
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

T 5.188 Course: Global Production [T-MACH-113832]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101282 - Global Production and Logistics
M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Exams			
WT 24/25	76-T-MACH-113832	Global Production	Lanza

Competence Certificate
Written Exam (60 min)

Prerequisites
T-MACH-108848 - Globale Produktion und Logistik - Teil 1: Globale Produktion must not be commenced.
T-MACH-105158 - Globale Produktion und Logistik - Teil 1: Globale Produktion must not be commenced.
T-MACH-110337 - Globale Produktion und Logistik must not be commenced.

Workload
150 hours

T 5.189 Course: Graph Theory and Advanced Location Models [T-WIWI-102723]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Competence Certificate
The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

T 5.190 Course: Growth and Development [T-WIWI-112816]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-107010 - Economics in a Connected World
M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2561503	Growth and Development	2 SWS	Lecture / 🗣	Ott
WT 24/25	2561504	Exercise for Growth and Development	1 SWS	Practice / 🗣	Ott, Ghoniem
Exams					
WT 24/25	7900078	Growth and Development			Ott
ST 2025	7900105	Growth and Development			Ott

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as an open-book examination or as a 60-minute written examination.

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload
135 hours

Below you will find excerpts from events related to this course:

V **Growth and Development** — **Lecture (V) On-Site**
2561503, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Content

This course is intended as an introduction to the field of advanced macroeconomics with a special focus on economic growth. Lectures aim to deal with the theoretical foundations of exogenous and endogenous growth models. The importance of growth for nations and discussion of some (well-known) growth theories together with the role of innovation, human capital and environment will therefore be primary focuses of this course.

Learning objective:

Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

Course content:

- Intertemporal consumption decision
- Growth models with exogenous saving rates: Solow
- Growth models with endogenous saving rates: Ramsey
- Growth and environmental resources
- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Exam description:

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature

Auszug:

- Acemoglu, D. (2009): Introduction to modern economic growth. Princeton University Press, New Jersey.
- Aghion, P., Howitt, P. (2009): Economics of growth, MIT-Press, Cambridge/MA.
- Barro, R.J., Sala-I-Martin, X. (2003): Economic Growth. MIT-Press, Cambridge/MA.
- Sydsaeter, K., Hammond, P. (2008): Essential mathematics for economic analysis. Prentice Hall International, Harlow.
- Sydsæter, K., Hammond, P., Seierstad, A., Strom, A., (2008): Further Mathematics for Economic Analysis, Second Edition, Pearson Education Limited, Essex.

5.191 Course: Handling Characteristics of Motor Vehicles I [T-MACH-105152]

Responsible: Dr.-Ing. Hans-Joachim Unrau
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101264 - Handling Characteristics of Motor Vehicles

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2113807	Handling Characteristics of Motor Vehicles I	2 SWS	Lecture / 🖥	Unrau
Exams					
WT 24/25	76-T-MACH-105152	Handling Characteristics of Motor Vehicles I			Unrau
ST 2025	76-T-MACH-105152	Handling Characteristics of Motor Vehicles I			Unrau

Legend: 🖥 Online, Blended (On-Site/Online), On-Site, ✗ Cancelled

Competence Certificate
Verbally

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Handling Characteristics of Motor Vehicles I

2113807, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
1. Problem definition: Control loop driver - vehicle - environment (e.g. coordinate systems, modes of motion of the car body and the wheels)

2. Simulation models: Creation from motion equations (method according to D'Alembert, method according to Lagrange, programme packages for automatically producing of simulation equations), model for handling characteristics (task, motion equations)

3. Tyre behavior: Basics, dry, wet and winter-smooth roadway

Learning Objectives:

The students know the basic connections between drivers, vehicles and environment. They can build up a vehicle simulation model, with which forces of inertia, aerodynamic forces and tyre forces as well as the appropriate moments are considered. They have proper knowledge in the area of tyre characteristics, since a special meaning comes to the tire behavior during driving dynamics simulation. Consequently they are ready to analyze the most importent influencing factors on the driving behaviour and to contribute to the optimization of the handling characteristics.

Organizational issues
Die Vorlesung wird als Videostream zur Verfügung gestellt. Sie finden den Videostream und das Vorlesungsmaterial auf ILIAS. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Literature

1. Willumeit, H.-P.: Modelle und Modellierungsverfahren in der Fahrzeugdynamik,
B. G. Teubner Verlag, 1998

2. Mitschke, M./Wallentowitz, H.: Dynamik von Kraftfahrzeugen, Springer-Verlag, Berlin, 2004

3. Gnadler, R.; Unrau, H.-J.: Umdrucksammlung zur Vorlesung Fahreigenschaften von Kraftfahrzeugen I

5.192 Course: Handling Characteristics of Motor Vehicles II [T-MACH-105153]

Responsible: Dr.-Ing. Hans-Joachim Unrau
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101264 - Handling Characteristics of Motor Vehicles

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2114838	Handling Characteristics of Motor Vehicles II	2 SWS	Lecture / 🖥	Unrau
Exams					
WT 24/25	76-T-MACH-105153	Handling Characteristics of Motor Vehicles II			Unrau
WT 24/25	76T-MACH-105153_wdh.	Handling Characteristics of Motor Vehicles II			Unrau
ST 2025	76-T-MACH-105153	Handling Characteristics of Motor Vehicles II			Unrau

Legend: 🖥 Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Handling Characteristics of Motor Vehicles II

2114838, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
1. Vehicle handling: Bases, steady state cornering, steering input step, single sine, double track switching, slalom, cross-wind behavior, uneven roadway

2. stability behavior: Basics, stability conditions for single vehicles and for vehicles with trailer

Learning Objectives:

The students have an overview of common test methods, with which the handling of vehicles is gauged. They are able to interpret results of different stationary and transient testing methods. Apart from the methods, with which e.g. the driveability in curves or the transient behaviour from vehicles can be registered, also the influences from cross-wind and from uneven roadways on the handling characteristics are well known. They are familiar with the stability behavior from single vehicles and from vehicles with trailer. Consequently they are ready to judge the driving behaviour of vehicles and to change it by specific vehicle modifications.

Organizational issues
Die Vorlesung wird als Videostream zur Verfügung gestellt. Sie finden den Videostream und das Vorlesungsmaterial auf ILIAS. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Literature

1. Zomotor, A.: Fahrwerktechnik: Fahrverhalten, Vogel Verlag, 1991

2. Mitschke, M./Wallentowitz, H.: Dynamik von Kraftfahrzeugen, Springer-Verlag, Berlin, 2004

3. Gnadler, R.; Unrau, H.-J.: Umdrucksammlung zur Vorlesung Fahreigenschaften von Kraftfahrzeugen II

5.193 Course: Heat Economy [T-WIWI-102695]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	2

Events					
ST 2025	2581001	Heat Economy	2 SWS	Lecture / 🗣	Fichtner
Exams					
WT 24/25	7981001	Heat Economy			Fichtner

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written (60 minutes) or oral exam (30 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None.

Recommendation
None

Annotation
See German version.

Below you will find excerpts from events related to this course:

V Heat Economy
2581001, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
Block, Seminarraum Standort West - siehe Institutsaushang

T 5.194 Course: High Performance Powder Metallurgy Materials [T-MACH-102157]

Responsible: apl. Prof. Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2126749	Advanced powder metals	2 SWS	Lecture /	Schell
Exams					
WT 24/25	76-T-MACH-102157	High Performance Powder Metallurgy Materials			Schell, Wagner
ST 2025	76-T-MACH-102157	High Performance Powder Metallurgy Materials			Schell

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
oral exam, 20- 30 min

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Advanced powder metals

2126749, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature

- W. Schatt ; K.-P. Wieters ; B. Kieback. ".Pulvermetallurgie: Technologien und Werkstoffe", Springer, 2007
- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
- F. Thümmler, R. Oberacker. "Introduction to Powder Metallurgy", Institute of Materials, 1993

T 5.195 Course: High-Voltage Technology [T-ETIT-110266]

Responsible: Dr.-Ing. Rainer Badent
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101163 - High-Voltage Technology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2307360	High-Voltage Technology	2 SWS	Lecture / 🗣	Badent
WT 24/25	2307362	Tutorial for 2307362High-Voltage Technology	1 SWS	Practice / 🗣	Badent, Zajadatz
Exams					
WT 24/25	73730360	High-Voltage Technology			Badent
ST 2025	73730360	High-Voltage Technology			Badent

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.196 Course: High-Voltage Test Technique [T-ETIT-101915]

Responsible: Dr.-Ing. Rainer Badent
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101164 - Generation and Transmission of Renewable Power

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2307392	High-Voltage Test Technique	2 SWS	Lecture / 🗣	Badent
WT 24/25	2307394	Tutorial for 2307392 High-Voltage Test Technique	2 SWS	Practice / 🗣	Gielnik
Exams					
WT 24/25	7307392	High-Voltage Test Technique			Badent
ST 2025	7307392	High-Voltage Test Technique			Badent

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

T 5.197 Course: Hot Research Topics in AI for Engineering Applications [T-MACH-113669]

Responsible: Prof. Dr.-Ing. Anne Meyer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2121341	Hot Research Topics in AI for Engineering Applications	3 SWS	Project (P / 🗣	Meyer, Dörr
Exams					
WT 24/25	76-T-MACH-113669	Hot Research Topics in AI for Engineering Applications			Meyer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The grade is determined by an examination of another type. This consists of an individual knowledge check after the lecture part, the continuous assessment of teamwork during the implementation task and a final presentation. The overall impression is assessed; in addition to the implementation task, the knowledge test and the final presentation are also taken into account.

Prerequisites
none

Recommendation
Basic knowledge of artificial intelligence and machine learning, Programming experience, preferably in Python, English proficiency

Annotation
Limited number of participants.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Hot Research Topics in AI for Engineering Applications

2121341, WS 24/25, 3 SWS, Language: English, Open in study portal

Project (PRO)
On-Site

Content
In " Hot Research Topics in AI for Engineering Applications", we explore the applicability of cutting-edge research findings in the fields of Machine Learning and Artificial Intelligence (e.g., LLM agents, Reinforcement Learning) to applications in engineering (e.g., optimization in production and logistics, creation of CAD models). Each year, we offer a different methodological focus (more on the IMI-homepage).

First, we provide the theoretical foundations and then move into a group work phase where students implement and analyze an application prototype. The event is aimed at students with prior knowledge in machine learning and programming.

- Theoretical foundations of the technologies considered in the course (e.g., Deep Learning, Transformers, LLM)
- Application possibilities of modern technologies in an industrial context
- Challenges in making current research findings usable for solving specific engineering problems and productive use
- Implementation of solutions to apply modern technologies to specified engineering problems (usually Python-based, using current frameworks)
- Independent execution of an implementation project with current, thematically relevant content (e.g., LLM agents for interaction with external systems such as robots, for algorithm construction, or for creating 3D CAD models, etc.)
- Technologies and applications are announced at the beginning of each semester

After the event, participants will be able to:

- Identify the technical and algorithmic foundations behind the relevant research topics and explain their functionalities
- Identify application possibilities of current research findings and related technologies in an industrial context, as well as the challenges that arise in the process
- Implement solutions proposed in recent publications using existing frameworks and codebases as prototypes
- Structure and execute programming projects in a team
- Clearly present the results of practical projects tailored to the audience

Participation Requirements

- Basic knowledge of artificial intelligence and machine learning
- Programming experience, preferably in Python
- English proficiency

Organizational issues
Place and time of the course can be found in ILIAS, / Ort und Zeit der Lehrveranstaltung siehe ILIAS

T 5.198 Course: Human Factors in Autonomous Driving [T-WIWI-113059]

Responsible: Prof. Dr. Alexey Vinel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2511452	Human Factors in Autonomous Driving	2 SWS	Lecture / Blended	Vinel, Bied, Schrapel
WT 24/25	2511453	Exercises Human Factors in Autonomous Driving	1 SWS	Practice / Blended	Vinel, Bied, Schrapel
Exams					
WT 24/25	79AIFB_HFAD_C6	Human Factors in Autonomous Driving			Vinel
ST 2025	79AIFB_HFAD_C6	Human Factors in Autonomous Driving			Vinel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) or an oral exam (20 min).

The exam takes place every semester and can be repeated at every regular examination date.

Workload
135 hours

T 5.199 Course: Human Factors in Security and Privacy [T-WIWI-109270]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	3

Exams			
WT 24/25	79AIFB_HFSP_A1	Human Factors in Security and Privacy	Volkamer

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation. Only those who have successfully participated in the exercises and the lecture will be admitted to the examination.

Prerequisites
Both need to be done:

- Pass Quiz on Paper for Graphical Passwords
- Presentation of Results Exercise 2

+ 9 of the following 11 need to be done:

- Submit ILIAS certificate until Oct 24
- Pass Quiz on InfoSec Lecture
- Active participation exercise 1 Part 1 - Evaluation and analyses methods
- Pass Quiz Paper Discussion 1 - User Behaviour and motivation theories
- Active participation exercise 1 Part 2
- Pass Quiz Paper Discussion 2 - User Behaviour and motivation theories
- Pass Quiz Paper Discussion 3 - Security Awareness
- Active participation exercise 1 Part 3
- Pass Quiz Paper Discussion 4 - Graphical Authentication
- Pass Quiz Paper Discussion 5 - Shoulder Surfing Authentication
- Active participation exercise 2

Recommendation
The prior attendance of the lecture "Information Security" is strongly recommended.

Annotation
The lecture will not be offered in winter semester 2020/21.

Some lectures are in English, some in German.

Workload
135 hours

T 5.200 Course: Hydrogen and reFuels - Energy Conversion in Combustion Engines [T-MACH-111585]

Responsible: Dr.-Ing. Heiko Kubach
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101275 - Combustion Engines I

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	4	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	2134155	Hydrogen and reFuels - Energy Conversion in Combustion Engines	2 SWS	Lecture / 🗣	Koch
Exams					
WT 24/25	76-T-MACH-111585	Hydrogen and reFuels - Energy Conversion in Combustion Engines			Kubach, Koch
ST 2025	76-T-MACH-105564	Hydrogen and reFuels - Energy Conversion in Combustion Engines			Koch, Kubach

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 25 minutes, no auxillary means

Prerequisites
T-MACH-113979 must not have been started.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Hydrogen and reFuels - Energy Conversion in Combustion Engines

2134155, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
New types of CO2-neutral fuels such as gaseous hydrogen but also liquid synthetic fuels often place specific requirements on engine systems that differ significantly from operation with conventional fuels. These special aspects of engine energy conversion are dealt with in this lecture.

Introduction

Thermodynamics of combustion engines

Fundamentals

gas exchange

Flow field

Wall heat losses

Combustion in gasoline engines

Pressure Trace Analysis

Combustion in Diesel engines

Specific Topics of Hydrogen Combsution

Waste heat recovery

T 5.201 Course: Ignition Systems [T-MACH-105985]

Responsible: Dr.-Ing. Olaf Toedter
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Version
Oral examination	4	Grade to a third	1

Events					
WT 24/25	2133125	Ignition systems	2 SWS	Lecture / 🗣	Toedter
Exams					
WT 24/25	76-T-MACH-105985	Ignition systems			Koch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, 20 min

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Ignition systems
2133125, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

- Ignition Process
- Spark Ignition
- Principle of Spark Ignition Systems
- Limits of Spark Ignition
- New Develpoments of Spark Ignition Systems
- New an Alternative Ignition Systems

T 5.202 Course: Incentives in Organizations [T-WIWI-105781]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory
M-WIWI-101505 - Experimental Economics
M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2573003	Incentives in Organizations	2 SWS	Lecture / 🗣	Nieken
ST 2025	2573004	Übung zu Incentives in Organizations	2 SWS	Practice / 🗣	Nieken, Mitarbeiter, Walther, Gorny
Exams					
WT 24/25	7900201	Incentives in Organizations			Nieken
ST 2025	7900132	Incentives in Organizations			Nieken

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min). The exam takesplace in every semester. Re-examinations are offered at every ordinaryexamination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

Prerequisites
None

Recommendation
Knowledge of microeconomics, game theory, and statistics is assumed.

Below you will find excerpts from events related to this course:

V Incentives in Organizations
2573003, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

The students acquire profound knowledge about the design and the impact of different incentive and compensation systems. Topics covered are, for instance, performance based compensation, team work, intrinsic motivation, multitasking, and subjective performance evaluations. We will use microeconomic or behavioral models as well as empirical data to analyze incentive systems. We will investigate several widely used compensation schemes and their relationship with corporate strategy. Students will learn to develop practical implications which are based on the acquired knowledge of this course.

Aim

The student

- develops a strategic understanding about incentives systems and how they work.
- analyzes models from personnel economics.
- understands how econometric methods can be used to analyze performance and compensation data.
- knows incentive schemes that are used in companies and is able to evaluate them critically.
- can develop practical implications which are based on theoretical models and empirical data from companies.
- understands the challenges of managing incentive and compensation systems and their relationship with corporate strategy.

Workload

The total workload for this course is: approximately 135 hours.

Lecture: 32 hours

Preparation of lecture: 52 hours

Exam preparation: 51 hours

Literature

Slides, Additional case studies and research papers will be announced in the lecture.

Literature (complementary):

Managerial Economics and Organizantional Architecture, Brickley / Smith / Zimmerman, McGraw-Hill Education, 2015

Behavioral Game Theory, Camerer, Russel Sage Foundation, 2003

Personnel Economics in Practice, Lazear / Gibbs, Wiley, 2014

Introduction to Econometrics, Wooldridge, Andover, 2014

Econometric Analysis of Cross Section and Panel Data, Wooldridge, MIT Press, 2010

T 5.203 Course: Industrial Mobile Robotics Lab [T-MACH-113701]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each term	2

Events					
WT 24/25	2117073	Industrial Mobile Robotics Lab	2 SWS	Practical course / 🗣	Enke, Furmans
ST 2025	2117073	Industrial Mobile Robotics Lab	2 SWS	Practical course / 🗣	Furmans, Enke
Exams					
WT 24/25	76-T-MACH-113701	Industrial Mobile Robotics Lab			Furmans

Legend: 🖥 Online, ✪ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Certificate through colloquium with presentation, documentation of the work results and fulfilment of the attendance requirement.

Prerequisites
T-MACH-105230 must not be started.

Recommendation
Basic knowledge of Python programming and basic knowledge of technical logistics of advantage.

Annotation
The number of participants is limited to 15 students.
The selection procedure is based on a letter of motivation in which the following questions should be answered:

- Why do you want to attend the course?
  What skills and previous knowledge do you have?

Workload
120 hours

Below you will find excerpts from events related to this course:

V Industrial Mobile Robotics Lab

2117073, WS 24/25, 2 SWS, Language: English, Open in study portal

Practical course (P)
On-Site

Content
This course is designed to teach students how to operate and control mobile robotic systems. Mobile robots have become a standard in the industry. This course will give students their first practical experience in this area.

For self-study, videos on the various relevant topics will be made available before the start of the course. Together with the University of Stuttgart, we will form teams at each location to implement either a vehicle control system or a control system for assigning jobs to different vehicles. The implementation will be based on a standardized communication interface - the VDA 5050 - which enables a uniform data exchange between the system participants. The teams will get to know each other at a kick-off event in Stuttgart. For the implementation, the teams will have to exchange information in order to jointly control a fleet of real mobile industrial robots in the final event at KIT. A simulation environment will also be provided for the development process, allowing testing without hardware in the early phases of the project.

Organizational issues
Das Praktikum findet in Kooperation mit der Universität Stuttgart statt. Es gibt zwei verpflichtende Präsenztage, das Kickoff findet an der Universität Stuttgart am 07.01.2025 statt, die Abschlussveranstaltung mit Live-Demo findet am KIT am 04.02.2025 statt.

Es werden an beiden Standorten Teams betreut, die sich während des Praktikums hybride austauchen und für die Abschlussveranstaltung eine gemeinsame Live-Demo vorbereiten. Während des Praktikums arbeiten die Teams selbständig an der Aufgabenstellung. Es werden dabei regelmäßige Sprechstunden, sowie weitere Input-Session angeboten. Der Fortschritt wird in zwei Zwischenmeilensteinen präsentiert.

Die Teilnehmerzahl ist beschränkt. Die Auswahl erfolgt nach einem Auswahlverfahren.
Um sich für die Teilnahme zu bewerben stellen Sie bitte einen Aufnahmeantrag für den aktuellen Ilias-Kurs mit einem kurzen Bewerbungstext. Dieser sollte ihre bisherigen Erfahrungen sowie ihre Motivation für das Praktikum beinhalten.

Voraussetzung sind Grundkentnisse im Programmieren (bspw. mit Python, C++, ...).

Geplanter Termin: 07.01.2025 - 04.02.2025

Literature
VDA 5050: https://www.vda.de/en/topics/automotive-industry/vda-5050

V	**Industrial Mobile Robotics Lab** 2117073, SS 2025, 2 SWS, Language: English, Open in study portal	**Practical course (P)** **On-Site**

Content
This course is designed to teach students how to operate and control mobile robotic systems. Mobile robots have become a standard in the industry. This course will give students their first practical experience in this area.

For self-study, videos on the various relevant topics will be made available before the start of the course. Together with the University of Stuttgart, we will form teams at each location to implement either a vehicle control system or a control system for assigning jobs to different vehicles. The implementation will be based on a standardized communication interface - the VDA 5050 - which enables a uniform data exchange between the system participants. The teams will get to know each other at a kick-off event in Stuttgart. For the implementation, the teams will have to exchange information in order to jointly control a fleet of real mobile industrial robots in the final event at KIT. A simulation environment will also be provided for the development process, allowing testing without hardware in the early phases of the project.

Organizational issues
Das Praktikum findet in Kooperation mit der Universität Stuttgart statt. Es gibt zwei verpflichtende Präsenztage, das Kickoff findet an der Universität Stuttgart am 26.05.2025 statt, die Abschlussveranstaltung mit Live-Demo findet am KIT am 04.07.2025 statt.

Es werden an beiden Standorten Teams betreut, die sich während des Praktikums hybride austauchen und für die Abschlussveranstaltung eine gemeinsame Live-Demo vorbereiten. Während des Praktikums arbeiten die Teams selbständig an der Aufgabenstellung. Es werden dabei regelmäßige Sprechstunden, sowie weitere Input-Session angeboten. Der Fortschritt wird in zwei Zwischenmeilensteinen präsentiert.

Die Teilnehmerzahl ist beschränkt. Die Auswahl erfolgt nach einem Auswahlverfahren.
Um sich für die Teilnahme zu bewerben stellen Sie bitte einen Aufnahmeantrag für den aktuellen Ilias-Kurs mit einem kurzen Bewerbungstext. Dieser sollte ihre bisherigen Erfahrungen sowie ihre Motivation für das Praktikum beinhalten.

Voraussetzung sind Grundkentnisse im Programmieren (bspw. mit Python, C++, ...).

Die Bewerbung erfolgt über Ilias.

Geplanter Termin: 15.05.2025 - 04.07.2025

Literature
VDA 5050: https://www.vda.de/en/topics/automotive-industry/vda-5050

T 5.204 Course: Information Engineering [T-MACH-102209]

Responsible: Prof. Dr.-Ing. Anne Meyer
Prof. Dr.-Ing. Jivka Ovtcharova

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	2

Events					
WT 24/25	2121355	Information Engineering	2 SWS	Seminar /	Meyer, Rönnau
ST 2025	2122014	Information Engineering	2 SWS	Seminar /	Meyer, Rönnau
Exams					
WT 24/25	76-T-MACH-102209	Information Engineering			Ovtcharova, Meyer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment (written composition and speech)

Prerequisites
None

Workload
90 hours

Below you will find excerpts from events related to this course:

V Information Engineering
2121355, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Seminar papers on current research topics of the Institute for Information Management in Engineering. The respective topics are presented at the beginning of each semester.

Organizational issues
Ort und Zeit siehe ILIAS

Literature
Themenspezifische Literatur

V Information Engineering
2122014, SS 2025, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Seminar papers on current research topics of the Institute for Information Management in Engineering. The respective topics are presented at the beginning of each semester.

Organizational issues
Zeit, Ort und weitere Informationen siehe ILIAS / Time, place and further information see ILIAS

Literature
Themenspezifische Literatur

T 5.205 Course: Information Management for Public Mobility Services [T-BGU-106608]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	3	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6232905	Information Management for Public Mobility Services	2 SWS	Block / 🗣	Vortisch
Exams					
WT 24/25	8245106608	Information Management for Public Mobility Services			Vortisch

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
lecture accompanying exercises, appr. 5 pieces

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 5.206 Course: Information Service Engineering [T-WIWI-106423]

Responsible: Prof. Dr. Harald Sack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2511606	Information Service Engineering	2 SWS	Lecture / 🗣	Sack
ST 2025	2511607	Exercises to Information Service Engineering	1 SWS	Practice / 🗣	Sack
Exams					
WT 24/25	79AIFB_ISE_B2	Information Service Engineering			Sack
ST 2025	79AIFB_ISE_B3	Information Service Engineering (Registration until 21.07.2025)			Sack

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None

Workload
150 hours

Below you will find excerpts from events related to this course:

V Information Service Engineering — **Lecture (V) On-Site**
2511606, SS 2025, 2 SWS, Language: English, Open in study portal

Content

- The Art of Understanding

- From Numbers to Insights
- Data, Information, and Knowledge
- Natural Language
- What is Successful Communication?
- The Art of Understanding

- Natural Language Processing

- NLP and Basic Linguistic Knowledge
- NLP Applications, Techniques and Challenges
- How to evaluate an NLP Experiment?
- Tokenization and Word Normalisation
- Statistical Language Models (N-Gram Model)
- Naive Bayes Text Classification
- Distributional Semantics and Word Vectors

- Knowledge Graphs

- Knowledge Representations and Ontologies
- Resource Description Framework (RDF)
- Modeling with RDFS
- Querying RDF(S) with SPARQL
- Popular Knowledge Graphs - Wikidata and DBpedia
- Ontologies with the Web Ontology Language (OWL)
- Linked Data Quality Assurance with SHACL
- From Linked Data to Knowledge Graphs

- Basic Machine Learning

- Machine Learning Fundamentals
- Evaluation and Generalization Problems
- Linear Regression
- Decision Trees
- Unsupervised Learning
- Neural Networks and Deep Learning
- Word Embeddings
- Knowledge Graph Embeddings

- ISE Applications

- Knowledge Graph Completion
- Knowledge Graphs and Large Language Models
- Semantic and Exploratory Search
- Semantic Recommender Systems

Learning objectives:

- The students know the fundamentals and measures of information theory and are able to apply those in the context of Information Service Engineering.
- The students have basic skills of natural language processing and are enabled to apply natural language processing technology to solve and evaluate simple text analysis tasks.
- The students have fundamental skills of knowledge representation with ontologies as well as basic knowledge of Semantic Web and Linked Data technologies. The students are able to apply these skills for simple representation and analysis tasks.
- The students have fundamental skills of information retrieval and are enabled to conduct and to evaluate simple information retrieval tasks.
- The students apply their skills of natural language processing, Linked Data engineering, and Information Retrieval to conduct and evaluate simple knowledge mining tasks.
- The students know the fundamentals of recommender systems as well as of semantic and exploratory search.

Literature

- D. Jurafsky, J.H. Martin, Speech and Language Processing, 2nd ed. Pearson Int., 2009.
- A. Hogan, The Web of Data, Springer, 2020.
- G. Rebala, A. Ravi, S. Churiwala, An Introduction to Machine Learning, Springer, 2019.

T 5.207 Course: Infrastructure Management [T-BGU-106300]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100998 - Design, Construction, Operation and Maintenance of Highways
M-BGU-100999 - Highway Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	6	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6233801	Design and Construction of Roads	2 SWS	Lecture / 🗣	Zimmermann, Stelzenmüller
ST 2025	6233802	Operation and Maintenance of Roads	2 SWS	Lecture / 🗣	Zimmermann, Hess, Stelzenmüller
Exams					
WT 24/25	8245106300	Infrastructure Management			Zimmermann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 120 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
180 hours

T 5.208 Course: Innovation and Project Management in Rail Vehicle Engineering [T-MACH-113068]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106496 - Modern Mobility on Rails and Roads

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	5

Events					
WT 24/25	2115921	Innovation and Project Management in Rail Vehicle Engineering	2 SWS	Lecture / 🗣	Lang, Cichon
ST 2025	2115921	Innovation and Project Management in Rail Vehicle Engineering	2 SWS	Lecture / 🗣	Lang, Cichon
Exams					
WT 24/25	76-T-MACH-106427	Innovation and Project Management in Rail Vehicle Engineering			Lang, Cichon
ST 2025	76-T-MACH-106427	Innovation and Project Management in Rail Vehicle Engineering			Lang, Cichon

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Graded examination:
2/3 of the examination: 20-minute oral examination on the content of the lecture
1/3 of the examination performance of another type: unit accompanying the lecture as part of a 10-minute presentation and a practical application from innovation and project management

Workload
135 hours

T 5.209 Course: Innovation Lab [T-ETIT-110291]

Responsible: Prof. Dr.-Ing. Sören Hohmann
Prof. Dr. Werner Nahm
Prof. Dr.-Ing. Eric Sax
Prof. Dr. Wilhelm Stork
Prof. Dr.-Ing. Thomas Zwick

Organisation: KIT Department of Electrical Engineering and Information Technology

Part of: M-WIWI-105011 - Student Innovation Lab (SIL) 2

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	9	Grade to a third	Each term	2 terms	1

Events					
WT 24/25	2303192	Innovation Lab	2 SWS	Project (P / 🗣	Hohmann, Zwick, Sax, Stork, Nahm, Schmalen, Rost
ST 2025	2303192	Innovation Lab	2 SWS	Project (P / 🗣	Hohmann, Zwick, Sax, Stork, Terzidis
Exams					
WT 24/25	7303192	Innovation Lab			Hohmann, Zwick, Stork, Sax, Nahm

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
see module description

T 5.210 Course: Innovation Management: Concepts, Strategies and Methods [T-WIWI-102893]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2545100	Innovation Management: Concepts, Strategies and Methods	2 SWS	Lecture /	Weissenberger-Eibl
Exams					
WT 24/25	7900145	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl
ST 2025	7900144	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every summer semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Innovation Management: Concepts, Strategies and Methods

2545100, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
The course ‘Innovation Management: Concepts, Strategies and Methods’ offers scientific concepts which facilitate the understanding of the different phases of the innovation process and resulting strategies and appropriate methodologies suitable for application. The concepts refer to the entire innovation process so that an integrated perspective is made possible. This is the basis for the teaching of strategies and methods which fulfil the diverse demands of the complex innovation process. The course focuses particularly on the creation of interfaces between departments and between various actors in a company’s environment and the organisation of a company’s internal procedures. In this context a basic understanding of knowledge and communication is taught in addition to the specific characteristics of the respective actors. Subsequently methods are shown which are suitable for the profitable and innovation-led implementation of integrated knowledge.

Aim: Students develop a differentiated understanding of the different phases and concepts of the innovation process, different strategies and methods in innovation management.

Organizational issues
Wichtig! Bitte treten Sie dem **ILIAS-Kurs zur Vorlesung** bei, damit wir Ihnen weitere Informationen mitteilen können.

Literature
Eine ausführliche Literaturliste wird mit den Vorlesungsunterlagen zur Verfügung gestellt.

Eine Einführung bei: Vahs,D./Brem,A. (2013): Innovationsmanagement. Von der Idee zur erfolgreichen Vermarktung, 4. Auflage, Stuttgart 2013.

T 5.211 Course: Innovation2Business – Innovation Strategy in the Industrial Corporate Practice [T-MACH-112882]

Responsible: Prof. Dr.-Ing. Albert Albers
Organisation: KIT Department of Mechanical Engineering

Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2145182	Innovation2Business – Innovation Strategy in the Industrial Corporate Practice	2 SWS	Lecture / 🗣	Albers
Exams					
WT 24/25	76-T-MACH-112882	Innovation2Business – innovation strategy in the industrial corporate practice			Albers

Legend: 🖥 Online, ✿ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam based on the lecture handout and materials, duration 90 minutes

Prerequisites
none

Recommendation
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V Innovation2Business – Innovation Strategy in the Industrial Corporate Practice
2145182, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
On-Site

Content
lecture block at the Bühl & Herzogenaurach locations with plant tours & fireside evenings + exam-preparatory Q&A.
Exam: written, limited to 30 seats (recommended for: Master's degree; mechanical engineering, industrial engineering, electrical engineering, computer science) → see module manual for details.
In this lecture series, use Schaeffler as an example to learn how global companies continuously transform themselves to grow sustainably and become
maintain a leading position in the global market in the long term through business-oriented innovation.
Together we will go through the most important elements of the innovation and development process and learn about the successes and learnings based on
vivid examples from practice.
Join the fireside evenings with the speakers to discuss the lecture content and beyond in a relaxed atmosphere.
The event is limited to 30 students and is free for you (meals, bus transfers & accommodations).

Organizational issues
Vorlesung findet an Schaeffler-Standorten (Herzogenaurach und Bühl) statt.

Sprache: Unterlagen Englisch, Vortragssprache Deutsch

T 5.212 Course: Integrated Design Project in Water Resources Management [T-BGU-111275]

Responsible: PD Dr.-Ing. Uwe Ehret
Dr.-Ing. Frank Seidel

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	6	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	6224801	Integrated Design Project in Water Resources Management	4 SWS	Lecture / Practice (/ 🗣	Ehret, Seidel
Exams					
ST 2025	8244111275	Integrated Design Project in Water Resources Management			Ehret, Seidel

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
project work, report approx. 15 pages with presentation approx. 15 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
180 hours

T 5.213 Course: Integrated Product Development [T-MACH-105401]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Tobias Düser

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-102626 - Major Field: Integrated Product Development

Type	Credits	Grading scale	Recurrence	Version
Oral examination	18	Grade to a third	Each winter term	3

Events					
WT 24/25	2145156	Lecture: IP – Integrated Product Development	4 SWS	Lecture / 🗣	Albers
WT 24/25	2145157	Workshop: IP – Integrated Product Development	4 SWS	Practice / 🗣	Albers
WT 24/25	2145300	Project Work: IP - Integrated Product Development	2 SWS	Others (sons / 🗣	Albers
Exams					
WT 24/25	76-T-MACH-105401	Integrated Product Development			Albers

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (approx. 60 minutes)

Prerequisites
none

Annotation
Due to organizational reasons, the number of participants is limited. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK hompage from April to July. The selection itself is made by the course's responsible in personal interviews. The criterion for selection is the progress of studies. In the event of equal progress, the decision is made by lot.

Workload
480 hours

Below you will find excerpts from events related to this course:

V Lecture: IP – Integrated Product Development

2145156, WS 24/25, 4 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

Registration required in the previous summer semester. The lecture starts in first week of October.

Prerequisites:

The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK hompage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:

none

Workload:

regular attendance: 84 h

self-study: 288 h

Examination:

oral examination (60 minutes)

combined examination of lectures, tutorials and project work

Course content:

organizational integration: integrated product engineering model, core team management and simultaneous engineering

informational integration: innovation management, cost management, quality management and knowledge management

personal integration: team coaching and leadership management

invited lectures

Learning objectives:

The Students are able to ...

- analyze and evaluate product development processes based on examples and their own experiences.
- plan, control and evaluate the working process systematically.
- choose and use suitable methods of product development, system analysis and innovation management under consideration of the particular situation.
- prove their results.
- develop complex technical solutions in a team and to present them to qualified persons as well as non-qualified persons
- to design overall product development processes under consideration of market-, customer- and company- aspects

Literature

Klaus Ehrlenspiel - Integrierte Produktentwicklung. Denkabläufe, Methodeneinsatz, Zusammenarbeit, Hanser Verlag, 2009

V	**Workshop: IP – Integrated Product Development** 2145157, WS 24/25, 4 SWS, Language: German, Open in study portal	**Practice (Ü)** **On-Site**

Content

Prerequisites:

The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK hompage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:

none

Workload:

regular attendance: 84 h

self-study: 288 h

Examination:

lectures: 21 h

preparation to exam: 99 h

Course content:

problem solving: analysis techniques, creativity techniques and evaluation methods

professional skills: presentation techniques, moderation and teamcoaching

development tools: MS Project, Szenario-Manager & Pro/Engineer Wildfire

Learning objectives:

The theoretical background taught in the lecture, is deepened through methodworkshops, business games and case studies. The reflexion of the onself precedure allows for an applicability and practicability of the contents in the accompnying development project as well as for the career entry.

Literature

Klaus Ehrlenspiel - Integrierte Produktentwicklung. Denkabläufe, Methodeneinsatz, Zusammenarbeit, Hanser Verlag, 2009

V **Project Work: IP - Integrated Product Development** — **Others (sonst.) On-Site**

2145300, WS 24/25, 2 SWS, Language: German, Open in study portal

Content
Participation only possible in combination with the lecture 2145156 'Integrated Product Development'.

Prerequisites:

The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK hompage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:

none

Workload:

regular attendance: 21 h

self-study: 99 h

Examination:

oral examination (60 minutes)

combined examination of lectures, tutorials and project work

Course content:

The project work begins with the early stages of product development, i.e. the identification of market trends and needs. Based on this information the students develop scenarios for future markets and create product profiles, which describe the customers and their demands without anticipating possible product solutions. After having passed several following milestones for ideas, concepts and designs, virtual prototypes and function prototypes are presented to an audience.
The project work is supported by coaching through skilled faculty staff. Additionally weekly tutorials, respectively workshops are given. For doing the project the teams gain access to team workspaces featuring IT-infrastructure and relevant software, such as office, CAD or FEA. Further on the teams learn how team cooperation and knowledge management can be supported in design project by using a wiki system.s

Learning objectives:

The center of "Integrated Product Development" constitutes itself in the development of a technical product within independent working student teams on the basis of the market situation up to virtual and real prototypes. Thereby the integrate treatment of the product development process is of importance. The project teams hereby represent development departments of medium sized companies, in which the presented methods and tools are field - experienced applied and ideas are transformed into concrete product models.
For the preparation of this development project the basics of 3D-CAD-modelling (Pro/ENGINEER) as well as different tools and methods of creative designing, of sketching and solution finding are mediated in workshops. Special events impart an insight of presentation techniques and the meaning of technical design.

5.214 Course: Integrated Production Planning in the Age of Industry 4.0 [T-MACH-109054]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101272 - Integrated Production Planning

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Events					
ST 2025	2150660	Integrated Production Planning in the Age of Industry 4.0	6 SWS	Lecture / Practice (/ 🗣	Lanza
Exams					
WT 24/25	76-T-MACH-109054	Integrated Production Planning in the Age of Industry 4.0			Lanza
ST 2025	76-T-MACH-109054	Integrated Production Planning in the Age of Industry 4.0			Lanza

Legend: 🖥 Online, ✧ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (120 min)

Prerequisites
"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

Workload
270 hours

Below you will find excerpts from events related to this course:

V **Integrated Production Planning in the Age of Industry 4.0**
2150660, SS 2025, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

Integrated Production Planning in the age of Industry 4.0 will be taught in the context of this engineering science lecture. In addition to a comprehensive introduction to Industry 4.0, the following topics will be addressed at the beginning of the lecture:

- Basics, history and temporal development of production
- Integrated production planning and integrated digital engineering
- Principles of integrated production systems and further development with Industry 4.0

Building on this, the phases of integrated production planning are taught in accordance with VDI Guideline 5200, whereby special features of parts production and assembly are dealt with in the context of case studies:

- Factory planning system
- Definition of objectives
- Data collection and analysis
- Concept planning (structural development, structural dimensioning and rough layout)
- Detailed planning (PPS, process simulation as a validation tool, planning of conveyor technology and storage systems for linking production and IT systems in the I4.0 factory)
- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are complemented by numerous current practical examples with a strong Industry 4.0 reference. Aspects of sustainability are anchored in all units and thus basic knowledge of sustainable production planning is taught. Within the exercises the lecture contents are deepened and applied to specific problems and tasks.

Learning Outcomes:

The students ...

- can discuss basic questions of production technology.
- are able to apply the methods of integrated production planning to new problems.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques for a specific problem.
- can apply the learned methods of integrated production planning to new problems.
- can use their knowledge targeted for efficient production technology.
- know the basic features of sustainable production planning and can apply underlying knowledge.

Workload:

MACH:
regular attendance: 63 hours
self-study: 177 hours
WING:
regular attendance: 63 hours
self-study: 207 hours

Organizational issues

Vorlesungstermine dienstags 14.00 Uhr und donnerstags 14.00 Uhr, Übungstermine donnerstags 15.45 Uhr. Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.215 Course: Integrative Strategies in Production and Development of High Performance Cars [T-MACH-105188]

Responsible: Karl-Hubert Schlichtenmayer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2150601	Integrative Strategies in Production and Development of High Performance Cars	2 SWS	Lecture / 🗣	Schlichtenmayer
Exams					
WT 24/25	76-T-MACH-105188	Integrative Strategies in Production and Development of High Performance Cars			Schlichtenmayer
ST 2025	76-T-MACH-105188	Integrative Strategies in Production and Development of High Performance Cars			Schlichtenmayer

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Integrative Strategies in Production and Development of High Performance Cars — **Lecture (V) On-Site**
2150601, SS 2025, 2 SWS, Language: German, Open in study portal

Content

The lecture deals with the technical and organizational aspects of integrated development and production of sports cars on the example of Porsche AG. The lecture begins with an introduction and discussion of social trends. The deepening of standardized development processes in the automotive practice and current development strategies follow. The management of complex development projects is a first focus of the lecture. The complex interlinkage between development, production and purchasing are a second focus. Methods of analysis of technological core competencies complement the lecture. The course is strongly oriented towards the practice and is provided with many current examples.

The main topics are:

- Introduction to social trends towards high performance cars
- Automotive Production Processes
- Integrative R&D strategies and holistic capacity management
- Management of complex projects
- Interlinkage between R&D, production and purchasing
- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

Learning Outcomes:

The students …

- are capable to specify the current technological and social challenges in automotive industry.
- are qualified to identify interlinkages between development processes and production systems.
- are able to explain challenges and solutions of global markets and global production of premium products.
- are able to explain modern methods to identify key competences of producing companies.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Literature
Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

5.216 Course: Intelligent Agent Architectures [T-WIWI-111267]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540525	Intelligent Agent Architectures	2 SWS	Lecture / 🗣	Geyer-Schulz
WT 24/25	2540526	Übung zu Intelligent Agent Architectures	1 SWS	Practice / 🗣	Geyer-Schulz, Bell
Exams					
WT 24/25	79011480	Intelligent Agent Architectures (WS 2024/2025)			Geyer-Schulz
ST 2025	7900069	Intelligent Agent Architectures (Nachklausur WS 2024/2025)			Geyer-Schulz

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".

Workload
135 hours

Below you will find excerpts from events related to this course:

V Intelligent Agent Architectures
2540525, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

Course content:

The lecture is structured in three parts:

In the first part the methods used for architecture design are introduced (system analysis, UML, formal specification of interfaces, software and analysis patterns, and the separation in conceptual and IT-architectures. The second part is dedicated to learning architectures and machine learning methods. The third part presents examples of learning CRM-Architectures.

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Learning Goals:

Students have special knowledge of software architectures and of the methods which are used in their development (Systems analysis, formal methods for the specification of interfaces and algebraic semantic, UML, and, last but not least, the mapping of conceptual architectures to IT architectures.

Students know important architectural patterns and they can – based on their CRM knowledge – combine these patterns for innovative CRM applications.

Assessment:

The assessment consists of a written exam of 1-hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from exercise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Literature

- P. Clements *u. a.*, *Documenting Software Architectures. Views and Beyond*. Upper Saddle River: Addison-Wesley, 2011.
- Fowler, *Patterns of Enterprise Application Architecture*. Amsterdam: Addison-Wesley Longman, 2002.
- S. Russell und P. Norvig, *Artificial Intelligence: A Modern Approach*, 3. Aufl. Harlow Essex England: Pearson New International Edition, 2014.
- V. N. Vapnik, *The Nature of Statistical Learning Theory*. New York: Springer, 1995.

T 5.217 Course: Intelligent Agents and Decision Theory [T-WIWI-110915]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2540537	Intelligent Agents and Decision Theory	2 SWS	Lecture	Geyer-Schulz
ST 2025	2540538	Übung zu Intelligent Agents and Decision Theory	1 SWS	Practice	Bell
Exams					
WT 24/25	7900294	Intelligent Agents and Decision Theory (Nachklausur SoSe 2024)			Geyer-Schulz
ST 2025	7900306	Intelligent Agents and Decision Theory			Geyer-Schulz

Competence Certificate
Written examination (60 minutes). The exam is held in each semester and can be repeated at any regular examination date. Details of the grading system and any exam bonus that may be achieved from the practice are announced in the course.

Prerequisites
None

Recommendation
We assume knowledge in statistics, operations research and microeconomics as taught in the Bachelor program (VWL I, Operations Research I + II, Statistics I + II) and a familiarity with preferably the Python programming language.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Intelligent Agents and Decision Theory
2540537, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content

The key assumption of this lecture is that the concept of artificial intelligence is inseparably linked to the economic concept of rationality of agents. We consider different classes of decision problems - decisions under certainty, risk and uncertainty - from an economic, managerial and AI-engineering perspective:

From an economic point of view, we analyze how to act rationally in these situations based on classic utility theory. In this regard, the course also introduces the relevant parts of decision theory for dealing with

- multiple conflicting objectives,
- incomplete, risky and uncertain information about the world,
- assessing utility functions, and
- quantifying the value of information ...

From an engineering perspective, we discuss how to develop practical solutions for these decision problems, using appropriate AI components. We introduce

- a general, agent-based design framework for AI systems,

as well as AI methods from the fields of

- search (for decisions under certainty),
- inference (for decions under risk) and
- learning (for decisions under uncertainty).

Where applicable, the course highlights the theoretical ties of these methods with decision theory.

We conclude with a discussion of ethical and philosophical issues concerning the development and use of AI.

Learning objectives

Students are able to design, analyze, implement, and evaluate intelligent agents.

Lecture Outline

1. Introduction: Artificial intelligence and the economic concept of rationality
2. Intelligent Agents: A general, agent-based design framework for AI systems
3. Decision under certainty: Assessing utility functions for decisions with multiple objectives
4. Search: Linear programming for decisions under certainty
5. Decisions under risk: The expected utility principle
6. Information systems: Improving economic decisions under risk
7. Inference: Bayesian networks for decisions under risk
8. Learning: Bayesian Networks (Basics)
9. Learning: Bayesian Networks (Algorithms I)
10. Learning: Bayesian Networks (Algorithms II)

Note: This rough outline may be subject to change.

Literature

Bamberg, Coenenberg & Krapp (2019). Betriebswirtschaftliche Entscheidungslehre (16th ed.). Verlag Franz Vahlen GmbH.

Fishburn (1988). Nonlinear preference and utility theory. Baltimore: Johns Hopkins University Press.

Keeney & Raiffa (1993). Decisions with multiple objectives: preferences and value trade-offs. Cambridge University Press.

Nickel, S., Stein, O., & Waldmann, K.-H. (2014). Operations Research (2nd ed.). Springer Berlin Heidelberg.

Russell & Norvig (2016). Artificial Intelligence: A Modern Approach (3rd Global Edition). Pearson.

Koller, D., & Friedman, N. (2009). Probabilistic graphical models: principles and techniques. MIT Press.

Sutton & Barto (2018). Reinforcement learning: An introduction. Cambridge: MIT press.

T 5.218 Course: International Business Development and Sales [T-WIWI-110985]

Responsible: Erice Casenave
Prof. Dr. Martin Klarmann
Prof. Dr. Orestis Terzidis

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	see Annotations	1

Events					
WT 24/25	2572189	International Business Development and Sales	4 SWS	Block / 🗣	Klarmann, Terzidis, Schmitt
Exams					
WT 24/25	7900156	International Business Development and Sales			Klarmann, Terzidis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

Annotation
Please contact the Marketing and Sales Research Group for further information.

Workload
180 hours

Below you will find excerpts from events related to this course:

V International Business Development and Sales

2572189, WS 24/25, 4 SWS, Language: English, Open in study portal

Block (B)
On-Site

Content
This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model.

- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.

Total workload for 6 ECTS: about 180 hours.

T 5.219 Course: International Finance [T-WIWI-102646]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	see Annotations	1

Events					
ST 2025	2530570	International Finance	2 SWS	Lecture / 🗣	Walter, Uhrig-Homburg
Exams					
WT 24/25	7900052	International Finance			Uhrig-Homburg
ST 2025	7900097	International Finance			Uhrig-Homburg

Legend: 📱 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The success control takes place in form of a written examination (60 min). If the number of participants is low, an oral examination may also be offered. The examination is offered every semester and can be repeated at any regular examination date.

Prerequisites
None

Recommendation
None

Annotation
The course is offered as a 14-day or block course.

Below you will find excerpts from events related to this course:

V International Finance
2530570, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
Kickoff am Mittwoch, 30.04.25, 16:00 - 19:15 Uhr im Raum 320 im Geb. 09.21 (Blücherstr. 17). Die Veranstaltung wird samstags als Blockveranstaltung angeboten (nach dem Kickoff nach Absprache).

Literature
Weiterführende Literatur:

- Eiteman, D. et al., Multinational Business Finance, 13. Auflage, 2012.
- Solnik, B. und D. McLeavey, Global Investments, 6. Auflage, 2008.

T 5.220 Course: Internet Law [T-INFO-101307]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2424354	Internet Law	2 SWS	Lecture / 🧩	Sattler
Exams					
WT 24/25	7500060	Internet Law			Sattler
ST 2025	7500057	Internet Law			Sattler

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 120 minutes.

Prerequisites
The course **Ausgewählte Rechtsfragen des Internetrechts T-INFO-108462** may not have started.

Recommendation
None.

Annotation
Lecture (with written exam) **Internet Law** T-INFO-101307 is offered in the winter semester.

Colloquium (other type of examination) **Selected Legal Issues in Internet Law** T-INFO-108462 is offered in the summer semester.

T 5.221 Course: Introduction to Bayesian Statistics for Analyzing Data [T-WIWI-110918]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Competence Certificate
Grades will be based on active participation (50%) and homework assignments (50%). The points system for the assessment is determined by the lecturer of the course. It will be announced at the beginning of the course.

Prerequisites
Participants should already have a basic knowledge of R and standard frequentist statistical tests. Please bring your own Laptop with you as we will be using R for several hands-on examples and exercises during the class. We will mainly work with the book “Statistical Rethinking. A Bayesian Course with Examples in R and Stan” by Richard McElrath. Students are advised to obtain the book before the class starts.

Annotation
Due to its interactive nature, the number of participants will be limited.

Workload
135 hours

T 5.222 Course: Introduction to Bionics [T-MACH-111807]

Responsible: apl. Prof. Dr. Hendrik Hölscher
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS
M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2025	2142151	Introduction to Biomimetics	2 SWS	Lecture / 🗣	Hölscher, Greiner
Exams					
WT 24/25	76-T-MACH-102172	Introduction into Biomimetics			Hölscher

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam (duration: 60 minutes)

Prerequisites
none

Annotation
Brick T-MACH-102172 may not be started

Below you will find excerpts from events related to this course:

V Introduction to Biomimetics
2142151, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

The students should be able analyze, judge, plan and develop biomimetic strategies and products.

Basic knowledge in physics and chemistry

The successfull attandence of the lecture is controlled by a written examination.

Organizational issues
Im ILIAS werden Materialien (Videos, Originalliteratur, Übungen) zur Vertiefung zur Verfügung gestellt.

Für die schriftliche Klausur werden zwei Termine angeboten (erste Woche nach Vorlesungsende im Sommersemester und eine Woche vor Vorlesungsbeginn im Wintersemester).

Literature
Folien und Literatur werden in ILIAS zur Verfügung gestellt.

T 5.223 Course: Introduction to Ceramics [T-MACH-100287]

Responsible: apl. Prof. Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2125757	Introduction to Ceramics	3 SWS	Lecture / Blended	Schell
Exams					
WT 24/25	76-T-MACH-100287	Introduction to Ceramics			Schell, Bucharsky, Wagner
ST 2025	76-T-MACH-100287	Introduction to Ceramics			Schell, Bucharsky, Wagner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of an oral exam (30 min) taking place at a specific date.

The re-examination is offered at a specific date.

Prerequisites
None

Workload
180 hours

Below you will find excerpts from events related to this course:

V Introduction to Ceramics

2125757, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature

- H. Salmang, H. Scholze, "Keramik", Springer
- Kingery, Bowen, Uhlmann, "Introduction To Ceramics", Wiley
- Y.-M. Chiang, D. Birnie III and W.D. Kingery, "Physical Ceramics", Wiley
- S.J.L. Kang, "Sintering, Densification, Grain Growth & Microstructure", Elsevier

T 5.224 Course: Introduction to Food Law [T-CHEMBIO-108091]

Responsible: Prof. Dr. Thomas Kuballa
Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1,5	pass/fail	Each winter term	2

Events					
WT 24/25	6627	Einführung in das Lebensmittelrecht	1 SWS	Lecture	Kuballa
Exams					
WT 24/25	71B108091	Introduction to Food Law			Kuballa
WT 24/25	71B108091-2	Introduction to Food Law			Kuballa

Prerequisites
none

T 5.225 Course: Introduction to Hydrogeology [T-BGU-101499]

Responsible: Prof. Dr. Nico Goldscheider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	2

Events					
WT 24/25	6339050	Introduction to Hydrogeology	4 SWS	Lecture / Practice (/ 🗣	Goldscheider
Exams					
WT 24/25	8210_101499	Introduction to Hydrogeology			Goldscheider
ST 2025	8210_101499_	Introduction to Hydrogeology			Goldscheider

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written exam with 90 minutes

Prerequisites
none

Workload
150 hours

T 5.226 Course: Introduction to Microsystem Technology - Practical Course [T-MACH-108312]

Responsible: Dr. Arndt Last
Organisation: KIT Department of Mechanical Engineering

Part of:
M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS
M-MACH-101291 - Microfabrication
M-MACH-101292 - Microoptics
M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each term	1

Events					
WT 24/25	2143877	Introduction to Microsystem Technology - Practical Course	2 SWS	Practical course / 🗣	Last
ST 2025	2143877	Introduction to Microsystem Technology - Practical Course	2 SWS	Practical course / 🗣	Last
Exams					
WT 24/25	76-T-MACH-108312	Introduction to Microsystem Technology - Practical Course			Last

Legend: 📱 Online, ✿ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
non-graded written examination

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Introduction to Microsystem Technology - Practical Course
2143877, WS 24/25, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung ' Grundlagen der Mikrosystemtechnik'

V Introduction to Microsystem Technology - Practical Course
2143877, SS 2025, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content
In the practical training includes nine experiments:

1. X-ray optics
2. UVL + REM
3. Micromixer
4. Atomic force microscopy
5. 3D-Printing
6. Light dirffraction at Chromium masks
7. Moulding
8. SAW-bio-sensors
9. Nano3D-printer - material transfer of thin foils
10. Electro spinning

Each student takes part in only four experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

Organizational issues
Das Praktikum findet in den Laboren des IMT am KIT-CN statt. Treffpunkt: Eingang Bau 301.

Teilnahmeanfragen an Dr. A. Last, arndt.last@kit.edu

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung ' Grundlagen der Mikrosystemtechnik'

T 5.227 Course: Introduction to Microsystem Technology I [T-MACH-114100]

Responsible: Dr. Vlad Badilita
Prof. Dr. Jan Gerrit Korvink

Organisation: KIT Department of Mechanical Engineering

Part of: M-ETIT-101158 - Sensor Technology I
M-MACH-101287 - Microsystem Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2141861	Introduction to Microsystem Technology I	2 SWS	Lecture / 🗣	Korvink, Badilita

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written examination (60 min)

Prerequisites
T-MACH-114035 and T-MACH-105182 must not have started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Introduction to Microsystem Technology I

2141861, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Mikrosystemtechnik für Ingenieure, W. Menz und J. Mohr, VCH Verlagsgesellschaft, Weinheim 2005

M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011

T 5.228 Course: Introduction to Microsystem Technology II [T-MACH-114101]

Responsible: Dr. Vlad Badilita
Prof. Dr. Jan Gerrit Korvink

Organisation: KIT Department of Mechanical Engineering

Part of: M-ETIT-101158 - Sensor Technology I
M-MACH-101287 - Microsystem Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2142874	Introduction to Microsystem Technology II	2 SWS	Lecture / 🗣	Korvink, Badilita

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written examination (60 min)

Prerequisites
T-MACH-114035 and T-MACH-105183 must not have started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Introduction to Microsystem Technology II

2142874, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

Organizational issues
Topic: Grundlagen der Mikrosystemtechnik II (MST II) SS 21
Time: Thursdays 14:00 - 15:30

10.91 Redtenbacher-Hörsaal

Literature
Menz, W., Mohr, J., O. Paul: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 2005

M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011

T 5.229 Course: Introduction to Nanotechnology [T-MACH-111814]

Responsible: apl. Prof. Dr. Hendrik Hölscher
Organisation: KIT Department of Mechanical Engineering
KIT Department of Economics and Management
Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	2

Events					
ST 2025	2142152	Introduction to Nanotechnology	2 SWS	Lecture / 🗣	Hölscher
Exams					
WT 24/25	76-T-MACH-105180	Introduction into Nanotechnology			Hölscher, Dienwiebel

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam 90 min

Prerequisites
none

Annotation
Brick T-MACH-111814 may not be started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Introduction to Nanotechnology
2142152, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Nanotechnology deals with the fabrication and analysis of nanostructures. The topics of the lecture include

- the most common measurement principles of nanotechnology especially scanning probe methods
- the analysis of physical and chemical properties of surfaces
- interatomic forces and their influence on nanostructures
- methods of micro- and nanofabrication and lithography
- basic models of contact mechanics and nanotribology
- important functional characteristics of nanodevices

Basic knowledge in mathematics and physics is assumed

The successfull attandence of the lecture is controlled by a 30 minutes oral exam.

Organizational issues
Es werden im ILIAS Materialien (Videos, Originalliteratur, Übungen) zum Vertiefung zur Verfügung gestellt.

Für die mündlichen Prüfungen werden zwei Termine angeboten (erste Woche nach Vorlesungsende im Sommersemester und eine Woche vor Vorlesungsbeginn im Wintersemester).

Literature
Alle Folien und Originalliteratur werden auf ILIAS zur Verfügung gestellt.

T 5.230 Course: Introduction to Sensory Analysis with Practice [T-CIWVT-111534]

Responsible: Prof. Dr. Katharina Scherf
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Events					
WT 24/25	6630		1 SWS	Lecture	Hofsäß
ST 2025	6630	Einführung in die Sensorik mit Übungen	1 SWS	Lecture / 🗣	Hofsäß
Exams					
WT 24/25	7220016	Introduction to Sensory Analysis with Practice			Bunzel
ST 2025	7220016	Introduction to Sensory Analysis with Practice			Scherf

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Prerequisites
None

T 5.231 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2550470	Introduction to Stochastic Optimization	2 SWS	Lecture / 🖥	Rebennack
ST 2025	2550471	Übung zur Einführung in die Stochastische Optimierung	1 SWS	Practice / 🗣	Rebennack, Kandora
ST 2025	2550474	Rechnerübung zur Einführung in die Stochastische Optimierung	2 SWS	Others (sons	Rebennack, Kandora
Exams					
WT 24/25	7900242	Introduction to Stochastic Optimization			Rebennack
ST 2025	7900311	Introduction to Stochastic Optimization			Rebennack

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites
None.

Workload
135 hours

T 5.232 Course: IoT Platform for Engineering [T-MACH-106743]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	2

Events					
WT 24/25	2123352	IoT platform for engineering	3 SWS	Project (P / 🗣	Meyer, Maier, Rönnau
ST 2025	2123352	IoT platform for engineering	3 SWS	Project (P / 🗣	Meyer, Maier
Exams					
WT 24/25	76T-MACH-106743	IoT platform for engineering			Meyer

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Assessment of another type (graded), Group teaching project on Industry 4.0 consisting of: Conception, implementation, accompanying documentation and final presentation.

Below you will find excerpts from events related to this course:

V IoT platform for engineering

2123352, WS 24/25, 3 SWS, Language: German, Open in study portal

Project (PRO)
On-Site

Content
Industry 4.0, IT systems for fabrication and assembly, process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.

Students can

- map and analyze processes in the context of Industry 4.0 with special methods of process modelling
- collaboratively grasp practical I4.0 issues using existing hardware and software and work out solutions for a continuous improvement process in a team
- prototypically implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

Organizational issues
Auftakt: Mi 23 Okt 10:00h - G20.20 (EG) R061

Literature
Keine / None

V IoT platform for engineering

2123352, SS 2025, 3 SWS, Language: German, Open in study portal

Project (PRO)
On-Site

Content
Industry 4.0, IT systems for fabrication and assembly, process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.

Students can

- map and analyze processes in the context of Industry 4.0 with special methods of process modelling
- collaboratively grasp practical I4.0 issues using existing hardware and software and work out solutions for a continuous improvement process in a team
- prototypically implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

Organizational issues
Zeit und Ort siehe ILIAS

Literature
Keine / None

T 5.233 Course: IT-Based Road Design [T-BGU-101804]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101066 - Safety, Computing and Law in Highway Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6233901	IT-based Road Design	2 SWS	Lecture / Practice (/ 🗣	Zimmermann

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oram exam with 15 minutes

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.234 Course: IT-Fundamentals of Logistics [T-MACH-105187]

Responsible: Prof. Dr.-Ing. Frank Thomas
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	4

Competence Certificate
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites
none

Workload
120 hours

5.235 Course: Joint Entrepreneurship Summer School [T-WIWI-109064]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
ST 2025	2545021	Joint Entrepreneurship School China	4 SWS	Seminar / 🗣	Kleinn, Terzidis, Eckerle
Exams					
ST 2025	7900346	Joint Entrepreneurship Summer School (China)			Terzidis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The learning control of the program (Summer School) consists of two parts:
A) **Investor Pitch**:
Based on a presentation (investor pitch) in front of a jury, the insights gained and developed during the course of the event are presented and the business idea presented. Among other things, the presentation performance of the team, the structured content and the logical consistency of the business idea are evaluated. The exact evaluation criteria will be announced in the course.

B) **Written elaboration:**
The second part of the assessment is a written report. The iterative knowledge gain of the entire event is systematically logged and can be further supplemented by the contents of the presentation. The report documents key action steps, applied methods, findings, market analyzes and interviews and prepares them in writing. The exact structure and requirements will be announced in the course.

The grade consists of 50% presentation performance and 50% written preparation. The points system for the assessment is determined by the lecturer of the course. It will be announced at the beginning of the course.

Prerequisites
The Summer School is aimed at master students of KIT. Prerequisite is the participation in the selection process.

Recommendation
We recommend basic business knowledge, the lecture Entrepreneurship as well as openness and interest in intercultural exchange. Solid knowledge of the English language is an advantage.

Annotation
The working language during the Summer School is English. A one-week stay in China is part of the Summer School.

Below you will find excerpts from events related to this course:

V Joint Entrepreneurship School China

2545021, SS 2025, 4 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
During the Summer School in Shanghai and Karlsruhe, students develop a business model of technologies and patents developed at KIT in workshops in German-Chinese tandems over the period of two weeks.

Click on our website for detailed information and a video: https://etm.entechnon.kit.edu/english/1095.php

Organizational issues
Dates:

- Briefing: April / May
- Karlsruhe: Presumably: 04.-08. August 2025
- Shanghai: Presumably: 22.-26. September 2025
- Deliverables: November 2025

T 5.236 Course: KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics [T-WIWI-111109]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-103118 - Data Science: Data-Driven User Modeling
M-WIWI-104080 - Designing Interactive Information Systems
M-WIWI-105714 - Consumer Research
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Irregular	1 terms	1

Competence Certificate
Non exam assessment. Grading will be based on a continuous basis throughout the semester. The assessment consists of:

- A written paper, and
- a group presentation with subsequent discussion and question and answer session of 30 minutes.

For particularly active and constructive participation in the discussions of other papers during the final presentation, a bonus of one grade level (0.3 or 0.4) can be achieved on the passed exam. Details on the grading will be announced at the beginning of the event.

Annotation
The number of participants is limited due to laboratory capacity and to ensure optimal supervision of the project groups. Places are allocated on the basis of preferences and suitability for the topics. Previous knowledge in the field of experimental economic research is particularly important.

The course cannot be offered in the summer semester 2024.

Workload
135 hours

T 5.237 Course: Knowledge Discovery [T-WIWI-102666]

Responsible: Dr.-Ing. Tobias Käfer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2511303	Knowledge Discovery, Graph Neural Networks, and Language Models	3 SWS	Lecture / Practice (/	Käfer, Shao, Noullet
Exams					
WT 24/25	79AIFB_KD_B3	Knowledge Discovery			Käfer
ST 2025	79AIFB_KD_C4	Knowledge Discovery (Registration until 21.07.2025)			Färber

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The overall grade will be determined using assignments during the semester (40% of the grade) and a final exam (60% of the grade).

Prerequisites
None

Workload
135 hours

Below you will find excerpts from events related to this course:

V **Knowledge Discovery, Graph Neural Networks, and Language Models**
2511303, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Content

The lecture provides a comprehensive overview of various approaches in machine learning and data mining for knowledge extraction. It explores multiple fields, including machine learning, natural language processing, and knowledge representation. The main focus is on discovering patterns and regularities in extensive data sets, particularly unstructured text found in news articles, publications, and social media. This process is known as knowledge discovery. The lecture delves into specific techniques, methods, challenges, as well as current and future research topics within this field.

One part of the lecture is dedicated to understanding large language models (LLMs), such as ChatGPT, by exploring their underlying principles, training methods, and applications. Additionally, the lecture dives into graph representation learning, which involves extracting meaningful representations from graph data. It covers the mathematical foundations of graph and geometric deep learning, highlighting the latest applications in areas like explainable recommender systems.

Moreover, the lecture highlights the integration of knowledge graphs with large language models, known as neurosymbolic AI. This integration aims to combine structured and unstructured data to enhance knowledge extraction and representation.

The content of the lecture encompasses the entire machine learning and data mining process. It covers topics on supervised and unsupervised learning techniques, as well as empirical evaluation. Various learning methods are explored, ranging from classical approaches like decision trees, support vector machines, and neural networks to more recent advancements such as graph neural networks.

Learning obectives:

Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preperation and postprocessing: 60 hours
- Exam and exam preperation: 30 hours

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (http://www-stat.stanford.edu/~tibs/ElemStatLearn/)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

T 5.238 Course: Laboratory Laser Materials Processing [T-MACH-102154]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each term	2

Events					
WT 24/25	2183640	Laboratory "Laser Materials Processing"	3 SWS	Practical course /	Schneider, Pfleging
ST 2025	2183640	Laboratory "Laser Materials Processing"	3 SWS	Practical course /	Schneider, Pfleging
Exams					
WT 24/25	76-T-MACH-102154	Laboratory Laser Materials Processing			Schneider
ST 2025	76-T-MACH-102154	Laboratory Laser Materials Processing			Schneider

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a colloquium for every single experiment and an overall final colloquium incl. an oral presentation of 20 min.

Prerequisites
None

Recommendation
Basic knowledge of physics, chemistry and material science is assumed.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Laboratory "Laser Materials Processing"

2183640, WS 24/25, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
The laboratory compromises 8 half-day experiments, which address the following laser processing topics of metals, ceramics and polymers:

• safety aspects

• surface hardening and remelting

• melt and reactive cutting

• surface modification by dispersing or alloying

• welding

• surface texturing

• metrology

There are used CO2-, excimer-, Nd:YAG- and high power diode-laser sources within the laboratory.

The student

- can describe the influence of laser, material and process parameters and can choose suitable parameters for the most important methods of laser-based processing in automotive engineering.
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

The attendance to one of the courses Physical Basics of Laser Technology (2181612) or Laser Application in Automotive Engineering (2182642) is strongly recommended.

regular attendance: 34 hours
self-study: 86 hours

The assessment consists of a colloquium for every single experiment and an overall final colloquium incl. an oral presentation of 20 min.

Organizational issues
Maximal 16 Teilnehmer/innen!
Es sind nur noch wenige Plätze frei (Stand 31.05.2024)! Registrierung für die Nachrückliste möglich per Email an johannes.schneider@kit.edu
Praktikum findet in Kleingruppen semesterbegleitend (dienstags bzw. mittwochs, halbtägig) auf dem Campus Nord am IAM-AWP (Geb. 681) und auf dem Campus Süd am IAM-CMS (Geb. 30.48) statt!

Termine werden mit den Teilnehmern/innen direkt abgestimmt.

Literature
F. K. Kneubühl, M. W. Sigrist: Laser, 2008, Vieweg+Teubner

T. Graf: Laser - Grundlagen der Laserstrahlquellen, 2009, Vieweg-Teubner Verlag

R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer

H. Hügel, T. Graf: Laser in der Fertigung, 2009, Vieweg+Teubner

J. Eichler, H.-J. Eichler: Laser - Bauformen, Strahlführung, Anwendungen, 2006, Springer

V **Laboratory "Laser Materials Processing"**
2183640, SS 2025, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

The laboratory compromises 8 half-day experiments, which address the following laser processing topics of metals, ceramics and polymers:

• safety aspects

• surface hardening and remelting

• melt and reactive cutting

• surface modification by dispersing or alloying

• welding

• surface texturing

• metrology

There are used CO2-, excimer-, Nd:YAG- and high power diode-laser sources within the laboratory.

The student

- can describe the influence of laser, material and process parameters and can choose suitable parameters for the most important methods of laser-based processing in automotive engineering.
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

The attendance to one of the courses Physical Basics of Laser Technology (2181612) or Laser Application in Automotive Engineering (2182642) is strongly recommended.

regular attendance: 34 hours
self-study: 86 hours

The assessment consists of a colloquium for every single experiment and an overall final colloquium incl. an oral presentation of 20 min.

Organizational issues

Die Praktikumsplätze für das Sommersemester 2025 sind bereits ausgebucht!

Anmeldung für die Nachrückliste per Email an johannes.schneider@kit.edu

Das Praktikum findet semesterbegleitend in Kleingruppen am IAM-ZM (CS) bzw. IAM-AWP (CN) statt!

Die Termine werden zu Beginn des Semesters bekannt gegeben.

Literature

F. K. Kneubühl, M. W. Sigrist: Laser, 2008, Vieweg+Teubner

T. Graf: Laser - Grundlagen der Laserstrahlquellen, 2009, Vieweg-Teubner Verlag

R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer

H. Hügel, T. Graf: Laser in der Fertigung, 2009, Vieweg+Teubner

J. Eichler, H.-J. Eichler: Laser - Bauformen, Strahlführung, Anwendungen, 2006, Springer

W.T. Silfvast: Laser Fundamentals, 2008, Cambrigde University Press

W.M. Steen: Laser Materials Processing, 2010, Springer

T 5.239 Course: Laboratory Production Metrology [T-MACH-108878]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Dr. Florian Stamer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	5	pass/fail	Each summer term	3

Events					
ST 2025	2150550	Laboratory Production Metrology	3 SWS	Practical course / On-Site	Lanza, Stamer
Exams					
ST 2025	76-T-MACH-108878	Laboratory Production Metrology			Lanza, Stamer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate

Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments

and

Oral Exam (15 min)

Prerequisites

none

Annotation

For organizational reasons the number of participants for the course is limited. Hence al selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

Workload

120 hours

Below you will find excerpts from events related to this course:

V Laboratory Production Metrology

2150550, SS 2025, 3 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content

During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The students learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software.

The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coodinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Learning Outcomes:

The students ...

- are able to name, describe and mark out different measurement technologies that are relevant in a production environment.
- are able to conduct measurements with the presented in-line and laboratory based measurement systems.
- are able to analyze measurement results and asses the measurement uncertainty of these.
- are able to deduce whether a work piece fulfills quality relevant specifications by analysing measurement results.
- are able to use the presented measurement technologies for a new task.

Workload:

regular attendance: 31,5 hours
self-study: 88,5 hours

Organizational issues

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Die Bewerbung erfolgt über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

For organizational reasons the number of participants for the course is limited. Hence a selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

Literature

Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt. Ebenso wird auf gängie Fachliteratur verwiesen.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/). Additional reference to literature will be provided, as well.

5.240 Course: Large Diesel and Gas Engines for Ship Propulsions [T-MACH-110816]

Responsible: Dr.-Ing. Heiko Kubach
Organisation:
Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	4	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	2134154	Large Diesel and Gas Engines for Ship Propulsions	2 SWS	Lecture / 🗣	Weisser
Exams					
ST 2025	76-T-MACH-110816	Großdiesel- und -gasmotoren für Schiffsantriebe			Weisser

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, 20 minutes

Prerequisites
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V **Large Diesel and Gas Engines for Ship Propulsions** — **Lecture (V) On-Site**
2134154, SS 2025, 2 SWS, Language: German, Open in study portal

Content

- Introduction and History
- Types of Ships amd Propulsion Systems
- Thermodynamic
- Boosting
- Design
- Fuels
- Lubricants
- Injection of liquid Fuels
- Combustions Processes for liquid Fuels
- Injection of Gaseous Fuels
- Combustion Processes for Gaseous Fuels
- Emissions
- Integration of Engines in Ships
- Large Engines in other Applications

Organizational issues
ACHTUNG: abweichend von den hier aufgeführten regelmäßigen Mittwoch-Terminen muss die Vorlesung als Blockveranstaltung in KW 30 (Di. bis Fr.) durchgeführt werden. Genaue Informationen entnehmen Sie bitte dem entsprechenden Iliaskurs.

T 5.241 Course: Large-scale Optimization [T-WIWI-106549]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2550475	Large-Scale Optimization	2 SWS	Lecture / 🖥	Rebennack
ST 2025	2550476	Übung zu Large-Scale Optimization	1 SWS	Practice / 🗣	Bijiga, Rebennack
ST 2025	2550477	Rechnerübung zu Large-scale Optimization	2 SWS	Others (sons	Rebennack, Bijiga
Exams					
WT 24/25	7900244	Large-scale Optimization			Rebennack
ST 2025	7900291	Large-scale Optimization			Rebennack

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites
None.

Workload
135 hours

T 5.242 Course: Laser in Automotive Engineering [T-MACH-105164]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	3

Events					
ST 2025	2182642	Laser Material Processing	2 SWS	Lecture / 🗣	Schneider
Exams					
WT 24/25	76-T-MACH-105164	Laser in Automotive Engineering			Schneider
ST 2025	76-T-MACH-105164	Laser in Automotive Engineering / Laser Material Processing			Schneider

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (30 min)

no tools or reference materials

Prerequisites
It is not possible, to combine this brick with brick Laser Material Processing [T-MACH-112763], brick Physical Basics of Laser Technology [T-MACH-109084] and brick Physical Basics of Laser Technology [T-MACH-102102]

Recommendation
preliminary knowlegde in mathematics, physics and materials science

Workload
120 hours

Below you will find excerpts from events related to this course:

V Laser Material Processing

2182642, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Based on a short description of the physical basics of laser technology the lecture reviews the most important high power lasers and their various applications in automotive engineering. Furthermore the application of laser light in metrology and safety aspects will be addressed.

- physical basics of laser technology
- laser beam sources (Nd:YAG-, CO2-, high power diode-laser)
- beam properties, guiding and shaping
- basics of materials processing with lasers
- laser applications in material processing
- savety aspects

The student

- can explain the principles of light generation, the conditions for light amplification as well as the basic structure and function of Nd:YAG-, CO2- and high power diode-laser sources.
- can describe the most important methods of laser-based processing in automotive engineering and illustrate the influence of laser, material and process parameters
- can analyse manufacturing problems and is able to choose a suitable laser source and process parameters.
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

It is not possible, to combine this lecture with the lecture *Physical basics of laser technology* [2181612].

regular attendance: 22,5 hours
self-study: 97,5 hours

oral examination (ca. 30 min)

no tools or reference materials

Organizational issues
Die Vorlesung ersetzt die bisherige Vorlesung "Lasereinsatz im Automobilbau" und wird jetzt auf Englisch angeboten!

The lecture replaces the previous lecture "Laser Application in Automotive Engineering" and is now offered in English!

Literature
W. T. Silvast: Laser Fundamentals, 2004, Cambridge University Press

J. Eichler, H.-J. Eichler: Laser - Basics, Advances, Applications, 2018, Springer

P. Poprawe: Tailored Light 1, 2018, Springer

K. F. Renk: Basics of Laser Physics, 2017, Springer

M. W. Sigrist: Laser: Theorie, Typen und Anwendungen, 2018, Springer-Spektrum

H. Hügel, T. Graf: Materialbearbeitung mit Laser, 2022, Springer Vieweg

T. Graf: Laser - Grundlagen der Laserstrahlquellen, 2009, Vieweg-Teubner Verlag

R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer

T 5.243 Course: Laser Material Processing [T-MACH-112763]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2182642	Laser Material Processing	2 SWS	Lecture / 🗣	Schneider
Exams					
WT 24/25	76-T-MACH-112763	Laser Material Processing			Schneider
ST 2025	76-T-MACH-112763	Laser Material Processing			Schneider

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (30 min)

no tools or reference materials

Prerequisites
It is not possible, to combine this brick with Laser in Automotive Engineering [T-MACH-105164], brick Physical Basics of Laser Technology [T-MACH-109084] and brick Physical Basics of Laser Technology [T-MACH-102102].

Recommendation
preliminary knowlegde in mathematics, physics and materials science

Workload
120 hours

Below you will find excerpts from events related to this course:

V Laser Material Processing

2182642, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

Based on a short description of the physical basics of laser technology the lecture reviews the most important high power lasers and their various applications in automotive engineering. Furthermore the application of laser light in metrology and safety aspects will be addressed.

- physical basics of laser technology
- laser beam sources (Nd:YAG-, CO2-, high power diode-laser)
- beam properties, guiding and shaping
- basics of materials processing with lasers
- laser applications in material processing
- savety aspects

The student

- can explain the principles of light generation, the conditions for light amplification as well as the basic structure and function of Nd:YAG-, CO2- and high power diode-laser sources.
- can describe the most important methods of laser-based processing in automotive engineering and illustrate the influence of laser, material and process parameters
- can analyse manufacturing problems and is able to choose a suitable laser source and process parameters.
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

It is not possible, to combine this lecture with the lecture *Physical basics of laser technology* [2181612].

regular attendance: 22,5 hours
self-study: 97,5 hours

oral examination (ca. 30 min)

no tools or reference materials

Organizational issues

Die Vorlesung ersetzt die bisherige Vorlesung "Lasereinsatz im Automobilbau" und wird jetzt auf Englisch angeboten!

The lecture replaces the previous lecture "Laser Application in Automotive Engineering" and is now offered in English!

Literature

W. T. Silvast: Laser Fundamentals, 2004, Cambridge University Press

J. Eichler, H.-J. Eichler: Laser - Basics, Advances, Applications, 2018, Springer

P. Poprawe: Tailored Light 1, 2018, Springer

K. F. Renk: Basics of Laser Physics, 2017, Springer

M. W. Sigrist: Laser: Theorie, Typen und Anwendungen, 2018, Springer-Spektrum

H. Hügel, T. Graf: Materialbearbeitung mit Laser, 2022, Springer Vieweg

T. Graf: Laser - Grundlagen der Laserstrahlquellen, 2009, Vieweg-Teubner Verlag

R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer

T 5.244 Course: Laser Physics [T-ETIT-100741]

Responsible: Prof. Dr. Marc Eichhorn
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101292 - Microoptics
M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2301480	Laserphysics	2 SWS	Lecture /	Eichhorn
WT 24/25	2301481	Exercise for 2301480 Laserphysics	1 SWS	Practice /	Eichhorn
Exams					
WT 24/25	7301480	Laser Physics			Eichhorn

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The exam will be taken as an oral examination (about 20 minutes). The individual appointments for examination are offered at two previously determined dates.

Prerequisites
none

T 5.245 Course: Laws concerning Traffic and Roads [T-BGU-106615]

Responsible: Hon.-Prof. Dr. Dietmar Hönig
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101066 - Safety, Computing and Law in Highway Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6233803	Laws Concerning Traffic and Roads	2 SWS	Lecture / 🗣	Hönig

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.246 Course: Lean Construction [T-BGU-108000]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6241901	Lean Construction	4 SWS	Lecture / Practice (/ 🗣	Haghsheno, Mitarbeiter/innen
Exams					
WT 24/25	8246108000	Lean Construction			Haghsheno

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 70 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
140 hours

T 5.247 Course: Learning Factory “Global Production“ [T-MACH-105783]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each winter term	4

Events					
WT 24/25	2149612	Learning Factory “Global Production“	4 SWS	/	Lanza
Exams					
WT 24/25	76-T-MACH-105783	Learning Factory "Global Production"			Lanza

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative test achievement (graded):

- Knowledge acquisition in the context of the seminar (4 achievements 20 min each) with weighting 40%.
- Interaction between participants with weighting 15%.
- Scientific colloquium (in groups of 3 students approx. 45 min each) with weighting 45%.

Prerequisites
none

Annotation
For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/lernfabrik.php).

Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Workload
180 hours

Below you will find excerpts from events related to this course:

V Learning Factory “Global Production“
2149612, WS 24/25, 4 SWS, Language: German, Open in study portal **Blended (On-Site/Online)**

Content

The learning factory “Global Production“ serves as a modern teaching environment for the challenges of global production. To make this challenges come alive, students can run a production of electric motors under real production conditions.
The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.
The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:

- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection

Learning Outcomes:

The students are able to …

- evaluate and select alternative locations using appropriate methods.
- use methods and tools of lean management to plan and manage production systems that are suitable for the location.
- use the Six Sigma method and apply goal-oriented process management.
- select an appropriate level of automation of the production units based on quantitative variables.
- make use of well-established methods for the evaluation and selection of suppliers.
- apply methods for planning a global production network depending on company-specific circumstances to sketch a suitable network and classify and evaluating it according to specific criteria.
- apply the learned methods and approaches with regard to problem solving in a global production environment and able to reflect their effectiveness.

Workload:

e-Learning: ~ 24 h
regular attendence: ~ 36 h
self-study: ~ 60 h

Organizational issues

Termine werden über die Institutshomepage bekanntgegeben.

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung auf 20 Teilnehmer begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Die Bewerbung erfolgt über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php)

Aufgrund der begrenzten Teilnehmerzahl ist eine Voranmeldung erforderlich.

Die Studierenden sollten Vorkenntnisse in mindestens einem der folgenden Bereiche haben:

- Integrierte Produktionsplanung
- Globale Produktion und Logistik
- Qualitätsmanagement

For organisational reasons, the number of participants for the course is limited to 20. As a result, a selection process will take place. Applications must be submitted via the wbk homepage (http://www.wbk.kit.edu/studium-und-lehre.php).

Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Literature

Medien:

E-Learning Plattform ilias, Powerpoint, Fotoprotokoll. Die Medien werden über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:

E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).

T 5.248 Course: Liberalised Power Markets [T-WIWI-107043]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets
M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2581998	Liberalised Power Markets	2 SWS	Lecture / 🗣	Fichtner
WT 24/25	2581999	Übungen zu Liberalised Power Markets	2 SWS	Practice / 🗣	Signer, Fichtner, Beranek
Exams					
WT 24/25	7900160	Liberalised Power Markets NEW			Fichtner

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Recommendation
None

Workload
165 hours

Below you will find excerpts from events related to this course:

V Liberalised Power Markets

2581998, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

1. Power markets in the past, now and in future

2. Designing liberalised power markets

2.1. Unbundling Dimensions of liberalised power markets

2.2. Central dispatch versus markets without central dispatch

2.3. The short-term market model

2.4. The long-term market model

2.5. Market flaws and market failure

2.6. Regulation in liberalised markets

3. The power (sub)markets

3.1 Day-ahead market

3.2 Intraday market

3.3 (Long-term) Forwards and futures markets

3.4 Emission rights market

3.5 Market for ancillary services

3.6 The “market” for renewable energies

3.7 Future market segments

4. Grid operation and congestion management

4.1. Grid operation

4.2. Congestion management

5. Market power

5.1. Defining market power

5.2. Indicators of market power

5.3. Reducing market power

6. Future market structures in the electricity value chain

1. Power markets in the past, now and in future

2. Designing liberalised power markets

2.2. Unbundling Dimensions of liberalised power markets

2.3. Central dispatch versus markets without central dispatch

2.4. The short-term market model

2.5. The long-term market model

2.6. Market flaws and market failure

2.7. Regulation in liberalised markets

3. The power (sub)markets

3.1 Day-ahead market

3.2 Intraday market

3.3 (Long-term) Forwards and futures markets

3.4 Emission rights market

3.5 Market for ancillary services

3.6 The “market” for renewable energies

3.7 Future market segments

4. Grid operation and congestion management

4.1. Grid operation

4.2. Congestion management

5. Market power

5.1. Defining market power

5.2. Indicators of market power

5.3. Reducing market power

6. Future market structures in the electricity value chain

Literature
Weiterführende Literatur:

Power System Economics; Steven Stoft, IEEE Press/Wiley-Interscience Press, 0-471-15040-1

T 5.249 Course: Life Cycle Assessment – Basics and Application Possibilities in an Industrial Context [T-WIWI-113107]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2581995	Life Cycle Assessment - Basics and Application Possibilities in an Industrial Context	2 SWS	Lecture / 🗣	Treml, Schultmann, Schneider
Exams					
WT 24/25	7981995	Life Cycle Assessment - Basics and Application Possibilities in an Industrial Context			Schultmann

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (approx. 30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None.

Recommendation
None

Below you will find excerpts from events related to this course:

V Life Cycle Assessment - Basics and Application Possibilities in an Industrial Context

Lecture (V)
On-Site

2581995, WS 24/25, 2 SWS, Language: German, Open in study portal

Content
The lecture focuses on the analysis of the environmental impacts of products and processes using Life Cycle Assessment (short: LCA). Structure and steps are conveyed in detail and selected further developments are shown. In order to record the methodology and classify potential environmental impacts, the practical development of what has been learned is also focused on using LCA software and interactive formats.

Topics include:

- Significance and areas of application
- Calculation models
- Attributional/Consequential LCA
- Life Cycle Sustainability Assessment, Social LCA and Life Cycle Costing
- Limitations
- Development of a Case Study

Literature
werden in der Veranstaltung bekannt gegeben

T 5.250 Course: Logistics and Supply Chain Management [T-MACH-110771]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105298 - Logistics and Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each summer term	5

Events					
ST 2025	2118078	Logistics and Supply Chain Management	4 SWS	Lecture / 🗣	Furmans, Alicke

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The success control takes place in the form of an examination performance of a different kind. This is composed as follows:

- 50% assessment of a written examination (60 min) during the semester break
- 50% assessment of an oral examination (20 min) during the semester break

To pass the examination, both examination performances must be passed.

Prerequisites
None

Annotation
The brick cannot be taken if one of the bricks "T-MACH-102089 – Logistics - Organisation, Design and Control of Logistic Systems" and "T-MACH-105181 – Supply Chain Management" has been taken.

Workload
270 hours

Below you will find excerpts from events related to this course:

V Logistics and Supply Chain Management — **Lecture (V) On-Site**
2118078, SS 2025, 4 SWS, Language: English, Open in study portal

Content

In the lecture "Logistics and Supply Chain Management", comprehensive and well-founded fundamentals of crucial issues in logistics and supply chain management are presented. Furthermore, the interaction of different design elements of supply chains is emphasized. For this purpose, both qualitative and quantitative models are presented and applied. Additionally, methods for mapping and evaluating logistics systems and supply chains are described. The contents of the lecture are deepened in exercises and case studies and comprehension is partially reviewed in case studies. The contents will be illustrated, among other things, on the basis of supply chains in the automotive industry.

Among others, the following topics are covered:

- Inventory Management
- Forecasting
- Bullwhip Effect
- Supply Chain Segmentation and Collaboration
- Key Performance Indicators
- Supply Chain Risk Management
- Production Logistics
- Location Planning
- Route Planning

It is intended to provide an interactive format in which students can also contribute (and work alone or in groups). Since logistics and supply chain management requires working in an international environment and therefore many terms are derived from English, the lecture will be held in English.

Plenary: The plenary sessions take place on Mondays from 09:45 - 13:00 and from 14:00 - 17:15.

Exercises: There are a total of five exercise sessions, which take place on Thursdays from 14:00 to 15:30. The dates can be found in the schedule in Ilias.

Examination dates: This is a "Prüfungsleistung anderer Art", consisting of a written and an oral part. The written exam is planned on 14th August 2024 from 8:00 am to 9:00 am. The oral examinations are expected to take place the two weeks before, i.e. in calendar weeks 31 and 32. An oral examination lasts 20 minutes.

Contact person: In the summer semester 2024, the contact persons for organisational matters are Maximilian Barlang and Alexander Ernst. Please contact us at
log-scm∂ifl.kit.edu

5.251 Course: Long-Distance and Air Traffic [T-BGU-106301]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6232904	Long-distance and Air Transportation	2 SWS	Lecture /	Vortisch, Dozenten
Exams					
WT 24/25	8245106301	Long-distance and Air Traffic			Vortisch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 5.252 Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	4

Events					
WT 24/25	2511500	Machine Learning 1 - Fundamental Methods	2 SWS	Lecture / 🗣	Zöllner
WT 24/25	2511501	Exercises to Machine Learning 1 - Fundamental Methods	1 SWS	Practice / 🗣	Zöllner, Polley, Fechner, Daaboul
Exams					
WT 24/25	79AIFB_ML1_C5	Machine Learning 1 - Basic Methods			Zöllner
ST 2025	79AIFB_ML1_C4	Machine Learning 1 - Basic Methods (Registration until 21.07.2025)			Zöllner

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min):

The exam takes place every semester and can be repeated at every regular examination date.

A grade bonus can be earned by successfully completing practice exercises. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None.

Workload
150 hours

Below you will find excerpts from events related to this course:

V Machine Learning 1 - Fundamental Methods

2511500, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The course prepares students for the rapidly evolving field of machine learning by providing a solid foundation, covering core concepts and techniques to get started in the field. Students delve into different methods in supervised, unsupervised, and reinforcement learning, as well as various model types, ranging from basic linear classifiers to more complex methods, such as deep neural networks. Topics include general learning theory, support vector machines, decision trees, neural network fundamentals, convolutional neural networks, recurrent neural networks, unsupervised learning, reinforcement learning, and Bayesian learning.

The course is accompanied by a corresponding exercise, where students gain hands-on experience by implementing and experimenting with different machine learning algorithms, helping them to apply machine learning algorithms on real world problems.

By the end of the course, students will have acquired a solid foundation in machine learning, enabling them to apply state-of-the-art algorithms to solve complex problems, contribute to research efforts, and explore advanced topics in the field.

Learning obectives:

- Students acquire knowledge of the fundamental methods in the field of machine learning.
- Students can classify, formally describe and evaluate methods of machine learning.
- Students can use their knowledge to select suitable models and methods for selected problems in the field of of machine learning.

Literature
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Machine Learning - Tom Mitchell
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.

T 5.253 Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics
M-WIWI-101637 - Analytics and Statistics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	4

Events					
ST 2025	2511502	Machine Learning 2 - Advanced Methods	2 SWS	Lecture / 🗣	Zöllner, Fechner, Polley, Stegmaier
ST 2025	2511503	Exercises for Machine Learning 2 - Advanced Methods	1 SWS	Practice / 🗣	Zöllner, Fechner, Polley, Stegmaier
Exams					
WT 24/25	79AIFB_ML2_B8	Machine Learning 2 – Advanced Methods			Zöllner
ST 2025	79AIFB_ML2_B1	Machine Learning 2 – Advanced Methods (Registration until 21.07.2025)			Zöllner

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None.

Workload
150 hours

Below you will find excerpts from events related to this course:

V Machine Learning 2 - Advanced Methods
2511502, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The subject area of machine intelligence and, in particular, machine learning, taking into account real challenges of complex application domains, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The lecture "Machine Learning 2" deals with modern advanced methods of machine learning such as semi-supervised, self-supervised and active learning, deep neural networks (deep learning, CNNs, GANs, diffusion models, transformer, adversarial attacks) and hierarchical approaches, e.g. reinforcement learning. Another focus is the embedding and application of machine learning methods in real systems.

The lecture introduces the latest basic principles as well as extended basic structures and elucidates previously developed algorithms. The structure and the mode of operation of the methods and methods are presented and explained by means of some application scenarios, especially in the field of technical (sub) autonomous systems (vehicles, robotics, neurorobotics, image processing, etc.).

Learning objectives:

- Students understand extended concepts of machine learning and their possible applications.
- Students can classify, formally describe and evaluate methods of machine learning.
- In detail, methods of machine learning can be embedded and applied in complex decision and inference systems.
- Students can use their knowledge to select suitable models and methods of machine learning for existing problems in the field of machine intelligence.

Recommendations:

Attending the lecture ***Machine Learning 1*** or a comparable lecture is very helpful in understanding this lecture.

Literature
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Deep Learning - Ian Goodfellow
- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.

T 5.254 Course: Machine Learning and Optimization in Energy Systems [T-WIWI-113073]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	4

Events					
WT 24/25	2581050	Machine Learning and Optimization in Energy Systems	3 SWS	Lecture / Practice (/ 🗣	Dengiz, Yilmaz
Exams					
WT 24/25	7900179	Machine Learning and Optimization in Energy Systems			Fichtner

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) or an oral exam (30 min) depending on the number of participants. A bonus can be acquired through successful participation in the computer exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the exercises.

Workload
105 hours

Below you will find excerpts from events related to this course:

V Machine Learning and Optimization in Energy Systems

Lecture / Practice (VÜ)
On-Site

2581050, WS 24/25, 3 SWS, Language: English, Open in study portal

Content
Goals:
Participants should know about the most common optimization and machine learning approaches for the application in energy systems. They should understand the basic principles of the methods and should be able to apply them for solving important problems of future energy systems with high shares of renewable energy sources.

Content:
In the beginning, the essential transition of the energy system into a smart grid and the need for methods from the field of optimization and machine learning are explained. The course can be subdivided into an optimization part and a larger machine learning part. In the optimization part, the basics of optimization approaches that are used in energy systems are shown. Further, heuristic methods and approaches from the field of multiobjective optimization are introduced. In the machine learning part, the most important methods from the field of unsupervised learning, supervised learning and reinforcement learning are introduced and their application in future energy systems are investigated.

Amongst the considered applications are power plant dispatch, intelligent heating with heat pumps, charging strategies for electric vehicles, clustering of energy data for energy system models and electricity demand and renewable generation forecasting.

We also offer a voluntary computer exercise that deepens the understanding of the methods and applications covered in the lecture. The students will have the opportunity to solve problems from the energy domain by using optimization and machine learning approaches implemented in the programming language Python.

The course's general focus is on the application of the methods in the energy field and not on the mathematical details of the different approaches.

The total workload for this course is approximately 105 hours:

- Attendance: 30 hours
- Self-study: 30 hours
- Exam preparation: 45 hours

T 5.255 Course: Machine Tools and High-Precision Manufacturing Systems [T-MACH-110963]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101286 - Machine Tools and Industrial Handling

Type	Credits	Grading scale	Recurrence	Version
Oral examination	9	Grade to a third	Each winter term	2

Events					
WT 24/25	2149910	Machine Tools and High-Precision Manufacturing Systems	6 SWS	Lecture / Practice (/	Fleischer
Exams					
WT 24/25	76-T-MACH-110963-WING	Machine Tools and High-Precision Manufacturing Systems			Fleischer
ST 2025	76-T-MACH-110963-WING	Machine Tools and High-Precision Manufacturing Systems			Fleischer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral exam (approx. 45 minutes)

Prerequisites
T-MACH-102158 - Machine Tools and Industrial Handling must not be commenced.
T-MACH-109055 - Machine Tools and Industrial Handling must not be commenced.
T-MACH-110962 - Machine Tools and High-Precision Manufacturing Systems must not be commenced.

Workload
270 hours

Below you will find excerpts from events related to this course:

V Machine Tools and High-Precision Manufacturing Systems

Lecture / Practice (VÜ)
On-Site

2149910, WS 24/25, 6 SWS, Language: German, Open in study portal

Content

The lecture gives an overview of the construction, use and application of machine tools and high-precision manufacturing systems. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools and high-precision manufacturing systems is conveyed. First, the main components of the systems are systematically explained and their design principles as well as the integral system design are discussed. Subsequently, the use and application of machine tools and high-precision manufacturing systems will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0 and artificial intelligence.
Guest lectures from industry round off the lecture with insights into practice.

The individual topics are:

- Structural components of dynamic manufacturing Systems
- Feed axes: High-precision positioning
- Spindles of cutting machine Tools
- Peripheral Equipment
- Machine control unit
- Metrological Evaluation
- Maintenance strategies and condition Monitoring
- Process Monitoring
- Development process for machine tools and high-precision manufacturing Systems
- Machine examples

Learning Outcomes:

The students …

- are able to assess the use and application of machine tools and high-precision manufacturing systems and to differentiate between them in terms of their characteristics and design.
- can describe and discuss the essential elements of machine tools and high-precision manufacturing systems (frame, main spindle, feed axes, peripheral equipment, control unit).
- are able to select and dimension the essential components of machine tools and high-precision manufacturing systems.
- are capable of selecting and evaluating machine tools and high-precision manufacturing systems according to technical and economic criteria.

Workload:

MACH:
regular attendance: 63 hours
self-study: 177 hours
WING/TVWL:
regular attendance: 63 hours
self-study: 207 hours

Organizational issues

Vorlesungstermine montags und mittwochs, Übungstermine donnerstags.
Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Lectures on Mondays and Wednesdays, tutorial on Thursdays.
The tutorial dates will announced in the first lecture.

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature

Medien:
Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.256 Course: Management Accounting 1 [T-WIWI-102800]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101498 - Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2579900	Management Accounting 1	2 SWS	Lecture / 🖥	Wouters
ST 2025	2579901	Tutorial Management Accounting 1 (Bachelor)	2 SWS	Practice / 🗣	Dickemann
ST 2025	2579902	Tutorial Management Accounting 1 (Master)	2 SWS	Practice / 🗣	Dickemann
Exams					
WT 24/25	79-2579900-B	Management Accounting 1 (Bachelor)			Wouters
WT 24/25	79-2579900-M	Management Accounting 1 (Mastervorzug und Master)			Wouters

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Recommendation
We recommend that you take part in our exercise for the lecture.

Annotation
The exercise is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration:

- Bachelor students: 79-2579900-B Management Accounting 1 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579900-M Management Accounting 1 (Master's transfer and Master)

Below you will find excerpts from events related to this course:

V Management Accounting 1

2579900, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics.
- They can use financial information for various purposes in organizations.

Examination:

- The assessment consists of a written exam (120 minutes) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Publisher: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- In addition, several papers that will be available on ILIAS.

V **Tutorial Management Accounting 1 (Bachelor)**
2579901, SS 2025, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
see Module Handbook

V **Tutorial Management Accounting 1 (Master)**
2579902, SS 2025, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
see Module Handbook

T 5.257 Course: Management Accounting 2 [T-WIWI-102801]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101498 - Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2579903	Management Accounting 2	2 SWS	Lecture / 🖥	Wouters
WT 24/25	2579904	Tutorial Management Accounting 2 (Bachelor)	2 SWS	Practice / 🗣	Letmathe
WT 24/25	2579905	Tutorial Management Accounting 2 (Master)	2 SWS	Practice / 🗣	Letmathe
Exams					
WT 24/25	79-2579903-B	Management Accounting 2 (Bachelor)			Wouters
WT 24/25	79-2579903-M	Management Accounting 2 (Mastervorzug und Master)			Wouters

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (120 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Prerequisites
None

Recommendation
It is recommended:

- to take part in the course "Management Accounting1" before this course
- participation in the exercise for the lecture "Management Accounting 2"

Annotation
The exercise for the lecture is offered separately for Bachelor's students as well as for students in the Master's transfer and Master's program.

Note for exam registration: Bachelor students:

- 79-2579903-B Management Accounting 2 (Bachelor)
- Students in the Master's transfer and Master's program: 79-2579903-M Management Accounting 2 (Master's transfer and Master)

Below you will find excerpts from events related to this course:

V Management Accounting 2
2579903, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics. They can use financial information for various purposes in organizations.

Recommendations:

- It is recommended to take part in the course "Management Accounting 1" before this course.

Examination:

- The assessment consists of a written exam (120 min) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Verlag: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- Zusätzlich werden Artikel auf ILIAS zur Vergügung gestellt.

V

Tutorial Management Accounting 2 (Bachelor)

2579904, WS 24/25, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
see ILIAS

V

Tutorial Management Accounting 2 (Master)

2579905, WS 24/25, 2 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
see ILIAS

T 5.258 Course: Management of IT-Projects [T-WIWI-113968]

Responsible: Dr. Sascha Alpers
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2511214	IT Project Management	2 SWS	Lecture / 🗣	Alpers
ST 2025	2511215	Exercise IT Project Management	1 SWS	Practice / 🗣	Rybinski
Exams					
ST 2025	7900302	IT Project Management (Registration until 21.07.2025)			Oberweis

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of a written examination (written exam) lasting 60 minutes.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-102667 - Management of IT-Projects must not have been started.
2. The course T-WIWI-112599 - Management of IT-Projects must not have been started.

Workload
135 hours

Below you will find excerpts from events related to this course:

V IT Project Management

2511214, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Contents:

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
    - plan of the project structure
    - flow chart
    - project schedule
    - plan of resources
- effort estimation
- project infrastructur
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Learning objectives:

Students

- explain the terminology of IT project management and typical used methods for planning, handling and controlling,
- apply methods appropiate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:

Knowledge about Software Engineering is helpful.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004
- Project Management Institute Standards Committee. A Guide to the Project Management Body of Knowledge (PMBoK guide). Project Management Institute. Four Campus Boulevard. Newton Square. PA 190733299. U.S.A.

V **Exercise IT Project Management**
2511215, SS 2025, 1 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content
The general conditions, influencing factors and methods in the planning, execution and control of IT projects are dealt with. In particular, the following topics will be dealt with: Project environment, project organization, project structure plan, effort estimation, project infrastructure, project control, decision-making processes, negotiation, time management.

T 5.259 Course: Management of IT-Projects [T-WIWI-112599]

Responsible: Dr. Roland Schätzle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Events					
ST 2025	2511214	IT Project Management	2 SWS	Lecture / 🗣	Alpers
ST 2025	2511215	Exercise IT Project Management	1 SWS	Practice / 🗣	Rybinski
Exams					
WT 24/25	79AIFB_MvIP_C3	Management of IT-Projects			Oberweis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The examination will be offered for the last time in the summer semester 2024 for first-time writers. A repeat examination (only for repeaters) is possible for the last time in the winter semester 2024/2025.

Success is assessed in the form of a written examination (written exam) lasting 60 minutes.

Prerequisites
Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

Annotation
The lecture will be held for the last time in the summer semester 2024.

Below you will find excerpts from events related to this course:

V IT Project Management

2511214, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

Contents:

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
  - plan of the project structure
  - flow chart
  - project schedule
  - plan of resources
- effort estimation
- project infrastructur
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Learning objectives:

Students

- explain the terminology of IT project management and typical used methods for planning, handling and controlling,
- apply methods appropiate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:

Knowledge about Software Engineering is helpful.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004
- Project Management Institute Standards Committee. A Guide to the Project Management Body of Knowledge (PMBoK guide). Project Management Institute. Four Campus Boulevard. Newton Square. PA 190733299. U.S.A.

V **Exercise IT Project Management**

2511215, SS 2025, 1 SWS, Language: German, Open in study portal

Practice (Ü)
On-Site

Content

The general conditions, influencing factors and methods in the planning, execution and control of IT projects are dealt with. In particular, the following topics will be dealt with: Project environment, project organization, project structure plan, effort estimation, project infrastructure, project control, decision-making processes, negotiation, time management.

5.260 Course: Managing New Technologies [T-WIWI-102612]

Responsible: Dr. Thomas Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	see Annotations	2

Events					
ST 2025	2545003	Managing New Technologies	2 SWS	Lecture / 🗣	Reiß
Exams					
WT 24/25	7900189	Managing New Technologies			Reiß
ST 2025	7900169	Managing New Technologies			Reiß

Legend: 🖥 Online, ✪ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of a written examination (60 minutes).

Prerequisites
None

Recommendation
None

Annotation
The course is expected to be offered for the last time in the summer semester 2024.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Managing New Technologies
2545003, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
This lecture provides an overview of new technologies in the research areas of biotechnology, nanotechnology and neuroscience as well as basic concepts of technology management. Students should be able to present problems of technology assessment and early recognition of new technologies in a structured way and apply formal approaches to technology management issues in an appropriate manner.

Organizational issues
Bitte melden Sie sich für die Prüfung Nr. 7900169 an, das ist die Prüfungs-Nr. für die schriftliche Prüfung.

(Die Prüfungs-Nr. 7900235 ist eine mündliche Prüfung, zu der sich Studierende nur nach Aufforderung durch das EnTechnon Sekretariat anmelden sollen, wenn Studierende eine mündliche Prüfung haben.)

Literature

- Hausschildt/Salomo: Innovationsmanagement;
- Borchert et al.: Innovations- und Technologiemanagement;
- Specht/Möhrle: Gabler Lexikon Technologiemanagement

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.

T 5.261 Course: Manufacturing Technology [T-MACH-102105]

Responsible: Prof. Dr.-Ing. Volker Schulze
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101276 - Manufacturing Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each winter term	3

Events					
WT 24/25	2149657	Manufacturing Technology	6 SWS	Lecture / Practice (/	Schulze
Exams					
WT 24/25	76-T-MACH-102105	Manufacturing Technology			Schulze
ST 2025	76-T-MACH-102105	Manufacturing Technology			Schulze

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Written Exam (180 min)

Prerequisites
none

Workload
240 hours

Below you will find excerpts from events related to this course:

V Manufacturing Technology
2149657, WS 24/25, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Content

The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lucture provides an excursion to an industry company.

Learning Outcomes:

The students ...

- are capable to specify the different manufacturing processes and to explain their functions.
- are able to classify the manufacturing processes by their general structure and functionality according to the specific main groups.
- have the ability to perform a process selection based on their specific characteristics.
- are enabled to identify correlations between different processes and to select a process regarding possible applications.
- are qualified to evaluate different processes regarding specific applications based on technical and economic aspects.
- are experienced to classify manufacturing processes in a process chain and to evaluate their specific influence on surface integrity of workpieces regarding the entire process chain.

Workload:

regular attendance: 63 hours
self-study: 177 hours

Organizational issues

Vorlesungstermine montags und dienstags, Übungstermine mittwochs.
Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Die LV wird letztmalig im WS 2024/25 angeboten (Vorlesungsvideos bleiben online).

Die Prüfung wird für Erstschreiber letztmalig im SS 2025 und Wiederholer letztmalig im WS 2025/26 angeboten.

Literature

Medien:
Skript zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).

T 5.262 Course: Market Research [T-WIWI-107720]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-101647 - Data Science: Evidence-based Marketing
M-WIWI-105312 - Marketing and Sales Management
M-WIWI-105714 - Consumer Research
M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2571150	Market Research	2 SWS	Lecture / 🗣	Klarmann
ST 2025	2571151	Market Research Tutorial	1 SWS	Practice / 🗣	Klarmann
Exams					
WT 24/25	7900053	Market Research			Klarmann
ST 2025	7900015	Market Research			Klarmann

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of success takes place through a written exam (70 minutes) with additional aids in the sense of an open book exam. Further details will be announced during the lecture.

Prerequisites
None

Recommendation
None

Annotation
Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.

Below you will find excerpts from events related to this course:

V Market Research — **Lecture (V) On-Site**
2571150, SS 2025, 2 SWS, Language: English, Open in study portal

Content

Within the lecture, essential statistical methods for measuring customer attitudes (e.g. satisfaction measurement), understanding customer behavior and making strategic decisions will be discussed. The practical use as well as the correct handling of different survey methods will be taught, such as experiments and surveys. To analyze the collected data, various analysis methods are presented, including hypothesis tests, factor analyses, cluster analyses, variance and regression analyses. Building on this, the interpretation of the results will be discussed.

Topics addressed in this course are for example:

- Theoretical foundations of market research
- Statistical foundations of market research
- Measuring customer attitudes
- Understanding customer reactions
- Strategical decision making

The aim of this lecture is to give an overview of essential statistical methods. In the lecture students learn the practical use as well as the correct handling of different statistical survey methods and analysis procedures. In addition, emphasis is put on the interpretation of the results after the application of an empirical survey. The derivation of strategic options is an important competence that is required in many companies in order to react optimally to customer needs.

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

The total workload for this course is approximately 135.0 hours.

Presence time: 30 hours

Preparation and wrap-up of the course: 45.0 hours

Exam and exam preparation: 60.0 hours

Please note that this course has to be completed successfully by students interested in master thesis positions at the chair of marketing.

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.263 Course: Marketing Analytics [T-WIWI-103139]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101647 - Data Science: Evidence-based Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	6

Events					
WT 24/25	2572170	Marketing Analytics	2 SWS	Lecture / 🗣	Klarmann
WT 24/25	2572171		1 SWS	Practice / 🗣	Martin
Exams					
WT 24/25	7900082	Marketing Analytics			Klarmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative (according to §4(2), 3 of the examination regulation) exam assessment (working on tasks in groups during the lecture).

Prerequisites
The prerequisite for taking the course is the successful completion of the course "Market Research".

Recommendation
It is strongly recommended to complete the course "Market Research" prior to taking the "Marketing Analytics" course.

Annotation
"Marketing Analytics" is offered as a block course with an alternative exam assessment.
Starting in the winter semester 22/23, the course will be scheduled to be completed after two thirds of the semester. For further information, please contact the Marketing and Sales Research Group (marketing.iism.kit.edu). Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing and Sales Research Group.

Below you will find excerpts from events related to this course:

V Marketing Analytics
2572170, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
In this course various relevant market research questions are addressed, as for example measuring and understanding customer attitudes, preparing strategic decisions and sales forecasting. In order to analyze these questions, students learn to handle social media data, panel data, nested observations and experimental design. To analyze the data, advanced methods, as for example multilevel modeling and return on marketing models are taught. Also, problems of causality are addressed in-depth. The lecture is accompanied by a computer-based exercise, in the course of which the methods are applied practically.

Students

- receive based on the course market research an overview of advanced empirical methods
- learn in the course of the lecture to handle advanced data collection and data analysis methods
- are based on the acquired knowledge able to interpret results and derive strategic implications

Total workload for 4.5 ECTS: ca. 135 hours.

In order to attend Marketing Analytics, students are required to have passed the course Market Research.

Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

Literature

- Hanssens, Dominique M., Parsons, Leonard J., Schultz, Randall L. (2003), Market response models: Econometric and time series analysis, 2nd ed, Boston.
- Gelman, Andrew, Hill, Jennifer (2006), Data analysis using regression and multilevel/hierarchical models, New York.
- Cameron, A. Colin, Trivedi, Pravin K. (2005), Microeconometrics: methods and applications, New York.
- Chapman, Christopher, Feit, Elea M. (2015), R for Marketing Research and Analytics, Cham.
- Ledolter, Johannes (2013), Data mining and business analytics with R, New York.

V

2572171, WS 24/25, 1 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
Tasks parallel to the lecture to work on in a group of students.

Organizational issues
Blockveranstaltung: genaue Uhrzeiten und Raum werden noch bekannt gegeben

T 5.264 Course: Marketing Strategy Business Game [T-WIWI-102835]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Irregular	1

Competence Certificate
The assessment (alternative exam assessment) consists of a group presentation and a subsequent round of questions totalling 20 minutes.

Prerequisites
None

Recommendation
None

Annotation
Please note that only one of the courses from the election block can be chosen in the module.
Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS points in the respective module to all students. Participation in a specific course cannot be guaranteed.
In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

Workload
45 hours

T 5.265 Course: Master's Thesis [T-WIWI-103142]

Responsible:	Studiendekan der KIT-Fakultät für Informatik Studiendekan des KIT-Studienganges
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101650 - Module Master's Thesis

Type	Credits	Grading scale	Version
Final Thesis	30	Grade to a third	1

Competence Certificate
see module description

Prerequisites
see module description

Final Thesis
This course represents a final thesis. The following periods have been supplied:

Submission deadline	6 months
Maximum extension period	3 months
Correction period	8 weeks

T 5.266 Course: Matching Theory [T-WIWI-113264]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101500 - Microeconomic Theory

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2500042	Matching Theory	3 SWS	Lecture / Practice (/	Okulicz
Exams					
WT 24/25	7900347	Matching Theory			Puppe
ST 2025	7900260	Matching Theory			Puppe

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Written examination (90 minutes)

Workload
135 hours

Below you will find excerpts from events related to this course:

V Matching Theory

2500042, WS 24/25, 3 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
How should we organize recruitment of students to schools? Could we improve the placement of doctors to hospitals? Why there always seems to be a better roommate to the one you currently have? Matching Theory answers all these questions and more. During the course we will formally study mathematical systems of allocating goods and people, and see their many real life applications from organizing kidney exchange to improving dating apps. The course will cover three main topics in Matching Theory and Market Design: (1) assignment problems (e.g., allocation of social housing), (2) two-sided matching (e.g., allocation of children to schools), (3) transferable-utility matching (e.g., labor market).

The students are expected to:

1. Understand the mathematical properties of allocations and commonly used mechanism
2. Understand the connection between Matching Theory and real-life allocation systems
3. Be able to use their knowledge to propose solutions for novel real-life problems

T 5.267 Course: Mathematical Models and Methods for Production Systems [T-MACH-105189]

Responsible: Dr.-Ing. Marion Baumann
Prof. Dr.-Ing. Kai Furmans

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2117059	Mathematical models and methods for Production Systems	4 SWS	Lecture / Practice (/ 🗣	Baumann, Furmans
Exams					
WT 24/25	76-T-MACH-105189	Mathematical models and methods for Production Systems			Furmans, Baumann
WT 24/25	76-T-MACH-105189-02	Mathematical Models and Methods for Production Systems			Furmans, Baumann

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites
none

Workload
180 hours

Below you will find excerpts from events related to this course:

V **Mathematical models and methods for Production Systems** **Lecture / Practice (VÜ) On-Site**
2117059, WS 24/25, 4 SWS, Language: English, Open in study portal

Content

Media:

black board, lecture notes, presentations

Learning Content:

- single server systems: M/M/1, M/G/1: priority rules, model of failures
- networks: open and closed approximations, exact solutions and approximations
- application to flexible manufacturing systems, AGV (automated guided vehicles) - systems
- modeling of control approaches like constant work in process (ConWIP) or kanban
- discrete-time modeling of queuing systems

Learning Goals:

Students are able to:

- Describe queueing systems with analytical solvable stochastic models,
- Derive approches for modeling and controlling material flow and production systems based on models of queueing theory,
- Use simulation and exakt methods.

Recommendations:

- Basic knowledge of statistic
- recommended compusory optional subject: Stochastics
- recommended lecture: Materials flow in logistic systems (also parallel)

Workload:

regular attendance: 42 hours
self-study: 198 hours

Organizational issues

- **Im Wintersemester 2024/2025 ist die Veranstaltung auf maximal 30 Teilnehmer beschränkt.**
- **Die Anmeldung erfolgt durch Beitritt zum ILIAS-Kurs und Ausfüllen des Anmeldungsformulars (erforderliche Felder beim Beitritt zum ILIAS-Kurs).**
- **Die Anmeldung ist vom 01.09.2024 bis zum 30.09.2024 möglich. Die verfügbaren Plätze werden anschließend vergeben.**

Die nächste Veranstaltung findet im Sommersemester 2026 statt!

Literature

Ronald W. Wolff (1989) Stochastic Modeling and the Theory of Queues, Englewood Cliffs, NJ : Prentice-Hall.
John A. Buzacott, J. George Shanthikumar (1993) Stochastic Models of Manufacturing Systems, Upper Saddle River, NJ : Prentice Hall.

T 5.268 Course: Mathematics for High Dimensional Statistics [T-WIWI-111247]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-101637 - Analytics and Statistics
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Irregular	1

Events					
ST 2025	2550562	Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Lecture / 🗣	Grothe
ST 2025	2550563	Übung zu Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Practice / 🗣	Grothe

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (approx. 30 min.) taking place in the recess period.

Prerequisites
None

Recommendation
Basic knowledge of mathematics and statistics is assumed.
Knowledge in multivariate statistics is an advantage, but not necessary for the course.

Annotation
Teaching and learning format: Lecture and exercise

Below you will find excerpts from events related to this course:

V Mathematische Grundlagen hochdimensionaler Statistik
2550562, SS 2025, 2 SWS, Open in study portal

Lecture (V)
On-Site

Content
Content:

The lecture focuses on modelling statistical objects (random vectors, random matrices and random graphs) in high dimensions. It deals with concentration inequalities that limit the fluctuations of such objects as well as complexity measures for quantities and functions. The theory is transferred to well-known and widespread applications such as neighbourhood detection in networks, statistical learning theory and LASSO.

Learning objectives:

Students are able to

- name and justify statistical properties of high-dimensional objects (vectors, matrices, functions).
- describe and explain differences in the behaviour between low- and high-dimensional random objects.
- name procedures for assess uncertainties in statistical models and apply them in simple examples.
- decide well-founded which modeling of high-dimensional structures is best suited in a specific situation.
- transform data into lower dimensions and quantify approximation errors.
- understand basic proofs in high-dimensional statistics using examples.
- develop, implement and evaluate smaller simulations in a programming language of their choice.

T 5.269 Course: Media Management [T-WIWI-112711]

Responsible: Prof. Dr. Ann-Kristin Kupfer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2572192	Media Management	2 SWS	Lecture / 🗣	Kupfer
WT 24/25	2572193	Media Management Exercise	1 SWS	Practice / 🗣	Kopp
Exams					
WT 24/25	7900135	Media Management			Kupfer
ST 2025	7900004	Media Management			Kupfer

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of an examination of another type. The following aspects are included in the assessment:

- Elaboration and presentation of a group task
- Written exam

Further details on the organization of the performance and the points system for the assessment will be announced in the lecture.

Prerequisites
None

Recommendation
Students are highly encouraged to actively participate in class.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Media Management

2572192, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Students learn the theoretical foundations of media management and its most important concepts. They learn both about the key characteristics of both media products and media markets. They further get to know essential business models of media markets. Special emphasis will be given to understanding media consumers and the marketing mix of media products. A tutorial offers the opportunity to apply the key learnings of the lecture.

The learning objectives are as follows:

- Getting to know the theoretical foundations of media management
- Evaluating strategies for media products and services as media-specific marketing mix instruments
- Fostering critical and analytical thinking skills and the application of knowledge to marketing problems
- Improvement of skills and competences in the area of project management within the framework of group work
- Improvement of foreign language skills (business English)

Total time required for 4.5 credit points: approx. 135 hours

Attendance time: 30 hours

Self-study: 105 hours

Organizational issues
Appointments to be announced.

T 5.270 Course: Membrane Technologies in Water Treatment [T-CIWVT-110865]

Responsible: Prof. Dr. Harald Horn
Dr.-Ing. Florencia Saravia

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101122 - Water Chemistry and Water Technology II

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	2

Events					
ST 2025	2233010	Membrane Technologies in Water Treatment	2 SWS	Lecture / 🗣	Horn, Saravia
ST 2025	2233011	Membrane Technologies in Water Treatment - Excercises	1 SWS	Practice / 🧩	Horn, Saravia, und Mitarbeitende
Exams					
WT 24/25	7232605	Membrane Technologies in Water Treatment			Horn, Saravia
ST 2025	7233010	Membrane Technologies in Water Treatment			Horn, Saravia

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Learning control is an written examination with a duration of 90 minutes (SPO section 4 subsection 2).

Prerequisites
The attendance at the excursions is examination prerequisite.

T 5.271 Course: Metal Forming [T-MACH-105177]

Responsible: Prof. Dr.-Ing. Thomas Herlan
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Events					
ST 2025	2150681	Metal Forming	2 SWS	Lecture / 🗣	Herlan
Exams					
ST 2025	76-T-MACH-105177	Metal Forming			Herlan

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral Exam (20 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Metal Forming

2150681, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

At the beginning of the lecture the basics of metal forming are briefly introduced. The focus of the lecture is on massive forming (forging, extrusion, rolling) and sheet forming (car body forming, deep drawing, stretch drawing). This includes the systematic treatment of the appropriate metal forming Machines and the corresponding tool technology. Aspects of tribology, as well as basics in material science and aspects of production planning are also discussed briefly. The plastic theory is presented to the extent necessary in order to present the numerical simulation method and the FEM computation of forming processes or tool design. The lecture will be completed by product samples from the forming technology.

The topics are as follows:

- Introduction and basics
- Hot forming
- Metal forming machines
- Tools
- Metallographic fundamentals
- Plastic theory
- Tribology
- Sheet forming
- Extrusion
- Numerical simulation

Learning Outcomes:

The students …

- are able to reflect the basics, forming processes, tools, Machines and equipment of metal forming in an integrated and systematic way.
- are capable to illustrate the differences between the forming processes, tools, machines and equipment with concrete examples and are qualified to analyze and assess them in terms of their suitability for the particular application.
- are also able to transfer and apply the acquired knowledge to other metal forming problems.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues

Vorlesungstermine freitags, wöchentlich.
Die konkreten Termine werden in der ersten Vorlesung bekannt gegeben und auf der Institutshomepage und ILIAS veröffentlicht.

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature

Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)

5.272 Course: Methods and Models in Transportation Planning [T-BGU-101797]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6232701	Calculation Methods and Models in Traffic Planning	2 SWS	Lecture / Practice (/ 🗣	Vortisch, Mitarbeiter/innen
Exams					
WT 24/25	8240101797	Methods and Models in Transportation Planning			Vortisch
ST 2025	8240101797	Methods and Models in Transportation Planning			Vortisch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.273 Course: Methods in Economics [T-WIWI-114054]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantiative-mathematical methods.

T 5.274 Course: Methods in Innovation Management [T-WIWI-110263]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate
The assessment is an alternative exam assessment consisting of a presentation (25%) and a written paper (75%). The points system for the assessment is determined by the lecturer of the course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
Prior attendance of the course “Innovation Management: Concepts, Strategies and Methods” is recommended.

Annotation
Teaching and learning format: Seminar

Workload
90 hours

T 5.275 Course: Micro- and Nanosystem Integration for Medical, Fluidic and Optical Applications [T-MACH-108809]

Responsible: apl. Prof. Dr. Ulrich Gengenbach
Dr. Liane Koker
apl. Prof. Dr. Ingo Sieber

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Competence Certificate
Oral exam (Duration: 30min)

Prerequisites
T-MACH-105695 "Selected topics of system integration for micro- and nanotechnology" must not be started.

Workload
120 hours

T 5.276 Course: Micro- and nanotechnology in implant technology [T-MACH-111030]

Responsible: Dr. Ralf Ahrens
Dr. Patrick Wolfgang Doll

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2141871	Micro- and nanotechnology in implant technology:	2 SWS	Lecture / ✕	Doll, Ahrens, Guber

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
Oral Exam (20 min.)

Prerequisites
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V Micro- and nanotechnology in implant technology:
2141871, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Cancelled

Content
siehe oben

Organizational issues
>>>>> Die Veranstaltung entfällt in diesem Wintersemester und findet erst im kommenden Sommersemester 2025 statt. <<<<<

T 5.277 Course: Microactuators [T-MACH-101910]

Responsible: Prof. Dr. Manfred Kohl
Organisation: KIT Department of Mechanical Engineering

Part of: M-ETIT-101158 - Sensor Technology I
M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS
M-MACH-101292 - Microoptics

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2025	2142881	Microactuators	2 SWS	Lecture / 🗣	Kohl
Exams					
WT 24/25	76-T-MACH-101910	Microactuators			Kohl
ST 2025	76-T-MACH-101910	Microactuators			Kohl

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
T-MACH-114036 must not be started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Microactuators

2142881, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
- Basic knowledge in the material science of the actuation principles
- Layout and design optimization
- Fabrication technologies
- Selected developments
- Applications

The lecture includes amongst others the following topics:

- Microelectromechnical systems: linear actuators, microrelais, micromotors
- Medical technology and life sciences: Microvalves, micropumps, microfluidic systems
- Microrobotics: Microgrippers, polymer actuators (smart muscle)
- Information technology: Optical switches, mirror systems, read/write heads

Literature
- Folienskript "Mikroaktorik"

- D. Jendritza, Technischer Einsatz Neuer Aktoren: Grundlagen, Werkstoffe, Designregeln und Anwendungsbeispiele, Expert-Verlag, 3. Auflage, 2008

- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004

- N.TR. Nguyen, S.T. Wereley, Fundamentals and applications of Microfluidics, Artech House, Inc. 2002

- H. Zappe, Fundamentals of Micro-Optics, Cambride University Press 2010

5.278 Course: Microbiology for Engineers [T-CIWVT-108871]

Responsible: Prof. Dr. Thomas Schwartz
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2233840	Microbiology for Engineers	2 SWS	Lecture / 🗣	Schwartz

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

5.279 Course: Mixed Integer Programming I [T-WIWI-102719]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming M-WIWI-102832 - Operations Research in Supply Chain Management M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

T 5.280 Course: Mixed Integer Programming II [T-WIWI-102720]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.
The examination is held in the semester of the lecture and in the following semester.
The examination can also be combined with the examination of *Mixed Integer Programming I* [2550138]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

T 5.281 Course: Mobile Machines [T-MACH-105168]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each summer term	2

Events					
ST 2025	2114073	Mobile Machines	4 SWS	Lecture / 🗣	Geimer, Kazenwadel
Exams					
WT 24/25	76T-MACH-105168	Mobile Machines			Geimer
ST 2025	76-T-MACH-105168	Mobile Machines			Geimer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (45 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
none

Recommendation
Knowledge in Fluid Power Systems is required. It is recommended to attend the course *Fluid Power Systems* [2114093] beforehand.

Annotation
Learning objectives:

After successful participation in the course:

- the student will be able to name the wide range of mobile machinery
- know the possible applications and operating sequences of the most important mobile machines
- be able to describe selected subsystems and components

Content:

- Presentation of the components used and the most important mobile machines
- Basics and structure of the machines
- Practical insights into the development of the machines

Media:

Downloadable set of slides for the lecture

Book "Grundlagen mobiler Arbeitsmaschinen", Karlsruhe series of publications on vehicle systems technology, Volume 22, KIT Scientific Publishing

Workload
240 hours

Below you will find excerpts from events related to this course:

V Mobile Machines — **Lecture (V) On-Site**
2114073, SS 2025, 4 SWS, Language: German, Open in study portal

Content

- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

Knowledge in Fluid Power is required.

Recommendations:

It is recommended to attend the course *Fluid Power Systems* [2114093] beforehand.

- regular attendance: 42 hours
- self-study: 184 hours

5.282 Course: Mobility Services and New Forms of Mobility [T-BGU-103425]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6232811	Mobility Services and New Forms of Mobility	2 SWS	Lecture / 🗣	Kagerbauer
Exams					
WT 24/25	8240103425	Mobility Services and new Forms of Mobility			Kagerbauer
ST 2025	8240103425	Mobility Services and new Forms of Mobility			Kagerbauer

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.283 Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102808 - Digital Service Systems in Industry
M-WIWI-102832 - Operations Research in Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	4

Events					
WT 24/25	2550490	Modellieren und OR-Software: Fortgeschrittene Themen	3 SWS	Practical course /	Pomes, Linner, Nickel
Exams					
WT 24/25	7900071	Modeling and OR-Software: Advanced Topics			Nickel
ST 2025	7900188	Modeling and OR-Software: Advanced Topics			Nickel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment is a written examination. The examination is held in every semester. The prerequisite can only be obtained in semesters in which the course exercises are offered.

Prerequisites
Prerequisite for admission to the exam is the successful participation in the exercises. This includes the processing and presentation of exercises.

Recommendation
Basic knowledge as conveyed in the module *Introduction to Operations Research* is assumed.

Successful completion of the course *Modeling and OR-Software: Introduction.*

Annotation
Due to the limited number of participants, please register in advance. Further information can be found on the website of the course. Registration in WS 24/25 takes place via the Wiwi-Portal: https://portal.wiwi.kit.edu/ys/8209.
The course is offered every semester. The range of courses planned for three academic years in advance can be found on the Internet.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Modellieren und OR-Software: Fortgeschrittene Themen
2550490, WS 24/25, 3 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis. We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling progamming languages are OPL and ILOG Script.

T 5.284 Course: Modeling and Simulation [T-WIWI-112685]

Responsible: Prof. Dr. Sanja Lazarova-Molnar
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2511100	Modeling and Simulation	2 SWS	Lecture	Lazarova-Molnar
ST 2025	2511101	Exercises Modeling and Simulation	1 SWS	Practice	Lazarova-Molnar, Mostafa
Exams					
WT 24/25	79AIFB_MaS_A6	Modeling and Simulation			Lazarova-Molnar
ST 2025	79AIFB_MaS_C6	Modeling and Simulation (Registration until 21.07.2025)			Lazarova-Molnar

Competence Certificate
Depending on the number of participants in the course, the exam will be offered either as an oral exam (20 min), or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None

Recommendation
Some experience in programming and knowledge of basic mathematics and statistics.

Annotation
Instruction is in the form of lectures and exercises. A detailed course schedule will be published before the start of the semester.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Modeling and Simulation

Lecture (V)

2511100, SS 2025, 2 SWS, Language: English, Open in study portal

Content

Modeling and Simulation is the most widely used operations research / systems engineering technique for designing new systems and optimizing the performance of existing systems. In one way or another, just about every engineering or scientific field uses simulation as an exploration, modeling, or analysis technique. The course is designed to provide students with basic knowledge of modeling and simulation approaches and to provide them with first experience of using a simulation package. The course will focus on modeling and simulation of real-world discrete event systems. Examples of discrete events are customer arrivals at a queue of a service desk, machine failures in manufacturing systems, telephone calls in a call center, etc. Moreover, continuous and hybrid models will be also discussed. Topics include Discrete-Event Simulation, Input Modeling, Output Analysis, Random Number Generation, Verification and Validation, Stochastic Petri Nets and Markov Chains.

Competence Certificate

Depending on the number of participants in the course, the exam will be offered either as an oral exam (20 min), or as a written exam (60 min).

The exam takes place every semester and can be repeated at every regular examination date.

Learning Objectives

Knowledge:

- Demonstrate knowledge about general and specific theories, challenges, algorithms, methods, technologies, and tools related to modelling and simulation
- Demonstrate knowledge of two important classes of simulation:
  - Discrete-event Monte-Carlo simulation,
  - Continuous simulation with ODEs
- Demonstrate knowledge of algorithms necessary to build a simulator

Skills:

- Analyse suitability of an approach/tool for a given modelling problem
- Understand simulation models of various types
- Demonstrate methods and techniques to overcome common challenges in modelling and simulation
- Model simulation input data
- Analyse and model discrete stochastic systems
- Analyse and interpret simulation results

Competences:

- Use different methods to conduct simulation-based analysis of real-world data
- Build and simulate stochastic models
- Use simulation software

Prerequisites

Some experience in programming and knowledge of basic mathematics and statistics

Form of instruction

Lectures and exercises. A detailed course plan will be published before the semester start.

Literature

Discrete-Event System Simulation, 5th Edition

Jerry Banks, John S. Carson, II, Barry L. Nelson and David M. Nicol

T 5.285 Course: Modeling the Dynamics of Financial Markets [T-WIWI-113414]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-106660 - Modeling the Dynamics of Financial Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Exams			
WT 24/25	7900024	Modeling the Dynamics of Financial Markets	Ulrich

Competence Certificate
The examination takes the form of a one-hour written comprehensive examination on the courses "Dynamic Capital Marke Theory", "Essentials for Dynamic Financial Machine Learning" and "Exercises, Python, Resesearch Frontier in Dynamic Capital Markets".

Recommendation
Recommendation: Knowledge in the fields of Advanced Statistics, Deep Learning, Financial Economics, Differential Equations, Optimization.

Workload
270 hours

T 5.286 Course: Morphodynamics [T-BGU-101859]

Responsible: Prof. Dr. Mario Jorge Rodrigues Pereira da Franca
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-WIWI-104837 - Natural Hazards and Risk Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6222805	Landscape and River Morphology	2 SWS	Lecture / Practice (/ 🗣	Rodrigues Pereira da Franca, Vanzo

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
See German version.

Prerequisites
None

Workload
90 hours

T 5.287 Course: Multicriteria Optimization [T-WIWI-111587]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Events					
WT 24/25	2550155	Multicriteria Optimization	2 SWS	Lecture / 🗣	Stein
WT 24/25	2550156	Exercises Multicriteria Optimization		Practice / 🗣	Stein, Beck
Exams					
WT 24/25	7900009_WS2425_HK	Multicriteria Optimization			Stein
ST 2025	7900209_SS2025_NK	Multicriteria Optimization			Stein

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.
The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The course is offered every second winter semester (starting WiSe 22/23). The curriculum of the next three years is available online (www.ior.kit.edu).

Contents:

Multicriteria optimization deals with optimization problems with multiple objective functions. In practice, the minimization or maximization of several objectives often conflict with each other, such as weight and stability of mechanical components, return and risk of stock portfolios, or cost and duration of transports. Various scalarization approaches allow one to formulate single-objective problems that can be solved using nonlinear or global optimization techniques, and whose optimal points have a reasonable interpretation for the underlying multicriteria problem.

However, some seemingly obvious scalarization approaches suffer from various drawbacks, so that regardless of scalarization approaches, it is necessary to clarify what is meant by the solution of a multicriteria optimization problem in the first place. For such Pareto-optimal points, optimality conditions and solution procedures based on them can be formulated. From the usually non-unique Pareto set, decision makers finally choose an alternative based on their subjective preferences.

The lecture gives a mathematically sound introduction to multicriteria optimization and is structured as follows:

- Introductory examples and terminology
- Solution concepts
- Methods for the determination of the Pareto set
- Selection of Pareto-optimal points under subjective preferences

Workload
135 hours

Below you will find excerpts from events related to this course:

V Multicriteria Optimization

2550155, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

Multicriteria optimization deals with optimization problems with multiple objective functions. In practice, the minimization or maximization of several objectives often conflict with each other, such as weight and stability of mechanical components, return and risk of stock portfolios, or cost and duration of transports. Various scalarization approaches allow one to formulate single-objective problems that can be solved using nonlinear or global optimization techniques, and whose optimal points have a reasonable interpretation for the underlying multicriteria problem.

However, some seemingly obvious scalarization approaches suffer from various drawbacks, so that regardless of scalarization approaches, it is necessary to clarify what is meant by the solution of a multicriteria optimization problem in the first place. For such Pareto-optimal points, optimality conditions and solution procedures based on them can be formulated. From the usually non-unique Pareto set, decision makers finally choose an alternative based on their subjective preferences.

The lecture gives a mathematically sound introduction to multicriteria optimization and is structured as follows:

- Introductory examples and terminology
- Solution concepts
- Methods for the determination of the Pareto set
- Selection of Pareto-optimal points under subjective preferences

Learning objectives:

The student

- knows and understands the fundamentals of multicriteria optimization,
- is able to choose, design and apply modern techniques of multicriteria optimization in practice.

Literature

- M. Ehrgott, Multicriteria Optimization, Second Edition, Springer, Berlin, 2005
- J. Jahn, Vector Optimization, Second Edition, Springer, Berlin, 2011
- K. Miettinen, Nonlinear Multiobjective Optimization, Springer, New York, 2004
- Y. Sawaragi, H. Nakayama, T. Tanino, Theory of Multiobjective Optimization, Academic Press, Orlando, FL, 1985

5.288 Course: Multivariate Statistical Methods [T-WIWI-103124]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-101637 - Analytics and Statistics
M-WIWI-101639 - Econometrics and Statistics II
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
WT 24/25	2550554	Multivariate Verfahren	2 SWS	Lecture / 🗣	Grothe
WT 24/25	2550555	Practice Multivariate Statistical Methods	2 SWS	Practice / 🗣	Liu
Exams					
WT 24/25	7900217	Multivariate Statistical Methods			Grothe
ST 2025	7900351	Multivariate Statistical Methods			Grothe

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Witten examination lasting 60 minutes.

The examination is offered during the examination period of the lecture semester. Only repeaters (and not first-time writers) are admitted to the repeat examination in the examination period of the following semester.

Prerequisites
None

Recommendation
The course covers highly advanced statistical methods with a quantitative focus. Hence, participants are necessarily expected to have advanced statistical knowledge, e.g. acquired in the course "Advanced Statistics". Without this, participation in the course is not advised.

Previous attendance of the course Analysis of Multivariate Data is recommended. Alternatively, the script can be provided to interested students.

Annotation
The course (lecture and exercise) is offered irregularly. Detailed information can be found on the chair's website.

Workload
135 hours

T 5.289 Course: Nano-Optics [T-PHYS-102282]

Responsible: PD Dr. Andreas Naber
Organisation: KIT Department of Physics
Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each winter term	2

Events					
WT 24/25	4020021	Nano-Optics	3 SWS	Lecture / 🗣	Naber
WT 24/25	4020022	Exercises to Nano-Optics	1 SWS	Practice / 🗣	Naber
Exams					
WT 24/25	7800099	Nano-Optics			Naber

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

5.290 Course: Nanotribology and -Mechanics [T-MACH-102167]

Responsible: Prof. Dr. Martin Dienwiebel
apl. Prof. Dr. Hendrik Hölscher

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication
M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	5

Events					
WT 24/25	2182712	Nanotribology and -Mechanics	2 SWS	Block / 🗣	Dienwiebel
ST 2025	2182712	Nanotribology and -Mechanics	2 SWS	Lecture / Practice (/ 🗣	Dienwiebel

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, about 25 min

Prerequisites
none

Recommendation
preliminary knowlegde in mathematics and physics

Workload
120 hours

Below you will find excerpts from events related to this course:

V **Nanotribology and -Mechanics** — **Block (B) On-Site**
2182712, WS 24/25, 2 SWS, Language: English, Open in study portal

Content

In the summer semester the lecture is offered in German and in the winter semester in English!

Part 1: Fundamentals of nanotribology

- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- nanolubrication

Part 2: Topical papers

The student can

- explain the physical foundations and common models used in the field of nanotribology and nanomechanics
- describe the most important experimental methods in nanotribology
- critically evaluate scientific papers on nanotribological issues with respect to their substantial quality

preliminary knowlegde in mathematics and physics recommended

regular attendance: 22,5 hours
preparation for presentation: 22,5 hours
self-study: 75 hours

presentation (40%) and oral examination (30 min, 60%)
no tools or reference materials

Organizational issues

Email registration to lecturer by 10/10/2024: martin.dienwiebel@kit.edu

Anmeldung per Email bis zum 10.10.2024 an den Dozenten: martin.dienwiebel@kit.edu

Literature

Tafelbilder, Folien, Kopien von Artikeln

V	**Nanotribology and -Mechanics** 2182712, SS 2025, 2 SWS, Language: German, Open in study portal	**Lecture / Practice (VÜ)** **On-Site**

Content

In the summer semester the lecture is offered in German and in the winter semester in English!

Part 1: Fundamentals of nanotribology

- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- nanolubrication

Part 2: Topical papers

The student can

- explain the physical foundations and common models used in the field of nanotribology and nanomechanics
- describe the most important experimental methods in nanotribology
- critically evaluate scientific papers on nanotribological issues with respect to their substantial quality

preliminary knowlegde in mathematics and physics recommended

regular attendance: 22,5 hours
preparation for presentation: 22,5 hours
self-study: 75 hours

presentation (40%) and oral examination (30 min, 60%)
no tools or reference materials

Organizational issues

Die Vorlesung wird auf Deutsch (SoSe) und auf Englisch (WiSe) angeboten!

Lecture will be offered for the last time in winter semester 2025/2026 and then replaced by: Energy Efficient and Sustainable Tribological Systems

Kontakt: martin.dienwiebel@kit.edu

Literature

Edward L. Wolf
Nanophysics and Nanotechnology, Wiley-VCH, 2006

C. Mathew Mate
Tribology on the Small Scale: A Bottom Up Approach to Friction, Lubrication, and Wear (Mesoscopic Physics and Nanotechnology) 1st Edition, Oxford University Press

Tafelbilder, Folien, Kopien von Artikeln

T 5.291 Course: Nature-Inspired Optimization Methods [T-WIWI-102679]

Responsible: Prof. Dr. Pradyumn Kumar Shukla
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2511106	Nature-Inspired Optimization Methods	2 SWS	Lecture / Blended	Shukla
ST 2025	2511107	Übungen zu Nature-Inspired Optimization Methods	1 SWS	Practice / Blended	Shukla
Exams					
WT 24/25	79AIFB_NOM_B5	Nature-Inspired Optimisation Methods			Shukla
ST 2025	79AIFB_NOM_C1	Nature-Inspired Optimization Methods (Registration until 21.07.2025)			Shukla

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Please note: no exam can be offered in the winter semester 2023/2024.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Nature-Inspired Optimization Methods

2511106, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Many optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.

Learning objectives:

Students learn:

- Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
- Different aspects and limitation of the methods
- Applications of such methods
- Multi-objective optimization methods
- Constraint handling methods
- Different aspects in parallelization and computing platforms

Literature
* E. L. Aarts and J. K. Lenstra: 'Local Search in Combinatorial Optimization'. Wiley, 1997 * D. Corne and M. Dorigo and F. Glover: 'New Ideas in Optimization'. McGraw-Hill, 1999 * C. Reeves: 'Modern Heuristic Techniques for Combinatorial Optimization'. McGraw-Hill, 1995 * Z. Michalewicz, D. B. Fogel: How to solve it: Modern Heuristics. Springer, 1999 * E. Bonabeau, M. Dorigo, G. Theraulaz: 'Swarm Intelligence'. Oxford University Press, 1999 * A. E. Eiben, J. E. Smith: 'Introduction to Evolutionary Computation'. * M. Dorigo, T. Stützle: 'Ant Colony Optimization'. Bradford Book, 2004 Springer, 2003

T 5.292 Course: Non- and Semiparametrics [T-WIWI-103126]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course *"Applied Econometrics"* [2520020]

Annotation
The course takes place every second winter semester: 2018/19 then 2020/21

T 5.293 Course: Nonlinear Control Systems [T-ETIT-100980]

Responsible: Dr.-Ing. Mathias Kluwe
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101157 - Control Engineering II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2303173	Nichtlineare Regelungssysteme	2 SWS	Lecture / 🗣	Kluwe
Exams					
WT 24/25	7303173	Nonlinear Control Systems			Kluwe
ST 2025	7303173	Nonlinear Control Systems			Kluwe

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

T 5.294 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	4

Events					
WT 24/25	2550111	Nonlinear Optimization I	2 SWS	Lecture / 🗣	Stein
WT 24/25	2550112	Exercises Nonlinear Optimization I	1 SWS	Practice / 🗣	Stein, Schwarze, Neussel
Exams					
WT 24/25	7900001_WS2425_HK	Nonlinear Optimization I			Stein
ST 2025	7900202_SS2025_NK	Nonlinear Optimization I			Stein

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The exam takes place in the semester of the lecture and in the following semester.
The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

Annotation
Part I and II of the lecture are held consecutively in the *same* semester.

Below you will find excerpts from events related to this course:

V Nonlinear Optimization I
2550111, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality condtions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T 5.295 Course: Nonlinear Optimization I and II [T-WIWI-103637]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each winter term	6

Events					
WT 24/25	2550111	Nonlinear Optimization I	2 SWS	Lecture / 🗣	Stein
WT 24/25	2550112	Exercises Nonlinear Optimization I	1 SWS	Practice / 🗣	Stein, Schwarze, Neussel
WT 24/25	2550113	Nonlinear Optimization II	2 SWS	Lecture / 🗣	Stein
Exams					
WT 24/25	7900003_WS2425_HK	Nonlinear Optimization I and II			Stein
ST 2025	7900204_SS2025_NK	Nonlinear Optimization I and II			Stein

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consits of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

Prerequisites
None.

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

Below you will find excerpts from events related to this course:

V Nonlinear Optimization I
2550111, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality condtions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

V

Nonlinear Optimization II

2550113, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T 5.296 Course: Nonlinear Optimization II [T-WIWI-102725]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2550112	Exercises Nonlinear Optimization I	1 SWS	Practice / 🗣	Stein, Schwarze, Neussel
WT 24/25	2550113	Nonlinear Optimization II	2 SWS	Lecture / 🗣	Stein
Exams					
WT 24/25	7900002_WS2425_HK	Nonlinear Optimization II			Stein
ST 2025	7900203_SS2025_NK	Nonlinear Optimization II			Stein

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate

The assessment consits of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of *Nonlinear Optimization I* [2550111]. In this case, the duration of the written exam takes 120 minutes.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

Below you will find excerpts from events related to this course:

V Nonlinear Optimization II

2550113, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, 2. Aufl., SpringerSpektrum, 2021

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T 5.297 Course: Novel Actuators and Sensors [T-MACH-102152]

Responsible: Prof. Dr. Manfred Kohl
Dr. Martin Sommer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology
M-MACH-101294 - Nanotechnology
M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	4

Events					
WT 24/25	2141865	Novel actuators and sensors	2 SWS	Lecture / 🗣	Kohl, Sommer
Exams					
WT 24/25	76-T-MACH-102152	Novel Actuators and Sensors			Kohl, Sommer
ST 2025	7600010	Novel Actuators and Sensors			Kohl
ST 2025	76-T-MACH-102152	Novel Actuators and Sensors			Sommer, Kohl

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 60 minutes

Prerequisites
T-MACH-114036 must not be started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Novel actuators and sensors

2141865, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
- Vorlesungsskript "Neue Aktoren" und Folienskript "Sensoren"
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
- "Sensors Update", Edited by H.Baltes, W. Göpel, J. Hesse, VCH, 1996, ISBN: 3-527-29432-5
- "Multivariate Datenanalyse – Methodik und Anwendungen in der Chemie", R. Henrion, G. Henrion, Springer 1994, ISBN 3-540-58188-X

T 5.298 Course: Online Concepts for Karlsruhe City Retailers [T-WIWI-111848]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-105312 - Marketing and Sales Management
M-WIWI-106258 - Digital Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	2

Events					
ST 2025	2571184	Online concepts for Karlsruhe city retailers	2 SWS	Others (sons /	Kupfer

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment:

- presentations in teams (in each case to the extent of approx. 15 minutes per team with subsequent discussio)
- delivery of a written elaboration per team.

Annotation
Please note that an application is required to participate in this workshop. The application phase usually takes place at the beginning of the lecture period in the summer semester. More information on the application process is usually available on the Marketing and Sales Research Group website (marketing.iism.kit.edu) shortly before the start of the lecture period in the summer semester.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Online concepts for Karlsruhe city retailers

2571184, SS 2025, 2 SWS, Language: German, Open in study portal

Others (sonst.)
On-Site

Content
Content
As part of a practical project in cooperation with the city marketing department of KME Karlsruhe Marketing und Event GmbH, students will have the opportunity to directly interact with retailers in Karlsruhe. Challenges of the digitalization of brick-and-mortar retailing will be analyzed and solutions will be developed and implemented.

In a theoretical part at the beginning of the event, students will gain an insight into the theoretical foundations of specific online marketing instruments. In cooperation with Karlsruhe City Marketing, students are taught application-oriented skills in online marketing tools, such as content management systems, social media platforms, search engine optimization or Google Ads campaigns.

In the practical part of the course, student teams cooperate with a real retailer in Karlsruhe's city center and learn how to analyze and optimize online presences and digital solutions based on key performance indicators. Possible use cases range from social media communication and website optimization to the introduction of innovative pricing and payment methods. In this way, students are given the tools for developing, maintaining and optimizing individual websites and digital solutions in stationary retailing.

Learning objectives result accordingly as follows:
- Learning of theoretical basics of central, application-oriented tools of online marketing
- Application and practical deep-dive of the acquired knowledge in a real case
- Concise and structured presentation of results

Total time required for 3 credit points: approx. 90.0 hours

Attendance time: 12 hours

Preparation and wrap-up of the course: 58 hours

Exam and exam preparation: 20 hours

T 5.299 Course: Operation Methods for Earthmoving [T-BGU-101801]

Responsible: Dr.-Ing. Heinrich Schlick
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6241905	Earthwork	1 SWS	Lecture / 🗣	Haghsheno, Waleczko
Exams					
WT 24/25	8240101801	Operation Methods for Earthmoving			Schneider

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
45 hours

5.300 Course: Operation Methods for Foundation and Marine Construction [T-BGU-101832]

Responsible: Dr.-Ing. Harald Schneider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6241904	Underground Construction	1 SWS	Lecture / 🗣	Haghsheno, Schneider
Exams					
WT 24/25	8240101832	Operation Methods for Foundation and Marine Construction			Schneider

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
45 hours

T 5.301 Course: Operations Research in Health Care Management [T-WIWI-102884]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	3

Events					
WT 24/25	2550495	Operations Research in Health Care Management	2 SWS	Lecture / 🗣	Graß
WT 24/25	2550496	Übungen zu OR im Health Care Management	1 SWS	Practice	Graß
ST 2025	2550495	Operations Research in Health Care Management	2 SWS	Lecture / 🖥	Graß
ST 2025	2550496	Übungen zu OR im Health Care Management	1 SWS	Practice / 🖥	Graß
Exams					
WT 24/25	7900010	Operations Research in Health Care Management			Graß
WT 24/25	7900032	Operations Research in Health Care Management			Graß
ST 2025	7900229	Operations Research in Health Care Management			Graß

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of a 60-minute written examination (in accordance with §4(2), 1 SPO).

The examination is offered every semester.

Prerequisites
None

Recommendation
Basic knowledge as co nveyed in the module "Introduction to Operations Research" is assumed.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

Below you will find excerpts from events related to this course:

V Operations Research in Health Care Management
2550495, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

V Operations Research in Health Care Management
2550495, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Literature
Weiterführende Literatur:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

T 5.302 Course: Operations Research in Supply Chain Management [T-WIWI-102715]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102805 - Service Operations
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Events					
ST 2025	2550480	Operations Research in Supply Chain Management	2 SWS	Lecture / 🗣	Nickel
ST 2025	2550481	Übungen zu OR in Supply Chain Management	1 SWS	Practice / 🗣	Hoffmann

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM,Tactical and operational SCMis assumed.

Annotation
The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

Below you will find excerpts from events related to this course:

V Operations Research in Supply Chain Management

2550480, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.

In form and content, the lecture addresses multiple areas of Supply Chain Management: After a short introduction, inventory models, scheduling, assembly line balancing as well as cutting and packing will be discussed. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.

Literature

- Simchi-Levi, D.; Chen, X.; Bramel, J.: The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management, 2nd edition, Springer, 2005
- Simchi-Levi, D.; Kaminsky, P.; Simchi-Levi, E.: Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, McGraw-Hill, 2000
- Silver, E. A.; Pyke, D. F.; Peterson, R.: Inventory Management and Production Planning and Scheduling, 3rd edition, Wiley, 1998
- Blazewicz, J.: Handbook on Scheduling - From Theory to Applications, Springer, 2007
- Pinedo, M. L.: Scheduling - Theory, Algorithms, and Systems (3rd edition), Springer, 2008
- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
- Borodin, A.; El-Yaniv, R.: Online Computation and Competitive Analysis, Cambridge University Press, 2005
- Francis, R. L.; McGinnis, L. F.; White, A.: Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice-Hall, 1992

T 5.303 Course: Optical Transmitters and Receivers [T-ETIT-100639]

Responsible: Prof. Dr. Wolfgang Freude
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	2

Events					
WT 24/25	2309460	Optical Transmitters and Receivers	2 SWS	Lecture / 🗣	Freude
WT 24/25	2309461	Tutorial for 2309460 Optical Transmitters and Receivers	2 SWS	Practice / 🗣	Freude, N.N.
Exams					
WT 24/25	7309460	Optical Transmitters and Receivers			Freude
ST 2025	7309460	Optical Transmitters and Receivers			Freude

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Prerequisites
none

T 5.304 Course: Optical Waveguides and Fibers [T-ETIT-101945]

Responsible: Prof. Dr.-Ing. Christian Koos
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101292 - Microoptics
M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2309464	Optical Waveguides and Fibers	2 SWS	Lecture / 🗣	Koos, N.N., Bao
WT 24/25	2309465	Tutorial for 2309464 Optical Waveguides and Fibers	1 SWS	Practice / 🗣	Koos, N.N.
Exams					
WT 24/25	7309464	Optical Waveguides and Fibers			Koos
ST 2025	7309464	Optical Waveguides and Fibers			Koos

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

T 5.305 Course: Optimization under Uncertainty [T-WIWI-106545]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2550464	Optimization Under Uncertainty	2 SWS	Lecture /	Rebennack
WT 24/25	2550465	Übungen zu Optimierungsansätze unter Unsicherheit	1 SWS	Practice /	Rebennack
WT 24/25	2550466		2 SWS	Others (sons	Rebennack
Exams					
WT 24/25	7900240	Optimization under Uncertainty			Rebennack
ST 2025	7900309	Optimization under Uncertainty			Rebennack

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Prerequisites
None.

Workload
135 hours

T 5.306 Course: Optoelectronic Components [T-ETIT-101907]

Responsible: Prof. Dr.-Ing. Sebastian Randel
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101287 - Microsystem Technology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2309486	Optoelectronic Components	2 SWS	Lecture /	Randel
ST 2025	2309487	Optoelectronic Components (Tutorial)	1 SWS	Practice /	Randel
Exams					
WT 24/25	7309486	Optoelectronic Components			Randel
ST 2025	7309486	Optoelectronic Components			Randel

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
none

Annotation
This course is recommended for Master programs. For details, see description of M-ETIT-100509 "Optoelectronic Components".

T 5.307 Course: Panel Data [T-WIWI-103127]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2520320	Panel Data	2 SWS	Lecture	Heller
ST 2025	2520321	Übungen zu Paneldaten	2 SWS	Practice	Heller

Competence Certificate
The performance assessment is an alternative exam assessment in the form of a one-hour examination comprising a written and an oral part. The examination takes place as an individual examination or in groups of two.

Prerequisites
None

Workload
135 hours

Below you will find excerpts from events related to this course:

V Panel Data

2520320, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content
Content:

Fixed-Effects-Models, Random-Effects-Models, Time-Demeaning

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Literature
Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge and London: MIT Press.

Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach* (5th ed.). Mason, Ohio: South-Western Cengage Learning.

T 5.308 Course: Parametric Optimization [T-WIWI-102855]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

T 5.309 Course: Patent Law [T-INFO-101310]

Responsible: Patric Werner
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2025	24656	Patent Law	2 SWS	Lecture / 🗣	Werner
Exams					
WT 24/25	7500006	Patent Law			Sattler, Matz
ST 2025	7500109	Patent Law			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites
None.

Recommendation
None.

T 5.310 Course: PH APL-ING-TL01 [T-WIWI-106291]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

T 5.311 Course: PH APL-ING-TL02 [T-WIWI-106292]

Organisation: University

Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

T 5.312 Course: PH APL-ING-TL03 [T-WIWI-106293]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

T 5.313 Course: PH APL-ING-TL04 ub [T-WIWI-106294]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Once	1

T 5.314 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Once	1

T 5.315 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

Organisation: University

Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Once	1

T 5.316 Course: PH APL-ING-TL07 [T-WIWI-108384]

Organisation: University

Part of: M-WIWI-101404 - Extracurricular Module in Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

T 5.317 Course: Physical Basics of Laser Technology [T-MACH-102102]

Responsible: Dr.-Ing. Johannes Schneider
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	5

Events					
WT 24/25	2181612	Physical basics of laser technology	3 SWS	Lecture / Practice (/	Schneider
Exams					
WT 24/25	76-T-MACH-102102	Physical Basics of Laser Technology			Schneider
ST 2025	76-T-MACH-102102	Physical Basics of Laser Technology			Schneider

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
oral examination (ca. 25-30 min)

no tools or reference materials

Prerequisites
It is not possible, to combine this brick with brick Laser Material Processing [T-MACH-112763], brick Laser Application in Automotive Engineering [T-MACH-105164] and brick Physical Basics of Laser Technology [T-MACH-109084].

Recommendation
Basic knowledge of physics, chemistry and material science

Workload
150 hours

Below you will find excerpts from events related to this course:

V Physical basics of laser technology

2181612, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

Based on the description of the physical basics about the formation and the properties of laser light the lecture goes through the different types of laser beam sources used in industry these days. The lecture focuses on the usage of lasers especially in materials engineering. Other areas like measurement technology or medical applications are also mentioned.

- physical basics of laser technology
- laser beam sources (solid state, diode, gas, liquid and other lasers)
- beam properties, guiding and shaping
- lasers in materials processing
- lasers in measurement technology
- lasers for medical applications
- savety aspects

The lecture is complemented by a tutorial.

The student

- can explain the principles of light generation, the conditions for light amplification as well as the basic structure and function of different laser sources.
- can describe the influence of laser, material and process parameters for the most important methods of laser-based materials processing and choose laser sources suitable for specific applications.
- can illustrate the possible applications of laser sources in measurement and medicine technology
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

regular attendance: 33,5 hours
self-study: 116,5 hours

The assessment consists of an oral exam (ca. 30 min) taking place at the agreed date (according to Section 4(2), 2 of the examination regulation). The re-examination is offered upon agreement.

It is allowed to select only one of the lectures "Laser in automotive engineering" (2182642) or "Physical basics of laser technology" (2181612) during the Bachelor and Master studies.

Organizational issues

Termine für die Übung werden in der Vorlesung bekannt gegeben!

Literature

M. W. Sigrist: Laser: Theorie, Typen und Anwendungen, 2018, Springer Spektrum

T. Graf: Laser - Grundlagen der Laserstrahlerzeugung 2015, Springer Vieweg

R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer

H. Hügel, T. Graf: Materialbearbeitung mit Laser, 2023, Springer Vieweg

J. Eichler, H.-J. Eichler: Lasers - Basics, Advances and Applications, 2018, Springer

W. T. Silfvast: Laser Fundamentals, 2008, Cambridge University Press

W. M. Steen: Laser Material Processing, 2010, Springer

R. Poprawe, et al.: Tailored Light 1 - High Power Lasers for Production, 2018, Springer

R. Poprawe, et al.: Tailored Light 2 - Laser Applications, 2024, Springer

T 5.318 Course: Physics for Engineers [T-MACH-100530]

Responsible: Prof. Dr. Martin Dienwiebel
Prof. Dr. Peter Gumbsch
apl. Prof. Dr. Alexander Nesterov-Müller
Dr. Daniel Weygand

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101287 - Microsystem Technology
M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2025	2142890	Physics for Engineers	4 SWS	Lecture / Practice (/ 🗣	Weygand, Dienwiebel, Nesterov-Müller, Gumbsch
Exams					
ST 2025	76-T-MACH-100530	Physics for Engineers			Gumbsch, Weygand, Nesterov-Müller, Dienwiebel

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam 90 min

Prerequisites
none

Workload
150 hours

Below you will find excerpts from events related to this course:

V Physics for Engineers
2142890, SS 2025, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
1) Foundations of solid state physics

- Wave particle dualism
- Tunnelling
- Schrödinger equation
- H-atom

2) Electrical conductivity of solids

- solid state: periodic potentials
- Pauli Principle
- band structure
- metals, semiconductors and isolators
- p-n junction / diode

3) Optics

- quantum mechanical principles of the laser
- linear optics
- non-linear optics

Exercises are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

The student

- has the basic understanding of the physical foundations to explain the relationship between the quantum mechanical principles and the optical as well as electrical properties of materials
- can describe the fundamental experiments, which allow the illustration of these principles

regular attendance: 22,5 hours (lecture) and 22,5 hours (excerises)
self-study: 105 hours

The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Organizational issues
Kontakt: daniel.weygand@kit.edu

Literature

- Tipler und Mosca: Physik für Wissenschaftler und Ingenieure, Elsevier, 2004
- Haken und Wolf: Atom- und Quantenphysik. Einführung in die experimentellen und theoretischen Grundlagen, 7. Aufl., Springer, 2000
- Harris, Moderne Physik, Pearson Verlag, 2013

T 5.319 Course: Pioneering Leadership in German SMEs [T-WIWI-114184]

Responsible: Eva Schulz-Kamm
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2025	2500033	Pioneering Leadership in the German Mittelstand	2 SWS	Seminar / 🗣	Weissenberger-Eibl

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Non exam assessment consisting of a presentation of the results and a seminar paper (written in the group).

The grade is composed of 70% of the grade for the written work and 30% of the grade for the presentation.

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Pioneering Leadership in the German Mittelstand

2500033, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
Participants
- learn about the particular specifics of management and the cultural constitution of medium-sized and, in particular, family-run companies in Germany.
- understand the core elements of owner strategy and corporate strategy and why both strategies are linked in family businesses.
- gain an overview of the complex challenges facing German SMEs and the entrepreneurial barriers and success factors that significantly determine competitiveness and innovative ability.
- have understood what role leadership skills play in this, what key skills there are, how they are measured and how they are used in business practice.
- have internalized which competencies constitute so-called “pioneering leadership” and can assess these in themselves as well as medium-sized companies - as attractive future employers - with regard to innovative ability and competitiveness.
- consolidate what they have learned using current examples and case studies from business practice in German SMEs as well as management consulting and HR consulting practice.

T 5.320 Course: Platform & Market Engineering: Commerce, Media, and Digital Democracy [T-WIWI-112823]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101409 - Electronic Markets
M-WIWI-101411 - Information Engineering
M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-102754 - Service Economics and Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2540460	Platform & Market Engineering: Commerce, Media, and Digital Democracy	2 SWS	Lecture / 🗣	Weinhardt, Fegert
ST 2025	2540461	Übungen zu Platform & Market Engineering: Commerce, Media, and Digital Democracy	1 SWS	Practice / 🗣	Fegert, Stano
Exams					
WT 24/25	7910804	Platform & Market Engineering: Commerce, Media, and Digital Democracy			Weinhardt

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) up to 6 bonus points can be obtained. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by max. one grade level (0.3 or 0.4).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Platform & Market Engineering: Commerce, Media, and Digital Democracy
2540460, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

Digital platforms and markets play an increasingly vital role in modern economies and societies. Understanding how to engineer these systems for efficiency, fairness, and societal benefit is crucial for shaping the digital future. By combining economic theory, engineering principles, and hands-on applications, this course prepares you to address real-world challenges in eCommerce, digital media, and digital democracy.

This lecture provides an in-depth exploration of the theoretical foundations, practical applications, and engineering principles essential for understanding and designing modern markets and digital platforms.

We aim to:

- Equip students with the ability to analyze, design, and evaluate digital markets and platforms.
- Provide an understanding of market mechanisms, economic principles, and the role of digital infrastructure in shaping economic and social interactions.
- Explore the influence of digital platforms on media, democracy, and citizen participation

Course Structure:

1. Foundations of Platform & Market Engineering
    1. Market Engineering and Institutional Economics
    2. The "House of Market Engineering"
    3. Key concepts: efficiency, fairness, incentive compatibility, market convergence
2. Applications and Principles of Markets
    1. Market Engineering and Institutional Economics
    2. Economic theories in digital markets and platforms
3. Market Engineering Microstructure and Infrastructure
    1. Game Theory
    2. Mechanism Design
    3. Trust and Enforcement
    4. Auctions (single-item, combinatorial)
    5. IT & Business Infrastructure
    6. Evaluating Market Engineering: Experimental Economics
4. Digital Platforms and the Media
5. Digital Democracy:
    1. Online Polarization and Disinformation
    2. Digital Participation Engineering
    3. Digital Citizen Science Engineering

Organizational issues

ehemals: "**Market Engineering: Information in Institutions"**

Literature

- Roth, A., The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools for Design Economics. Econometrica 70(4): 1341-1378, 2002.
- Weinhardt, C. ,Holtmann, C., Neumann, D., Market Engineering. Wirtschaftsinformatik, 2003.
- Wolfstetter, E., Topics in Microeconomics - Industrial Organization, Auctions, and Incentives. Cambridge, Cambridge University Press, 1999.
- Smith, V. "Theory, Experiments and Economics", The Journal of Economic Perspectives,Vol. 3, No. 1, 151-69 1989

T 5.321 Course: PLM for Product Development in Mechatronics [T-MACH-102181]

Responsible: Prof. Dr.-Ing. Martin Eigner
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Competence Certificate
Oral examination 20 min.

Prerequisites
none

Workload
120 hours

T 5.322 Course: Polymer Engineering I [T-MACH-102137]

Responsible: Dr.-Ing. Wilfried Liebig
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	2

Events					
WT 24/25	2173590	Polymer Engineering I	2 SWS	Lecture / 🗣	Liebig
Exams					
WT 24/25	76-T-MACH-102137	Polymer Engineering I			Liebig
ST 2025	76-T-MACH-102137	Polymer Engineering I			Liebig

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral exam, about 25 minutes

Prerequisites
T-MACH-114007 must not have been started

Workload
120 hours

Below you will find excerpts from events related to this course:

V Polymer Engineering I
2173590, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Economical aspects of polymers
2. Introductiom of mechanical,
chemical end electrical properties
3. Processing of polymers
(introduction)
4. Material science of polymers
5. Synthesis

learning objectives:

The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material "polymer" meeting its requirements in an economical and ecological way.

The students

- are able to describe and classify polymers
  based on the fundamental synthesis processing techniques
- can find practical applications for state-of-the-art polymers and manufacturing technologies
- are able to apply the processing techniques, the application of polymers and polymer composites regarding to the basic principles of material science
- can describe the special mechanical, chemical and elctrical prooperties of polymers and correlate these properties to the chemical bindings.
- can define application areas and the limitation in the use of polymers

requirements:

none

workload:

regular attendance: 21 hours
self-study: 99 hours

Literature

Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.

T 5.323 Course: Polymer Engineering II [T-MACH-102138]

Responsible: Dr.-Ing. Wilfried Liebig
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Events					
ST 2025	2174596	Polymer Engineering II	2 SWS	Lecture / 🗣	Liebig
Exams					
WT 24/25	76-T-MACH-102138	Polymerengineering II			Liebig
ST 2025	76-T-MACH-102138	Polymerengineering II			Liebig

Legend: 📱 Online, ♲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral exam, about 25 minutes

Prerequisites
T-MACH-114007 must not be started.

Recommendation
Knowledge in Polymerengineering I

Workload
120 hours

Below you will find excerpts from events related to this course:

V Polymer Engineering II

2174596, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
1. Processing of polymers
2. Properties of polymer components
Based on practical examples and components
2.1 Selection of material
2.2 Component design
2.3 Tool engineering
2.4 Production technology
2.5 Surface engineering
2.6 Sustainability, recycling

learning objectives:

The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, that the students gather knowledge and technical skills to use the material "polymer" meeting its requirements in an economical and ecological way.

The students

- can describe and classify different processing techniques
  and can exemplify mould design principles based on technical parts.
- know about practical applications and processing of polymer parts
- are able to design polymer parts according to given restrictions
- can choose appropriate polymers based on the technical requirements
- can decide how to use polymers regarding the production, economical and ecological requirements

requirements:
Polymerengineering I
workload:

The workload for the lecture Polymerengineering II is 120 h per semester and consists of the presence during the lecture (21 h) as well as preparation and rework time at home (99 h).

Literature
Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.

Recommended literature and selected official lecture notes are provided in the lecture.

T 5.324 Course: Polymers in MEMS A: Chemistry, Synthesis and Applications [T-MACH-102192]

Responsible: Dr.-Ing. Bastian Rapp
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2141853	Polymers in MEMS A: Chemistry, Synthesis and Applications	2 SWS	/	Worgull
Exams					
WT 24/25	76-T-MACH-102192	Polymers in MEMS A: Chemistry, Synthesis and Applications			Rapp, Worgull

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral examination

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Polymers in MEMS A: Chemistry, Synthesis and Applications
2141853, WS 24/25, 2 SWS, Language: German, Open in study portal

Blended (On-Site/Online)

Organizational issues
Findet als Blockveranstaltung am Semesterende statt.

T 5.325 Course: Polymers in MEMS B: Physics, Microstructuring and Applications [T-MACH-102191]

Responsible: Dr.-Ing. Matthias Worgull
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2141854	Polymers in MEMS B: Physics, Microstructuring and Applications	2 SWS	Lecture /	Worgull
Exams					
WT 24/25	76-T-MACH-102191	Polymers in MEMS B: Physics, Microstructuring and Applications			Worgull

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral examination

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Polymers in MEMS B: Physics, Microstructuring and Applications
2141854, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

T 5.326 Course: Polymers in MEMS C: Biopolymers and Bioplastics [T-MACH-102200]

Responsible: Dr.-Ing. Bastian Rapp
Dr.-Ing. Matthias Worgull

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2142855	Polymers in MEMS C - Biopolymers and Bioplastics	2 SWS	/	Worgull
Exams					
WT 24/25	76-T-MACH-102200	Polymers in MEMS C: Biopolymers and Bioplastics			Worgull, Rapp

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral examination

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Polymers in MEMS C - Biopolymers and Bioplastics
2142855, SS 2025, 2 SWS, Language: German, Open in study portal **Blended (On-Site/Online)**

Content

Polymers are ubiquitous in everyday life: from packaging materials all the way to specialty products in medicine and medical engineering. Today it is difficult to find a product which does not (at least in parts) consist of polymeric materials. The question of how these materials can be improved with respect to their disposal and consumption of (natural) resources during manufacturing is often raised. Today polymers must be fully recycled in Germany and many other countries due to the fact that they do not (or only very slowly) decompose in nature. Furthermore significant reductions of crude oil consumption during synthesis are of increasing importance in order to improve the sustainability of this class of materials. With respect to disposal polymers which do not have to be disposed by combustion but rather allow natural decomposition (composting) are of increasing interest. Polymers from renewable sources are also of interest for modern microelectromechanical systems (MEMS) especially if the systems designed are intended as single-use products.

This lecture will introduce the most important classes of these so-called biopolymers and bioplastics. It will also discuss and highlight polymers which are created from naturally created analogues (e.g. via fermentation) to petrochemical polymer precursors and describe their technical processing. Numerous examples from MEMS as well as everyday life will be given.

Some of the topics covered are:

- What are biopolyurethanes and how can you produce them from castor oil?
- What are "natural glues" and how are they different from chemical glues?
- How do you make tires from natural rubbers?
- What are the two most important polymers for life on earth?
- How can you make polymers from potatoes?
- Can wood be formed by injection molding?
- How do you make buttons from milk?
- Can you play music on biopolymers?
- Where and how do you use polymers for tissue engineering?
- How can you built LEGO with DNA?

The lecture will be given in German language unless non-German speaking students attend. In this case, the lecture will be given in English (with some German translations of technical vocabulary). The lecture slides are in English language and will be handed out for taking notes. Additional literature is not required.

For further details, please contact the lecturer, PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is not necessary.

Organizational issues

Für weitere Rückfragen, wenden Sie sich bitte an PD Dr.-Ing- Matthias Worgull (matthias.worgull@kit.edu). Eine Voranmeldung ist nicht notwendig.

Literature

Zusätzliche vorlesungsbegleitende Literatur ist nicht notwendig.

T 5.327 Course: Portfolio and Asset Liability Management [T-WIWI-103128]

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2520357	Portfolio and Asset Liability Management	2 SWS	Lecture	Safarian
ST 2025	2520358	Übungen zu Portfolio and Asset Liability Management	2 SWS	Practice	Safarian

Competence Certificate
The assessment of this course consists of a written examination (following §4(2), 1 SPOs, 180 min.).

Prerequisites
None

Below you will find excerpts from events related to this course:

V Portfolio and Asset Liability Management
2520357, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Learning objectives:

Knowledge of various portfolio management techniques in the financial industry.

Content:

Portfolio theory: principles of investment, Markowitz- portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorial CAPM, arbitragepricing theory (APT), arbitrage and hedging, multi factorial models, equity-portfolio management, passive strategies, active investment

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Organizational issues
Blockveranstaltung, Termine werden über Ilias bekanntgegeben

Literature
To be announced in the lecture

T 5.328 Course: Power Transmission and Power Network Control [T-ETIT-101941]

Responsible: Prof. Dr.-Ing. Thomas Leibfried
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101164 - Generation and Transmission of Renewable Power

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Events					
ST 2025	2307372	Power Transmission and Power Network Control	2 SWS	Lecture / ✕	Leibfried
ST 2025	2307374	Übungen zu 2307372 Energieübertragung und Netzregelung	1 SWS	Practice / ✕	Bisseling
Exams					
WT 24/25	7307372	Power Transmission and Power Network Control			Leibfried
ST 2025	7307372	Power Transmission and Power Network Control			Leibfried

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Prerequisites
none

T 5.329 Course: Practical Course in Water Technology [T-CIWVT-106840]

Responsible: Dr. Andrea Hille-Reichel
Prof. Dr. Harald Horn

Organisation: KIT Department of Chemical and Process Engineering

Part of: M-CIWVT-101121 - Water Chemistry and Water Technology I

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	3

Events					
WT 24/25	2233032	Practical Course: Water Quality and Water Assessment	2 SWS	Practical course / 🗣	Horn, Hille-Reichel, und Mitarbeitende
Exams					
WT 24/25	7232664	Practical Course in Water Technology			Horn, Hille-Reichel

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate

The learning: 6 Experiments including entrance test, protocol; presentation about a selected experiment (about 15 minutes); final test (SPO section 4, subsection 2 No. 3).

Prerequisites

None

5.330 Course: Practical Course Polymers in MEMS [T-MACH-105556]

Responsible: Dr.-Ing. Matthias Worgull
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	3	pass/fail	Each summer term	1

Events					
ST 2025	2142856	Practical Course Polymers in MEMS	2 SWS	Block /	Worgull

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The practical course will close with an oral examination.There will be only passed and failed results, no grades.

Prerequisites
none

Below you will find excerpts from events related to this course:

Practical Course Polymers in MEMS
2142856, SS 2025, 2 SWS, Language: German, Open in study portal

Block (B)
Blended (On-Site/Online)

Content
This practical course complements the lectures "Polymers in MEMS A", "Polymers in MEMS B" and "Polymers in MEMS C" and will allow students to gain a deeper understanding of polymers and their processing. During the course of this practical course, various polymers will be synthesized and molded into components suitable for microelectromechanical systems (MEMS) applications. The aim of the course is to bring a polymer all the way from synthesis to application.

The practical course will be given in German language unless non-German speaking students attend. In this case, the course will be given in English (with some German translations of technical vocabulary). Lecture notes for the experiments are in English language and will be handed out to the students. The practical course will be held "en block" at the end of the semester (presumably beginning of October)

For further details, please contact PD Dr.-Ing. Matthias Worgull (matthias.worgull@kit.edu). Preregistration is mandatory. The number of participants is limited to 5 students.

Organizational issues
Anmeldung und Terminabsprache in der Vorlesung (2142855)

Für weitere Rückfragen, wenden Sie sich bitte an PD Dr.-Ing- Matthias Worgull (matthias.worgull@kit.edu). Eine Voranmeldung ist notwendig. Die Platzanzahl ist auf 5 Teilnehmer beschränkt.

Literature
Vorlesungsunterlagen, dort empfohlene Literatur

T 5.331 Course: Practical Course Technical Ceramics [T-MACH-105178]

Responsible: apl. Prof. Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each winter term	2

Events					
WT 24/25	2125751	Practical Course Technical Ceramics	2 SWS	Practical course / 🗣	Schell
Exams					
WT 24/25	76-T-MACH-105178	Practical Course Technical Ceramics			Schell

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Colloquium and laboratory report for the respective experiments.

Prerequisites
none

Workload
30 hours

Below you will find excerpts from events related to this course:

V Practical Course Technical Ceramics
2125751, WS 24/25, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Organizational issues
Elektronisch über das ILIAS-Portal

Literature
Salmang, H.: Keramik, 7. Aufl., Springer Berlin Heidelberg, 2007. - Online-Ressource

Richerson, D. R.: Modern Ceramic Engineering, CRC Taylor & Francis, 2006

T 5.332 Course: Practical Seminar Digital Service Systems [T-WIWI-106563]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
WT 24/25	7900341	Practical Seminar: Human-Centered Systems	Mädche
ST 2025	7900319	Service Design Thinking	Satzger
ST 2025	7900320	Practical Seminar Service Innovation	Satzger

Competence Certificate
The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according

to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites
None

Recommendation
None

Annotation
New course title starting summer term 2017: "Practical Seminar Digital Service Systems".

The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.

T 5.333 Course: Practical Seminar: Advanced Analytics [T-WIWI-108765]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment consists of practical work in the field of advanced analytics, a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites
None

Recommendation
At least one module offered by the institute should have been chosen before attending this seminar.

Annotation
The course is held in English. The course is not offered regularly.

5.334 Course: Practical Seminar: Artificial Intelligence in Service Systems [T-WIWI-112152]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101506 - Service Analytics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2025	7900320	Practical Seminar Service Innovation	Satzger

Competence Certificate
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites
None.

Recommendation
Knowledge in the field of Artificial Intelligence in Service Systems is assumed. Therefore, it is recommended to attend the course Artificial Intelligence in Service Systems [2595650] beforehand.

Workload
135 hours

T 5.335 Course: Practical Seminar: Data-Driven Information Systems [T-WIWI-106207]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2025	7900318	Practical Seminar: Data Science for Industrial Applications	Satzger

Competence Certificate
The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites
None

Recommendation
At least one module offered by the institute should have been chosen before attending this seminar.

Annotation
The course is held in english. The course is not offered regularly.

T 5.336 Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
WT 24/25	2500008	Practical seminar: Health Care Management	3 SWS	Others (sons / 🗣	Nickel, Mitarbeiter
ST 2025	2550498	Practical seminar: Health Care Management	3 SWS	Seminar / ⚙	Nickel, Mitarbeiter
Exams					
WT 24/25	7900105	Practical Seminar: Health Care Management (with Case Studies)			Nickel

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

Prerequisites
None.

Recommendation
Basic knowledge as conveyed in the module *Introduction toOperations Research* is assumed.

Annotation
The credits have been reduced to 4,5 starting summer term 2016.

The lecture is offered every term.

The planned lectures and courses for the next three years are announced online.

Workload
135 hours

T 5.337 Course: Practical Seminar: Human-Centered Systems [T-WIWI-113459]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-104068 - Information Systems in Organizations
M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
WT 24/25	2540554	Practical Seminar: Human-Centered Systems	3 SWS	Lecture /	Mädche
ST 2025	2540554	Practical Seminar: Human-Centered Systems	3 SWS	Lecture /	Mädche
Exams					
WT 24/25	7900341	Practical Seminar: Human-Centered Systems			Mädche

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment of this course is in the form of a different type of examination. The assessment is carried out by a practical component, preparing written documentation and actively participating in the discussions. A total of 60 points can be achieved, of which:

- a maximum of 25 points for the written documentation
- a maximum of 25 points for the practical component
- a maximum of 10 points for active participation in the discussions

At least 30 points must be achieved to pass the performance assessment. Please note that a practical component such as conducting a survey or implementing an application is also part of the regular scope of the course in addition to the written documentation. The respective tasks can be found in the announcement on the institute's website https://h-lab.iism.kit.edu.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-108437 - Practical Seminar: Information Systems and Service Design must not have been started.

Below you will find excerpts from events related to this course:

V Practical Seminar: Human-Centered Systems — **Lecture (V)** **Blended (On-Site/Online)**
2540554, WS 24/25, 3 SWS, Language: English, Open in study portal

V Practical Seminar: Human-Centered Systems — **Lecture (V)** **Blended (On-Site/Online)**
2540554, SS 2025, 3 SWS, Language: English, Open in study portal

Content
In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Please find the current open offerings on our website: https://h-lab.iism.kit.edu/thesis.php

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.

T 5.338 Course: Practical Seminar: Service Innovation [T-WIWI-110887]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-102806 - Service Innovation, Design & Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2025	7900319	Service Design Thinking	Satzger
ST 2025	7900320	Practical Seminar Service Innovation	Satzger

Competence Certificate
Success is assessed through the preparation of written documentation, a presentation of the results of the practical components carried out and active participation in the discussions (in accordance with §4(2), 3 SPO).

Please note that a practical component such as conducting a survey or implementing an application is also part of the regular scope of the course in addition to the written documentation. Please refer to the course description for the respective tasks.

The overall grade is made up of the weighted components (e.g. documentation, oral presentation, practical work and active participation). The weighting of these components for the grade will be announced at the beginning of the course.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-105774 - Practical Seminar: Digital Service Design must not have been started.
2. The course T-WIWI-102799 - Practical Seminar Service Innovation must not have been started.

Recommendation
Knowledge of Service Innovation Methods is assumed. Therefore it is recommended (but not mandatory) to attend the course Service Innovation [2540468] beforehand.

Annotation
Due to the project work, the number of participants is limited and participation requires knowledge about models, concepts and approaches that are taught in the Service Innovation lecture. Having taken the Service Innovation lecture or demonstrating equivalent knowledge is a prerequisite for participating in this Practical Seminar. Details for registration will be announced on the web pages for this course.

The seminar is not offered regularly.

Workload
135 hours

T 5.339 Course: Practical Training in Basics of Microsystem Technology [T-MACH-102164]

Responsible: Dr. Arndt Last
Organisation: KIT Department of Mechanical Engineering

Part of: M-ETIT-101158 - Sensor Technology I
M-MACH-101287 - Microsystem Technology
M-MACH-101290 - BioMEMS
M-MACH-101291 - Microfabrication
M-MACH-101292 - Microoptics
M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2143875	Introduction to Microsystem Technology - Practical Course	2 SWS	Practical course / 🗣	Last
WT 24/25	2143877	Introduction to Microsystem Technology - Practical Course	2 SWS	Practical course / 🗣	Last
ST 2025	2143875	Introduction to Microsystem Technology - Practical Course	2 SWS	Practical course / 🗣	Last
Exams					
WT 24/25	76-T-MACH-102164	Practical Training in Basics of Microsystem Technology			Last

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam

Prerequisites
none

Below you will find excerpts from events related to this course:

V Introduction to Microsystem Technology - Practical Course
2143875, WS 24/25, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung ' Grundlagen der Mikrosystemtechnik'

V Introduction to Microsystem Technology - Practical Course
2143877, WS 24/25, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung ' Grundlagen der Mikrosystemtechnik'

V Introduction to Microsystem Technology - Practical Course
2143875, SS 2025, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content

In the practical training includes ten experiments:

1. Röntgenoptik
2. UVL + REM
3. Mischerbauteil
4. Rasterkraftmikroskopie
5. 3D-Printing
6. Lichtstreuung an Chrommasken
7. Abformung
8. SAW-Biosensorik
9. Nano3D-Drucker - Materialtransfer dünnster Schichten
10. Elektrospinning

Each student takes part in only four experiments.
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

Organizational issues

Das Praktikum findet in den Laboren des IMT am CN statt. Treffpunkt: Bau 301, vor dem Eingang.

Teilnahmeanfragen an arndt.last@kit.edu

Literature

Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung ' Grundlagen der Mikrosystemtechnik'

5.340 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101505 - Experimental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
The course is given every second fall term, e.g., WS2017/18, WS2019/20, ...

The retake exam is given in the summer term subsequent to the fall term where the course (lecture and final exam) is given.

T 5.341 Course: Predictive Modeling [T-WIWI-110868]

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Exams			
WT 24/25	7900014	Predictive Modeling	Krüger

Competence Certificate
The assessment of this course is a written examination (90 minutes) according to §4(2), 1 of the examination regulation. A bonus can be acquired by successful completion of an assignment (written report + short in-class presentation) during the semester. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4).

Prerequisites
None

Workload
135 hours

T 5.342 Course: Price Management [T-WIWI-105946]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Dr Paul Glenn

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101409 - Electronic Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2540529	Price Management	2 SWS	Lecture / 🗣	Glenn
ST 2025	2540530	Exercise Price Management	1 SWS	Practice / 🗣	Glenn
Exams					
WT 24/25	7900170	Price Management (Nachklausur SoSe 2024)			Geyer-Schulz
ST 2025	7900139	Price Management			Geyer-Schulz

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate

Lecture and exam will not be offered in summer semester 2019. The next examination is in the summer semester 2020.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites

None

Recommendation

None

Annotation

The lecture is offered for the first time in summer term 2016.

Below you will find excerpts from events related to this course:

V Price Management

2540529, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues

Termine:

Samstags von 9:00 - 19:00 Uhr

26.04.2025 => Termin 1

10.05.2025 => Termin 2

28.06.2025 => Termin 3

19.07.2025 => Termin 4

Literature

- H. Simon and M. Fassnacht, *Preismanagement*, vol. 4. Wiesbaden: Springer Gabler, 2016.
- T. T. Nagle, J. E. Hogan, und J. Zalee, *The Strategy and Tactics of Pricing: A guide to growing more profitably*. New Jersey: Prentice Hall, 2010.

T 5.343 Course: Pricing [T-WIWI-102883]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2572199	Pricing	3 SWS	Block / On-Site	Schröder, Klarmann, Bill
Exams					
WT 24/25	7900343	Pricing			Klarmann

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. The examination (and thus the grade) is composed of three parts:

1. The design and execution of your own small experimental study around the topic of behavioral pricing (as group work).
2. The processing and presentation of a case study on pricing (as group work).
3. The execution of a simulated price negotiation based on a systematic preparation (usually in teams of two).

Prerequisites
Since the earlier course (a) "Pricing Excellence" and (b) "Price Negotiations and Sales Presentations" become parts of the Pricing course, Pricing cannot be taken if (a) and/or (b) have already been completed.

Recommendation
Students are highly encouraged to actively participate in class.

Annotation
A small application is required for participation in this class. The application phase usually takes place at the beginning of the lecture period in the winter semester. More information on the application process will be made available on the Marketing and Sales Research Group website (marketing.iism.kit.edu) shortly before the start of the winter semester lecture period. This course is limited to 24 participants.

Below you will find excerpts from events related to this course:

V Pricing
2572199, WS 24/25, 3 SWS, Language: English, Open in study portal

Block (B)
On-Site

Content
At the Pricing lecture, students learn about current research and best practices in price management. Delivered in workshop format, the lecture has three key elements:

1. "Behavioral Pricing" workshop
   In this part of the course, central concepts and findings from behavioral pricing research (e.g. price information processing, reference prices, price fairness and mental accounting) are presented and discussed on the basis of important behavioral theories (e.g. prospect theory and information economics). After a brief introduction to experimental research, participants will then conduct their own small experimental study in the form of group work on a hypothesis they have developed on pricing behavior, analyze the data, and present it.

2. "Pricing Excellence" workshop
   In a theory section at the beginning of the course, students are taught theoretical principles of pricing. This includes an introduction to (1) pricing of product prices as well as (2) pricing of net customer prices (development of discount systems). Furthermore, theoretical basics of price enforcement and price monitoring are discussed. This will be followed by a practical application of what has been learned by working on a case study in small groups with a concluding presentation.

3. "Price Negotiation" workshop
   After an introduction to key theories and concepts of negotiation, students prepare and then conduct a simulated price negotiation in small groups with guidance.

<u>Learning Objectives:</u>

Students...

- are familiar with central theories explaining behavioral phenomena regarding consumers dealing with prices
- are able to describe and explain central phenomena of behavioral science with regard to price behavior and derive implications from them
- can formulate their own hypotheses on price behavior and design, conduct and evaluate a suitable experimental study for this purpose
- learn theoretical basics of pricing behavior
- learn the theoretical basics of price enforcement and price monitoring
- apply the acquired knowledge in a practical case study
- know important conceptual basics on the subject of price negotiations
- can prepare and competently conduct price negotiations
- present the results of their group work in a concise and structured manner

All events will take place in presence with compulsory attendance at all dates.

Total time required for 4.5 credit points: approx. 135 hours

Attendance time: 30 hours

Self-study: 105 hours

Organizational issues
Dates will be announced.

T 5.344 Course: Principles of Ceramic and Powder Metallurgy Processing [T-MACH-102111]

Responsible: apl. Prof. Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2193010	Basic principles of powder metallurgical and ceramic processing	2 SWS	Lecture / Blended	Schell
Exams					
WT 24/25	76-T-MACH-102111	Principles of Ceramic and Powder Metallurgy Processing			Schell, Wagner
ST 2025	76-T-MACH-102111	Principles of Ceramic and Powder Metallurgy Processing			Schell

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment consists of an oral exam (20-30 min) taking place at the agreed date. The re-examination is offered upon agreement.

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Basic principles of powder metallurgical and ceramic processing
2193010, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature

- R.J. Brook: Processing of Ceramics I+II, VCH Weinheim, 1996
- M.N. Rahaman: Cermamic Processing and Sintering, 2nd Ed., Marcel Dekker, 2003
- W. Schatt ; K.-P. Wieters ; B. Kieback. ".Pulvermetallurgie: Technologien und Werkstoffe", Springer, 2007
- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
- F. Thümmler, R. Oberacker. "Introduction to Powder Metallurgy", Institute of Materials, 1993

T 5.345 Course: Principles of Whole Vehicle Engineering [T-MACH-114075]

Responsible: Dr. Manfred Harrer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each term	1

Exams			
ST 2025	76-T-MACH-114075	Principles of Whole Vehicle Engineering	Harrer

Competence Certificate
Written examination

Duration: 90 minutes

Auxiliary means: none

Prerequisites
T-MACH-114095 - Fundamentals of Automobile Development must not be started.

Workload
120 hours

T 5.346 Course: Principles of Whole Vehicle Engineering [T-MACH-114095]

Responsible: Dr. Manfred Harrer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each term	1

Exams			
ST 2025	76-T-MACH-114095	Principles of Whole Vehicle Engineering	Harrer

Competence Certificate
Written examination

Duration: 90 minutes

Auxiliary means: none

Prerequisites
T-MACH-114075 – Grundsätze der PKW-Entwicklung must not be started.

Workload
120 hours

T 5.347 Course: Probabilistic Time Series Forecasting Challenge [T-WIWI-111387]

Responsible: Prof. Dr. Fabian Krüger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	2

Events					
WT 24/25	2500080	Probabilistic Time Series Forecasting Challenge	2 SWS	Practice /	Bracher, Koster, Lerch, Krüger
WT 24/25	2500081	Probabilistic Time Series Forecasting Challenge		Project (P /	Krüger, Bracher, Koster, Lerch
Exams					
WT 24/25	7900338	Probabilistic Time Series Forecasting Challenge			Krüger, Lerch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment. Necessary conditions to pass the course:

- Weekly submission of statistical forecasts during the semester (excluding the Christmas break),
- Presentation (ca. 20 minutes) during the semester,
- Submission of a final report (5-10 pages) around the end of the semester.

Grading is based on the presentation (30%) and the final report (70%).

Prerequisites
Good methodological knowledge in statistics and data science.
Good knowledge in applied data analysis, incl. programming skills in R, Python or similar.
Knowledge of time series analysis is helpful, but not required.

Annotation
The course is limited in participation. Participants will be selected via the WIWI portal.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Probabilistic Time Series Forecasting Challenge

2500081, WS 24/25, SWS, Language: English, Open in study portal

Project (PRO)
Blended (On-Site/Online)

Content
Statistical forecasts are relevant across all fields of society. In this data science project, students make, evaluate and communicate their own statistical forecasts in a real-time setting. We consider probabilistic forecasts that involve a measure of uncertainty in addition to a point forecast. Students are asked to make forecasts of several real-world time series (including weather variables and the DAX stock market index). Historical data on all series are available from public sources that are updated as time proceeds. While the time series differ from each other in important ways, statistical methods can meaningfully be used for prediction in all cases. We focus on quantile forecasts which are useful to measure forecast uncertainty in a relatively simple way.

Organizational issues

Short description

In this data science project, students make and evaluate statistical forecasts in a realistic setup (involving real-time predictions and real-world time series data). A kickoff meeting will take place in person in mid October. During the semester, there will be a weekly online meeting in which students and instructors discuss the current state of the forecasting challenge.

Prerequisites

Students should have a good working knowledge of statistics and data science, including proficiency in a programming language like R, Python, or Matlab. Knowledge of time series analysis is helpful but not strictly required. Motivation and curiosity are particularly important in this course format that requires regular, active participation over the whole semester.

Please note that the number of participants is limited due to the interactive course format. Application takes place via the Wiwi portal, where further information is available.

Examination rules

The course counts for 4.5 credit points (Leistungspunkte). Examination is via an alternative exam assessment (§4(2), 3 SPO).
Necessary conditions to pass the course:
1) Weekly submission of statistical forecasts during the semester, excluding the Christmas break,
2) A presentation (approx. 20 minutes) during the semester,
3) Submission of a final report (5-10 pages) around the end of the semester.
The presentation and the final report should describe the forecasting methods and their statistical evaluation. Grading is based on the presentation (30%) and the final report (70%).

T 5.348 Course: Process Engineering [T-BGU-101844]

Responsible: Dr.-Ing. Harald Schneider
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6241703	Process Engineering	2 SWS	Lecture / 🗣	Schneider, Waleczko
Exams					
WT 24/25	8240101844	Process Engineering			Schneider

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.349 Course: Process Engineering: Example Food Processing [T-CIWVT-111536]

Responsible: PD Dr. Volker Gaukel
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101120 - Principles of Food Process Engineering

Type	Credits	Grading scale	Version
Oral examination	6	Grade to a third	1

Events					
WT 24/25	2211110	Process Fundamentals by the Example of Food Production	2 SWS	Lecture / 🗣	Gaukel
Exams					
WT 24/25	7220027	Process Engineering: Example Food Processing			Gaukel

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 5.350 Course: Process Mining [T-WIWI-109799]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2025	2511204	Process Mining	2 SWS	Lecture / 🗣	Oberweis, Schreiber
ST 2025	2511205	Exercise Process Mining	1 SWS	Practice / 🗣	Oberweis, Schreiber, Rybinski
Exams					
WT 24/25	79AIFB_PM_A5	Process Mining			Oberweis
ST 2025	79AIFB_PM_C2	Process Mining (Registration until 21.07.2025)			Oberweis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Prerequisites
None

Annotation
Former name (up to winter semester 2018/1019) "Workflow Management".

Below you will find excerpts from events related to this course:

V Process Mining
2511204, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

The area of process mining covers approaches which aim at deducting new knowledge on the basis of logfiles generated by information systems. Such information systems are e.g., workflow-management-systems which are used for an efficient control of processes in enterprises and organisations. The lecture introduces the foundations of processes and respective modeling and analysis techniques. In the following, the foundations of process mining and the three classical types of approaches - discovery, conformance and enhancement - will be taught. In addition to the theoretical basics, tools, application scenarios in practice and open research questions are covered as well.

Learning objectives:

Students

- understand the concepts and approaches of process mining and know how they are applied,
- create and evaluate business process models,
- analyze static and dynamic properties of workflows,
- apply approaches and tools of process mining.

Recommendations:

Knowledge of course Applied Informatics - Modelling is expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- W. van der Aalst, H. van Kees: Workflow Management: Models, Methods and Systems, Cambridge, The MIT Press, 2002.
- W. van der Aalst: Process Mining: Data Science in Action. Springer, 2016.
- J. Carmona, B. van Dongen, A. Solti, M. Weidlich: Conformance Checking: Relating Processes and Models. Springer, 2018.
- A. Drescher, A. Koschmider, A. Oberweis: Modellierung und Analyse von Geschäftsprozessen: Grundlagen und Übungsaufgaben mit Lösungen. De Gruyter Studium, 2017.
- A. Oberweis: Modellierung und Ausführung von Workflows mit Petri-Netzen. Teubner-Reihe Wirtschaftsinformatik, B.G. Teubner Verlag, 1996.
- R. Peters, M. Nauroth: Process-Mining: Geschäftsprozesse: smart, schnell und einfach, Springer, 2019.
- F. Schönthaler, G.Vossen, A. Oberweis, T. Karle: Business Processes for Business Communities: Modeling Languages, Methods, Tools. Springer, 2012.
- M. Weske: Business Process Management: Concepts, Languages, Architectures. Springer, 2012.

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T 5.351 Course: Product- and Production-Concepts for Modern Automobiles [T-MACH-110318]

Responsible: Dr. Stefan Kienzle
Dr. Dieter Steegmüller

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2149670	Product- and Production-Concepts for modern Automobiles	2 SWS	Lecture /	Steegmüller, Kienzle
Exams					
WT 24/25	76-T-MACH-110318	Product- and Production-Concepts for modern Automobiles			Steegmüller, Kienzle

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral Exam (20 min)

Prerequisites
T-MACH-105166 - Materials and Processes for Body Leightweight Construction in the Automotive Industry must not have been started.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Product- and Production-Concepts for modern Automobiles

2149670, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

The lecture illuminates the practical challenges of modern automotive engineering. As former leaders of the automotive industry, the lecturers refer to current aspects of automotive product development and production.

The aim is to provide students with an overview of technological trends in the automotive industry. In this context, the course also focuses on changes in requirements due to new vehicle concepts, which may be caused by increased demands for individualisation, digitisation and sustainability. The challenges that arise in this context will be examined from both a production technology and product development perspective and will be illustrated with practical examples thanks to the many years of industrial experience of both lecturers.

The topics covered are:

- General conditions for vehicle and body development
- Integration of new drive technologies
- Functional requirements (crash safety etc.), also for electric vehicles
- Development Process at the Interface Product & Production, CAE/Simulation
- Energy storage and supply infrastructure
- Aluminium and lightweight steel construction
- FRP and hybrid parts
- Battery, fuel cell and electric motor production
- Joining technology in modern car bodies
- Modern factories and production processes, Industry 4.0.

Learning Outcomes:

The students ...

- are able to name the presented general conditions of vehicle development and are able to discuss their influences on the final product using practical examples.
- are able to name the various lightweight approaches and identify possible areas of application.
- are able to identify the different production processes for manufacturing lightweight structures and explain their functions.
- are able to perform a process selection based on the methods and their characteristics.

Workload:

regular attendance: 25 hours
self-study: 95 hours

Organizational issues

Termine werden über Ilias bekannt gegeben.

Bei der Vorlesung handelt es sich um eine Blockveranstaltung. Eine Anmeldung über Ilias ist erforderlich.

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The lecture is a block course. An application in Ilias is mandatory.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature

Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.352 Course: Production and Logistics Management [T-WIWI-102632]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each summer term	1

Events					
ST 2025	2581954	Production and Logistics Management	2 SWS	Lecture / 🗣	Schultmann, Rudi
ST 2025	2581955	Production and Logistics Managment	2 SWS	Practice / 🗣	Alikhah
Exams					
WT 24/25	7981954	Production and Logistics Management			Schultmann

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Production and Logistics Management
2581954, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
This course covers central tasks and challenges of operative production and logistics management. Students get to know the set-up and mode of planning systems such as production planning and control systems, enterprise resource planning systems and advanced planning systems to cope with the accompanying planning tasks in supply chain management. Methods to solve these tasks from the field of operational research will be explored with respect to manufacturing program planning, material requirement planning, lot size problems and scheduling. Alongside to MRP II (Manufacturing Resources Planning), students will be introduced to integrated supply chain management approaches. Finally, commercially available planning systems will be presented and discussed.

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.353 Course: Production Technology for E-Mobility [T-MACH-110984]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	2

Events					
ST 2025	2150605	Production Technology for E-Mobility	2 SWS	Lecture / 🗣	Fleischer
Exams					
WT 24/25	76-T-MACH-110984	Production Technology for E-Mobility			Fleischer
ST 2025	76-T-MACH-110984	Production Technology for E-Mobility			Fleischer

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Production Technology for E-Mobility
2150605, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
In the lecture Production Engineering for Electromobility the students should be enabled to design, select and develop production processes for the production of the components of an electric drive train (electric motor, battery cells, fuel cells) by using research-oriented teaching. To apply what has been learned, practical appointments are taking place at the Karlsruhe Forschungsfabrik as part of the course.

Learning Outcomes:

The students are able to:

- describe the structure and function of a fuel cell, an electric traction drive and a batterysystem.
- reproduce the process chains for the production of the components fuel cell, battery and electric traction drive.
- apply methodical tools to solve problems along the process chain.
- derive the challenges in the production of electric drives for electric mobility.
- describe the factors influencing the individual process steps on each other using the process chain of Li-ion battery cells.
- enumerate or describe the necessary process parameters to counteract the influencing factors of the process steps in Li-ion battery cell production.
- apply methodical tools to solve problems along the process chain for the production of Li-ion battery cells.
- derive the challenge of mounting and dismounting battery modules.
- derive the challenges in the production of fuel cells for use in mobility.
- develop solutions to overcome challenges in the production of fuel cells.

Workload:

regular attendance: 42 hours
self-study: 78 hours

Organizational issues

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

Zwei der Veranstaltungstermine finden in Form von Praktika in der Forschungsfabrik statt. Hier sollen die Studierenden das in der Vorlesung vermittelte Wissen durch praktische Tätigkeiten an Demonstratoranlagen der Brennstoffzellenfertigung anwenden. Diese sollen auch die kreative Lösungskompetenz der Studierenden fördern. Die Teilnahme an den Praxiseinheiten wird für die Teilnahme an der Prüfung vorausgesetzt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Two of the course dates take the form of practical training in the Forschungsfabrik. Here, students will apply the knowledge imparted in the lectures by carrying out practical tasks on demonstrator systems for fuel cell production. These are also designed to foster students' creative problem-solving skills. Participation in the practical units is a prerequisite for taking the exam.

Literature

Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)

T 5.354 Course: Project Development with Case Study [T-BGU-111217]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106453 - Facility Management in Hospitals for Industrial Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6242904	Projectdevelopment with Case Study	1 SWS	Lecture / 🗣	Lennerts, Mitarbeiter/innen

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
45 hours

T 5.355 Course: Project Internship Additive Manufacturing: Development and Production of an Additive Component [T-MACH-110960]

Responsible: Prof. Dr.-Ing. Frederik Zanger

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	2

Events					
WT 24/25	2149700	Project Internship Aditive Manufacturing: Development and Production of an Additive Component	2 SWS	Practical course / 🗣	Zanger, Frey
ST 2025	2149700	Project Internship Aditive Manufacturing: Development and Production of an Additive Component	2 SWS	Practical course / 🗣	Zanger, Frey
Exams					
WT 24/25	76-T-MACH-110960	Project Internship Aditive Manufacturing: Development and Production of an Additive Component			Zanger
ST 2025	76-T-MACH-110960	Project Internship Additive Manufacturing: Development and Production of an Additive Component			Zanger

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate

Alternative test achievement (graded)

The competence certificate is a project work; alternative test achievement according to § 4 Abs. 2 No. 3 of the SPO. Here, the project work, the milestone-based presentation of the results in presentation form (10 min each) and a final oral examination (15 min) are included in the assessment.

Prerequisites

none

Workload

120 hours

Below you will find excerpts from events related to this course:

V Project Internship Aditive Manufacturing: Development and Production of an Additive Component

Practical course (P)
On-Site

2149700, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

The lecture "Project Internship Additive Manufacturing: Development and Production of an Additive Component" combines the basics of metallic laser powder bed fusion (LPBF) with a development project in cooperation with an industrial company.
The students learn the basics of the following topics in the project-related lecture:

- Influence of different process variables on the component quality of parts produced in the LPBF process
- Preparation and simulation of the LPBF process
- Production of additive metallic components
- Process monitoring and quality assurance in additive manufacturing
- Topology optimization
- CAM for subtractive rewor

The topics addressed in the course will be applied practically in various workshops on the individual topics and transferred to the developmental task in self-study.
Finally, the results of the elaborations are produced additively and post-processed subtractively.

Learning Outcomes:

The students …

- are able to describe the properties and applications of the additive manufacturing processes laser powder bed fusion (LPBF).
- are able to select the appropriate manufacturing process for a technical application.
- are able to describe and implement the creation of a product along the entire additive process chain (CAD, simulation, work preparation, CAM) from the idea to the production.
- are able to discuss the development process for components that are optimized for additive manufacturing.
- are able to perform topology optimization.
- are able to simulate the additive process, compensate for process-related distortions and determine the ideal alignment on the building platform.
- are able to create necessary support structures for the additive process and to derive a building order file.
- are able to create a CAM model for the subtractive rework process of additive parts.

Workload:

regular attendance: 12 hours
self-study: 108 hours

Organizational issues

Die Veranstaltung beginnt mit einer Blockveranstaltung vor Semesterbeginn. Während des Semesters finden nur einzelne Pflichtveranstaltungen statt. Die genauen Termine werden über die Vorlesungsankündigung des wbk mitgeteilt: http://www.wbk.kit.edu/studium-und-lehre.php

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Der Link zur Bewerbung wird in der Vorlesungsankündigung über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php) zur Verfügung gestellt.

Literature

Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

V **Project Internship Aditive Manufacturing: Development and Production of an Additive Component**

2149700, SS 2025, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site

Content

The lecture "Project Internship Additive Manufacturing: Development and Production of an Additive Component" combines the basics of metallic laser powder bed fusion (LPBF) with a development project in cooperation with an industrial company.
The students learn the basics of the following topics in the project-related lecture:

- Influence of different process variables on the component quality of parts produced in the LPBF process
- Preparation and simulation of the LPBF process
- Production of additive metallic components
- Process monitoring and quality assurance in additive manufacturing
- Topology optimization
- CAM for subtractive rewor

The topics addressed in the course will be applied practically in various workshops on the individual topics and transferred to the developmental task in self-study.
Finally, the results of the elaborations are produced additively and post-processed subtractively.

Learning Outcomes:

The students ...

- are able to describe the properties and applications of the additive manufacturing processes laser powder bed fusion (LPBF).
- are able to select the appropriate manufacturing process for a technical application.
- are able to describe and implement the creation of a product along the entire additive process chain (CAD, simulation, work preparation, CAM) from the idea to the production.
- are able to discuss the development process for components that are optimized for additive manufacturing.
- are able to perform topology optimization.
- are able to simulate the additive process, compensate for process-related distortions and determine the ideal alignment on the building platform.
- are able to create necessary support structures for the additive process and to derive a building order file.
- are able to create a CAM model for the subtractive rework process of additive parts.

Workload:

regular attendance: 12 hours
self-study: 108 hours

Organizational issues

Die Veranstaltung beginnt mit einer Blockveranstaltung vor Semesterbeginn. Während des Semesters finden nur einzelne Pflichtveranstaltungen statt. Die genauen Termine werden über die Vorlesungsankündigung des wbk mitgeteilt: http://www.wbk.kit.edu/studium-und-lehre.php

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Der Link zur Bewerbung wird in der Vorlesungsankündigung über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php) zur Verfügung gestellt.

Literature

Skript zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

T 5.356 Course: Project Lab Cognitive Automobiles and Robots [T-WIWI-109985]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each winter term	3

Events					
WT 24/25	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course / Blended	Zöllner, Daaboul
Exams					
WT 24/25	7900107	Advanced Lab Cognitive Automobile and Robots (Master)			Zöllner

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

Prerequisites
None

Workload
150 hours

Below you will find excerpts from events related to this course:

V Practical Course Cognitive automobiles and robots (Master)

2512501, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

The lab is intended as a practical supplement to courses such as "Machine Learning 1/2".
Scientific topics, mostly in the area of autonomous driving and robotics, will be addressed in joint work with ML/KI methods. The goal of the internship is for participants to design, develop, and evaluate ML Software system.

In addition to the scientific goals, such as the study and application of methods, the aspects of project-specific teamwork in research (from specification to presentation of results) are also worked on in this internship.

The individual projects require the analysis of the set task, selection of appropriate methods, specification and implementation and evaluation of the solution approach. Finally, the selected solution is to be documented and presented in a short lecture.

Learning Objectives:

- Students will be able to practically apply theoretical knowledge from lectures on machine learning to a selected area of current research.
- Students will be proficient in analyzing and solving thematic problems.
- Students will be able to evaluate, document, and present their concepts and results.

Recommendations:

- Theoretical knowledge of machine learning and/or AI.
- Python knowledge
- Initial experience with deep learning frameworks such as PyTorch/Jax/Tensorflow may be beneficial.

Workload:

The workload of 5 credit points consists of practical implementation of the selected solution, as well as time for literature research and planning/specification of the selected solution. In addition, a short report and presentation of the work performed will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

T 5.357 Course: Project Lab Machine Learning [T-WIWI-109983]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2025	2512500	Project Lab Machine Learning	3 SWS	Practical course /	Daaboul, Zöllner, Schneider

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of:

- a practical work
- a presentation and
- a written seminar thesis

Details of the grade formation will be announced at the beginning of the course.

Prerequisites
None

Workload
150 hours

Below you will find excerpts from events related to this course:

V Project Lab Machine Learning

2512500, SS 2025, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:

The workload of 5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

T 5.358 Course: Project Management [T-WIWI-103134]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2581963	Project Management	2 SWS	Lecture / 🗣	Schultmann, Volk
Exams					
WT 24/25	7981963	Project Management			Schultmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Project Management
2581963, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

1. Introduction
2. Principles of Project Management
3. Project Scope Management
4. Time Management and Resource Scheduling
5. Cost Management
6. Quality Management
7. Risk Management
8. Stakeholder
9. Communication, Negotiation and Leadership
10. Project Controlling
11. Agile Project Management

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.359 Course: Project Management in Construction and Real Estate Industry I [T-BGU-103432]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	3	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6241701	Construction Project Management	4 SWS	Lecture / Practice (/ 🗣	Haghsheno, Mitarbeiter/innen
Exams					
WT 24/25	8240103432	Project Management in Construction and Real Estate Industry I			Haghsheno

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
see German version

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

Below you will find excerpts from events related to this course:

V Construction Project Management
6241701, WS 24/25, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
This course provides a comprehensive and in-depth introduction to construction project management. It takes a closer look at the organisation and delivery of a construction project from the client's perspective. Selected project management content is taught and applied in teamwork within the context of four practice-based case studies. At the end of the semester, the results are presented in a role play (acquisition meeting with a client).

Organizational issues
Donnerstags vom 24.10.2024 bis 13.02.2025, jeweils 14:00 – 17:15 Uhr (hybrid)

Literature

- AHRENS, Hannsjörg; BASTIAN, Klemens; MUCHOWSKI, Lucian (Hrsg.) (2021): *Handbuch Projektsteuerung - Baumanagement: Ein praxisorientierter Leitfaden mit zahlreichen Hilfsmitteln und Arbeitsunterlagen*, 6. Auflage, Fraunhofer IRB Verlag, Stuttgart
- FEWINGS, Peter; HENJEWELE, Christian (2019): *Construction Project Management – An Integrated Approach*, 3. Auflage, Routledge, New York (USA)
- GPM Deutsche Gesellschaft für Projektmanagement e. V. (Hrsg.) (2017): *Individual Competence Baseline für Projektmanagement (Version 4.0)*, 1. Auflage, GPM Deutsche Gesellschaft für Projektmanagement e. V., Nürnberg
- HAGHSHENO, Shervin; JOHN, Paul Christian (2024): *Bauherrnseitige Projektmanagement-Dienstleistungen in Deutschland*, Forschungsbericht, DVP – Deutscher Verband für Projektmanagement in der Bau- und Immobilienwirtschaft e. V.
- HUEMANN, Martina; TURNER, J. Rodney (Hrsg.) (2024): *The Handbook of Project Management*, 6. Auflage, Routledge, New York (USA)
- KOCHENDÖRFER, Bernd; LIEBCHEN, Jens H.; VIERING, Markus G. (2021): *Bau-Projekt-Management: Grundlagen und Vorgehensweisen*, 5. Auflage, Springer Vieweg, Wiesbaden
- SCHULZ, Markus (2020): *Projektmanagement: Zielgerichtet. Effizient. Klar.*, 2. Auflage, UVK Verlag, Tübingen

T 5.360 Course: Project Management in Construction and Real Estate Industry II [T-BGU-103433]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	3	Grade to a third	Each winter term	1 terms	2

Events					
WT 24/25	6241701	Construction Project Management	4 SWS	Lecture / Practice (/ 🗣	Haghsheno, Mitarbeiter/innen
Exams					
WT 24/25	8240103433	Project Management in Construction and Real Estate Industry II			Haghsheno

Legend: Online, Blended (On-Site/Online), 🗣 On-Site, × Cancelled

Competence Certificate
see German version

Prerequisites
Project Management in Construction and Real Estate Industry I (T-BGU-103432) has to be passed.

Recommendation
none

Annotation
none

Workload
90 hours

Below you will find excerpts from events related to this course:

V Construction Project Management

6241701, WS 24/25, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
This course provides a comprehensive and in-depth introduction to construction project management. It takes a closer look at the organisation and delivery of a construction project from the client's perspective. Selected project management content is taught and applied in teamwork within the context of four practice-based case studies. At the end of the semester, the results are presented in a role play (acquisition meeting with a client).

Organizational issues
Donnerstags vom 24.10.2024 bis 13.02.2025, jeweils 14:00 – 17:15 Uhr (hybrid)

Literature

- AHRENS, Hannsjörg; BASTIAN, Klemens; MUCHOWSKI, Lucian (Hrsg.) (2021): *Handbuch Projektsteuerung - Baumanagement: Ein praxisorientierter Leitfaden mit zahlreichen Hilfsmitteln und Arbeitsunterlagen*, 6. Auflage, Fraunhofer IRB Verlag, Stuttgart
- FEWINGS, Peter; HENJEWELE, Christian (2019): *Construction Project Management – An Integrated Approach*, 3. Auflage, Routledge, New York (USA)
- GPM Deutsche Gesellschaft für Projektmanagement e. V. (Hrsg.) (2017): *Individual Competence Baseline für Projektmanagement (Version 4.0)*, 1. Auflage, GPM Deutsche Gesellschaft für Projektmanagement e. V., Nürnberg
- HAGHSHENO, Shervin; JOHN, Paul Christian (2024): *Bauherrnseitige Projektmanagement-Dienstleistungen in Deutschland*, Forschungsbericht, DVP – Deutscher Verband für Projektmanagement in der Bau- und Immobilienwirtschaft e. V.
- HUEMANN, Martina; TURNER, J. Rodney (Hrsg.) (2024): *The Handbook of Project Management*, 6. Auflage, Routledge, New York (USA)
- KOCHENDÖRFER, Bernd; LIEBCHEN, Jens H.; VIERING, Markus G. (2021): *Bau-Projekt-Management: Grundlagen und Vorgehensweisen*, 5. Auflage, Springer Vieweg, Wiesbaden
- SCHULZ, Markus (2020): *Projektmanagement: Zielgerichtet. Effizient. Klar.*, 2. Auflage, UVK Verlag, Tübingen

T 5.361 Course: Project Paper Lean Construction [T-BGU-101007]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	1,5	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6241901	Lean Construction	4 SWS	Lecture / Practice (/ 🗣	Haghsheno, Mitarbeiter/innen
Exams					
WT 24/25	8246101007	Project paper Lean Construction			Haghsheno

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
project:

report, appr. 10 pages, and
presentation, appr. 10 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
40 hours

T 5.362 Course: Project Studies [T-BGU-101847]

Responsible: Prof. Dr.-Ing. Sascha Gentes
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	6243801	Project Studies	2 SWS	Lecture / Practice (/	Gentes
Exams					
WT 24/25	8240101847	Project Studies			Gentes
ST 2025	8240101847	Project Studies			Gentes

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.363 Course: Project Workshop: Automotive Engineering [T-MACH-102156]

Responsible: Dr.-Ing. Michael Frey
Dr.-Ing. Martin Gießler

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101264 - Handling Characteristics of Motor Vehicles
M-MACH-101265 - Vehicle Development
M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each term	1

Events					
WT 24/25	2115817	Project Workshop: Automotive Engineering	3 SWS	Lecture / 🗣	Gießler, Frey
ST 2025	2115817	Project Workshop: Automotive Engineering	3 SWS	Lecture / 🗣	Gießler, Frey

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Workload
180 hours

Below you will find excerpts from events related to this course:

V Project Workshop: Automotive Engineering
2115817, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Learning Objectives:

During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Organizational issues

Begrenzte Teilnehmerzahl mit Auswahlverfahren, in deutscher Sprache. Bewerbungen sind am Ende des vorhergehenden Semesters einzureichen.
Termin und Raum: siehe Institutshomepage.

Limited number of participants with selection procedure, in German language. Please send the application at the end of the previous semester

Date and room: see homepage of institute.

Literature

Steinle, Claus; Bruch, Heike; Lawa, Dieter (Hrsg.), Projektmanagement, Instrument moderner Innovation, FAZ Verlag, Frankfurt a. M., 2001, ISBN 978-3929368277

Skripte werden beim Start-up Meeting ausgegeben.

The scripts will be supplied in the start-up meeting.

V	**Project Workshop: Automotive Engineering** 2115817, SS 2025, 3 SWS, Language: German, Open in study portal	**Lecture (V)** **On-Site**

Content

During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

Learning Objectives:

The students are familiar with typical industrial development processes and working style. They are able to apply knowledge gained at the university to a practical task. They are able to analyze and to judge complex relations. They are ready to work self-dependently, to apply different development methods and to work on approaches to solve a problem, to develop practice-oriented products or processes.

Organizational issues

Begrenzte Teilnehmerzahl mit Auswahlverfahren, die Bewerbungen sind am Ende des vorhergehenden Semesters einzureichen.

Raum und Termine: s. Aushang bzw. Homepage

Literature

Steinle, Claus; Bruch, Heike; Lawa, Dieter (Hrsg.), Projektmanagement, Instrument moderner Innovation, FAZ Verlag, Frankfurt a. M., 2001, ISBN 978-3929368277

Skripte werden beim Start-up Meeting ausgegeben.

T 5.364 Course: Public International Law [T-INFO-113381]

Responsible: TT-Prof. Dr. Frederike Zufall
Organisation: KIT Department of Informatics
Part of: M-INFO-106754 - Public Economic and Technology Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	2400172	Public International Law with an Economic Law Focus	2 SWS	Lecture / 🗣	Kasper
Exams					
WT 24/25	7500066	Public International Law			Zufall
ST 2025	7500182	Public International Law with an Economic Law Focus			Zufall

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Depending on the number of participants, it will be announced six weeks before the examination (§ 6 (3) SPO) whether the performance assessment is carried out
- as an oral examination (duration approx. 20 mins.) (§ 4 Abs. 2 Nr. 2 SPO) or
- as a written examination (lasting 60 mins.) (§ 4 Abs. 2 No. 1 SPO).

Prerequisites
None.

Recommendation
- General knowledge of (public) law (eg, through participating in public law or EU law modules) is helpful but not necessary.
- Interest in international affairs and politics is welcomed.

Annotation
Competency Goals:
- Participating students will be able to navigate the plethora of multilateral treaties to detect relevant international law for specific cases.
- They can develop solutions for legal problems based on case law of international courts and tribunals.
- Students will be able to read and comprehend international treaties and case law.
- They will have a fundamental understand of the interplay between various subfields of public international law.
- Students can identify and explain current issues in public international law.

Content:
The lecture is designed to provide participating students with a general understanding of the foundations, subjects, and sources of public international law, its interplay with national legal regimes, and more detailed knowledge of particular subfields of public international law.

Since the lecture targets students of information systems, particular focus will be given to economic topics in international law, such as investment and trade law aspects. Due to the general importance of climate change for todays (economic) law, international climate change law and environmental law will form further focus areas.

In addition, a concise overview on human rights law, the law on State responsibility, and the peaceful settlement of disputes will be provided.

Throughout the lecture, important case law will be referenced and students are expected to read relevant cases in part to facilitate a discussion of such cases and their relevance for a subject field. Although the United Nations, including its principal judicial organ, the International Court of Justice, is one of the, if not the, key international organization in public international law, further international organizations (eg, Council of Europe, World Trade Organization) and their respective law(s) will also be touched.

Students are advised to have a statute book at hand that includes the most important international treaties and conventions (eg, Evans, Blackstone's International Law Documents, currently 15th ed 2021).

Conducting the lecture in English intends to facilitate students to link their ideas and arguments to current debates in international law.

Below you will find excerpts from events related to this course:

V	**Public International Law with an Economic Law Focus** 2400172, SS 2025, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **On-Site**

Content

Content:

The lecture is designed to provide participating students with a general understanding of the foundations, subjects, and sources of public international law with an economic law focus, its interplay with national legal regimes, and more detailed knowledge of particular subfields of public international law.
Since the lecture targets students of information systems, particular focus will be given to economic topics in international law, such as investment and trade law aspects. Due to the general importance of climate change for todays (economic) law, international climate change law and environmental law will form further focus areas.
In addition, a concise overview on human rights law, the law on State responsibility, and the peaceful settlement of disputes will be provided.
Throughout the lecture, important case law will be referenced and students are expected to read relevant cases in part to facilitate a discussion of such cases and their relevance for a subject field. Although the United Nations, including its principal judicial organ, the International Court of Justice, is one of the, if not the, key international organization in public international law, further international organizations (eg, Council of Europe, World Trade Organization) and their respective law(s) will also be touched.
Students are advised to have a statute book at hand that includes the most important international treaties and conventions (eg, Evans, Blackstone's International Law Documents, currently 15th ed 2021).
Conducting the lecture in English intends to facilitate students to link their ideas and arguments to current debates in international law.

Competency Goals:

- Participating students will be able to navigate the plethora of multilateral treaties to detect relevant international law for specific cases.
- They can develop solutions for legal problems based on case law of international courts and tribunals.
- Students will be able to read and comprehend international treaties and case law.
- They will have a fundamental understand of the interplay between various subfields of public international law.
- Students can identify and explain current issues in public international law.

Area of Specialization: For Master modules only.

Interest/Recommendations:
- General knowledge of (public) law (eg, through participating in public law or EU law modules) is helpful but not necessary.
- Interest in international affairs and politics is welcomed.

The total workload for this course unit is 90 hours for 3 credit points, of which 22.5 hours are spent in attendance.

Organizational issues

Lecture Dates:

- 26th of April 2025, 9 to 17 hours (in class)
- 24th of May, 9 to 17 hours (in class)
- 21th of June 9 to 17 hours (in class)

Name:

10.50 HS 102

Gebäude:

10.50 Kollegiengebäude Bauingenieure II

Lageplan:

https://www.kit.edu/campusplan/

T 5.365 Course: Public Management [T-WIWI-102740]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101504 - Collective Decision Making
M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2561127	Public Management	3 SWS	Lecture / Practice (/	Wigger
Exams					
WT 24/25	790puma	Public Management			Wigger
ST 2025	790puma	Public Management			Wigger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Public Finance is required.

Below you will find excerpts from events related to this course:

V Public Management
2561127, WS 24/25, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
Blended (On-Site/Online)

Literature
Weiterführende Literatur:

- Damkowski, W. und C. Precht (1995): Public Management; Kohlhammer
- Richter, R. und E.G. Furubotn (2003): Neue Institutionenökonomik; 3. Auflage, Mohr
- Schedler, K. und I. Proeller (2003): New Public Management; 2. Auflage; UTB
- Mueller, D.C. (2009): Public Choice III; Cambridge University Press
- Wigger, B.U. (2006): Grundzüge der Finanzwissenschaft; 2. Auflage; Springer

T 5.366 Course: Public Revenues [T-WIWI-102739]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2560120	Public Revenues	2 SWS	Lecture / 🗣	Wigger
ST 2025	2560121	Übung zu Öffentliche Einnahmen	1 SWS	Practice / 🗣	Wigger, Schmelzer
Exams					
WT 24/25	790oeff	Public Revenues			Wigger
ST 2025	790oeff	Public Revenues			Wigger

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Public Finance is required.

Below you will find excerpts from events related to this course:

V Public Revenues
2560120, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
The *Public Revenues* lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

Learning goals:

See German version.

Workload:

The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
Literatur:

- Homburg, S.(2000): *Allgemeine Steuerlehre*, Vahlen
- Rosen, H.S.(1995): *Public Finance*; 4. Aufl., Irwin
- Wellisch, D.(2000): *Finanzwissenschaft I* und *Finanzwissenschaft III*, Vahlen
- Wigger, B. U.(2006): *Grundzüge der Finanzwissenschaft*; 2. Aufl., Springer

T 5.367 Course: Python Algorithms for Vehicle Technology [T-MACH-110796]

Responsible: Stephan Rhode
Organisation:
Part of: M-MACH-101265 - Vehicle Development
M-MACH-101266 - Automotive Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2114862	Python Algorithms for Automotive Engineering	2 SWS	Lecture / 🔀	Rhode
Exams					
ST 2025	76-T-MACH-110796	Python Algorithm for Vehicle Technology			Rhode

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Examination

Duration: 90 minutes

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Python Algorithms for Automotive Engineering
2114862, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
Teaching content:

- Introduction to Python and useful tools and libraries for creating algorithms, graphical representation, optimization, symbolic arithmetic and machine learning
  - Anaconda, Pycharm, Jupyter
  - NumPy, Matplotlib, SymPy, Scikit-Learn
- Methods and tools for creating software
  - Version management GitHub, git
  - Testing software pytest, Pylint
  - Documentation Sphinx
  - Continuous Integration (CI) Travis CI
  - Workflows in Open Source and Inner Source, Kanban, Scrum
- Practical programming projects to:
  - Road sign recognition
  - Vehicle state estimation
  - Calibration of vehicle models by mathematical optimization
  - Data-based modelling of the powertrain of an electric vehicle

Objectives:

The students have an overview of the programming language Python and important Python libraries to solve automotive engineering problems with computer programs. The students know current tools around Python to create algorithms, to apply them and to interpret and visualize their results. Furthermore, the students know
basics in the creation of software to be used in later programming projects in order to develop high-quality software solutions in teamwork. Through practical programming projects (road sign recognition, vehicle state estimation, calibration, data-based modelling), the students can perform future complex tasks from the area of driver assistance systems.

Organizational issues

Die Vorlesung beginnt mit zwei Kick-Off Veranstaltung in Präsenz am 25.04. sowie am 09.05.2025 um 11:30 Uhr am Campus Ost, Geb.70.04, Raum 219. Die restlichen Termine finden überwiegend digital statt. Weitere Infos über ILIAS.

Literature

- A Whirlwind Tour of Python, Jake VanderPlas, Publisher: O'Reilly Media, Inc. Release Date: August 2016, ISBN: 9781492037859 link
- Scientific Computing with Python 3, Olivier Verdier, Jan Erik Solem, Claus Führer, Publisher: Packt Publishing, Release Date: December 2016, ISBN: 9781786463517 link
- Introduction to Machine Learning with Python, Sarah Guido, Andreas C. Müller, Publisher: O'Reilly Media, Inc., Release Date: October 2016, ISBN: 9781449369880, link
- Clean Code, Robert C. Martin, Publisher: Prentice Hall, Release Date: August 2008, ISBN: 9780136083238, link

5.368 Course: Python for Computational Risk and Asset Management [T-WIWI-110213]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105032 - Data Science for Finance

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Competence Certificate
The examination takes the form of an alternative exam assessment.
The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Prerequisites
None.

Recommendation
Good knowledge of statistics and basic programming skills

Workload
135 hours

T 5.369 Course: Quality Management [T-MACH-102107]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	3

Events					
WT 24/25	2149667	Quality Management	2 SWS	Lecture / Blended	Lanza, Stamer
Exams					
WT 24/25	76-T-MACH-102107	Quality Management			Lanza
ST 2025	76-T-MACH-102107	Quality Management			Lanza

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Written Exam (60 min)

Prerequisites
It is not possible to combine this brick with brick Quality Management [T-MACH-112586].

Workload
120 hours

Below you will find excerpts from events related to this course:

V Quality Management
2149667, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:

- The term "Quality"
- Total Quality Management (TQM) and Six Sigma
- Universal methods and tools
- QM during early product stages – product denition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Learning Outcomes:

The students …

- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues

Vorlesungstermine montags 09:45 Uhr
Übung erfolgt während der Vorlesung

Literature

Medien:
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt:

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.370 Course: Quantitative Methods in Energy Economics [T-WIWI-107446]

Responsible: Patrick Plötz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3,5	Grade to a third	Each winter term	3

Events					
WT 24/25	2581007	Quantitative Methods in Energy Economics	2 SWS	Lecture / 🗣	Plötz
WT 24/25	2581008	Übungen zu Quantitative Methods in Energy Economics	1 SWS	Practice / 🗣	Plötz, Britto
Exams					
WT 24/25	7981007	Quantitative Methods in Energy Economics			Fichtner

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (app. 30 minutes) exam (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Quantitative Methods in Energy Economics

2581007, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Energy economics makes use of many quantitative methods in exploration and analysis of data as well as in simulations and modelling. This lecture course aims at introducing students of energy economics into the application of quantitative methods and techniques as taught in elementary courses to real problems in energy economics. The focus is mainly on regression, simulation, time series analysis and related statistical methods as applied in energy economics.

Learning Goals:

The student

- knows and understands selected quantitative methods of energy economics
- is able to use selected quantitative methods of energy economics
- understands they range of usage, limits and is autonomously able to adress new problems by them.

Literature
Wird in der Vorlesung bekannt gegeben.

T 5.371 Course: Quantum Functional Devices and Semiconductor Technology [T-ETIT-100740]

Responsible: Prof. Dr.-Ing. Christian Koos
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-MACH-101294 - Nanotechnology
M-MACH-101295 - Optoelectronics and Optical Communication

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Prerequisites
none

T 5.372 Course: Rail System Technology [T-MACH-102143]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101274 - Rail System Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each term	6

Events					
WT 24/25	2115919	Rail System Technology	2 SWS	Lecture / 🗣	Cichon
WT 24/25	2115996	Rail Vehicle Technology	2 SWS	Lecture / 🗣	Cichon
ST 2025	2115919	Rail System Technology	2 SWS	Lecture / 🗣	Cichon
ST 2025	2115996	Rail Vehicle Technology	2 SWS	Lecture / 🗣	Cichon
Exams					
WT 24/25	76-T-MACH-102143	Rail System Technology			Cichon
ST 2025	76-T-MACH-102143	Rail System Technology			Cichon

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
writen examination in German language
Duration. 120 minutes
No tools or reference materials may be used during the exam except calculator and dictionary

Prerequisites
none

Workload
270 hours

Below you will find excerpts from events related to this course:

V Rail System Technology
2115919, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).

V Rail Vehicle Technology
2115996, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, coupling, doors and windows
3. Bogies: forces, running gears, bogies, Jakobs-bogies, active components, connection to car body, wheel arrangement
4. Drives: priciples, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multisystem vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
5. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electropneumatic brake, emergency brake, parking brake)
6. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck vehicles, locomotives, freight wagons

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).

V **Rail System Technology**
2115919, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
2. Operation: Transportation, public transport, regional transport, long-distance transport, freight service, scheduling
3. Infrastructure: rail facilities, track alignment, railway stations, clearance diagram
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations

Organizational issues
ab SS 2024 schriftliche Prüfung

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).

V **Rail Vehicle Technology**
2115996, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, coupling, doors and windows
3. Bogies: forces, running gears, bogies, Jakobs-bogies, active components, connection to car body, wheel arrangement
4. Drives: priciples, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multisystem vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
5. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electropneumatic brake, emergency brake, parking brake)
6. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck vehicles, locomotives, freight wagons

Organizational issues
ab SS 2024 schriftliche Prüfung

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).

T 5.373 Course: Rapid Industrialization of Immature Products using the Example of Electric Mobility [T-MACH-113031]

Responsible: Dr. Jörg Bauer
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	2149621	Rapid Industrialization of Immature Products using the Example of Electric Mobility	2 SWS	Lecture / 🗣	Bauer
Exams					
WT 24/25	76-T-MACH-113031	Rapid Industrialization of Immature Products using the Example of Electric Mobility			Bauer
ST 2025	76-T-MACH-113031	Rapid Industrialization of Immature Products using the Example of Electric Mobility			Bauer

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written Exam (60 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Rapid Industrialization of Immature Products using the Example of Electric Mobility — **Lecture (V) On-Site**
2149621, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

The lecture "Rapid Industrialization of Immature Products using the Example of Electric Mobility" deals with production engineering methods for the robust and cost-effective production of technologically novel, so-called "immature" products. In this context, approaches for solving the central challenges resulting from the tension triangle of product development, industrialization and production are identified and discussed.

Based on the motivation for rapid market entry, the current approach involving stakeholders and other participants is explained. On this basis, key enablers for rapid and targeted industrialization are derived and discussed. For example, robust industrial processes based on flexible equipment are an essential core element for cost-effective production. Against this background, industry-relevant concepts for the automation and flexibilization of production processes are presented in the lecture in order to be able to deal efficiently and effectively with product-specific changes on the production side. Therefore, the main goal of an industrialization process is to develop production technologies and processes that enable robust, resource-efficient and cost-effective manufacturing of established and innovative products.

The lecture is structured as follows:

1. Motivation for rapid industrialization (complex market requirements, shortened development and product cycles, decreasing quantities per variant, ...).
2. Industrialization methods (simultaneous engineering, releases, frozen zones, high volumes, ...)
3. Key enablers to accelerate industrialization (simulation and digitalization, flexible and digital production equipment
4. Supply chains and suppliers
5. Testing and deployment
6. Ramp-up

Learning Outcomes:

- The students are familiar with the essential elements of simultaneous engineering and industrialization (motivation, processes, fields of action, challenges).
- The Students know the key enablers for the rapid industrialization of immature products (digitization, flexible production equipment, rapid manufacturing processes for primary production).
- The Students are familiar with the basic principles, methods and procedures of the main enablers. The understanding is deepened through theory, case and practical examples.
- The toolbox of key enablers described in the lecture allows students to select and independently apply the enablers in the context of future challenges.
- The Students are able to disseminate and to apply the knowledge acquired during the lecture in their future working lives.

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues

Blockvorlesung im Januar/Februar 2025. Termine und Ort werden online bekannt gegeben. (http://www.wbk.kit.edu/studium-und-lehre.php).

Block course in January/February 2025. Timetable and location will be published online. (http://www.wbk.kit.edu/studium-und-lehre.php).

Literature

Foliensatz zur Veranstaltung wird über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 5.374 Course: Recommender Systems [T-WIWI-102847]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2540506	Recommender Systems	2 SWS	Lecture / 🗣	Geyer-Schulz
WT 24/25	2540507	Exercise Recommender Systems	1 SWS	Practice / 🗣	Geyer-Schulz, Nazemi
Exams					
WT 24/25	7900310	Recommender Systems (WS 2024/2025)			Geyer-Schulz
ST 2025	7900138	Recommender Systems			Geyer-Schulz

Legend: 🖥 Online, ꙮ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Recommender Systems

2540506, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Learning objectives:

The student

- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Exam:

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from excersise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Organizational issues
Geb. 10.11, Raum 223

Literature

Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.

Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.

Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. Journal of Marketing Research, 37:363 – 375, Aug 2000.

Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. American Economic Review, 89(3):564 – 584, 1999.

Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.

Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints, volume 2356 of Lecture Notes in Artificial Intelligence LNAI, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. JACM, 46(5):604–632, sep 1999.

Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usernet News. Communications of the ACM, 40(3):77 – 87, Mar 1997.

Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.

Weiterführende Literatur:

Antoinette Alexander. The return of hardware: A necessary evil? Accounting Technology, 15(8):46 – 49, Sep 1999.

Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. Communications of the ACM, 40(3):88 – 89, Mar 1997.

Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. Communications of the ACM, 42(12):32 – 38, Dec 1999.

Thomas J. Blischok. Every transaction tells a story. Chain Store Age Executive with Shopping Center Age, 71(3):50–56, Mar 1995.

Hans Hermann Bock. Automatische Klassifikation. Vandenhoeck und Ruprecht, Göttingen, 1974.

Andrew S.C. Ehrenberg. Repeat-Buying: Facts, Theory and Applications. Charles Griffin & Company Ltd, London, 2 edition, 1988.

Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. Marketing ZFP, 24:47 – 55, 2002.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, Data Analysis – Scientific Modeling and Practical Applications, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.

Andreas Geyer-Schulz, Michael Hahsler, and Maximillian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. International Journal of Engineering Education, 17(2):153 – 163, 2001.

Mark-Edward Grey. Recommendersysteme auf Basis linearer Regression, 2004.

John A. Hartigan. Clustering Algorithms. John Wiley and Sons, New York, 1975.

Kevin Kelly. New Rules for the New Economy: 10 Radical Strategies for a Connected World. Viking, 1998.

Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France, volume 2455 of Lecture Notes in Computer Science, pages 254–261, Berlin, Sep 2002. Springer-Verlag.

Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. Data Mining and Knowledge Discovery, 6:5 – 8, 2002.

G. S. Maddala. Introduction to Econometrics. John Wiley, Chichester, 3 edition, 2001.

Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? Journal of Targeting, Measurement and Analysis for Marketing, 10(4):304 – 313, Jan 2002.

Andreas Mild and Thomas Reutterer. An improved collaborative filtering approach for predicting cross-category purchases based on binary market basket data. Journal of Retailing & Consumer Services, 10(3):123–133, may 2003.

Paul Resnick and Hal R. Varian. Recommender Systems. Communications of the ACM, 40(3):56 – 58, Mar 1997.

Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences, pages 345 – 354, New York, 1998. ACM Press.

J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.

Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating "word of mouth". In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

T 5.375 Course: Regulation Theory and Practice [T-WIWI-102712]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101406 - Network Economics
M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	see Annotations	2

Competence Certificate
The lecture is not offered for an indefinite period of time.
Result of success is made by a 20-30 minutes oral examination. Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
None

Recommendation
Basic knowledge and skills of microeconomics from undergraduate studies (bachelor's degree) are expected.

Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture*Competition in Networks* [26240] is helpful in any case but not considered a formal precondition.

Annotation
The lecture is not offered for an indefinite period of time.

T 5.376 Course: Responsible Artificial Intelligence [T-WIWI-111385]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems
M-WIWI-103118 - Data Science: Data-Driven User Modeling
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2545164	Responsible Artificial Intelligence	2 SWS	Lecture / 🗣	Hoffmann, Miskiw
WT 24/25	2545165	Responsible Artificial Intelligence	1 SWS	Practice / 🗣	Hoffmann, Miskiw
Exams					
WT 24/25	7900290	Responsible Artificial Intelligence			Weinhardt

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The final grade is based on an examination of other type according to § 4 Par. 2 No. 3. It consists of

- The completion of an exercise including a short presentation (15 min)(max. 30 points)
- Oral exam (max. 60 points).

Further details are explained during the lecture.

Prerequisites
Prior to the start of the lecture, introductory materials will be provided for self-study. The lecture has a limitation of participants. Therefore, prior registration via the Wiwi-Portal is mandatory.

Annotation
Can a technology really be trustworthy or even responsible? Since the success of LLMs at the latest, this question has been increasingly asked in society. With the increasing use of artificial intelligence, terms such as "Trustworthy AI", "Responsible AI" or "Ethical AI" are therefore gaining in importance. But what exactly is behind them? Technology is only ever used by people for specific purposes. So if we want to "trust" an AI solution, we need to understand how the people and organizations involved develop AI responsibly. According to the European Commission's HLEG AI, trustworthy AI must be lawful, ethical and robust.

This lecture sheds light on all these areas and thus provides an answer to the question of what a responsible and thus sustainable approach to AI can look like. After an introduction to AI and data, various approaches will be discussed with which actions and technology applications can be morally evaluated. The aim of this ethical reflection is to find out what we should do with AI instead of limiting ourselves to what we can do with AI.

In the context of robustness, vulnerabilities of AI and measures to address them will be discussed. The lecture will cover other topics such as bias, adversarial attacks, transparency, privacy and human-computer interaction. Current developments in regulatory requirements at European level will also be discussed. Guest lectures and continuous insights into business practice complement the foundations laid.

After successfully completing the course, students should be able

- to classify and evaluate the scientific discussion on ethics in artificial intelligence systems,
- understand the concept of trust and responsibility in the context of artificial intelligence and apply the relevant knowledge to change processes in companies,
- shape the social and entrepreneurial discussion on the use of AI themselves and
- know the legal requirements for AI and implement them in the corporate context.

Workload
135 hours

T 5.377 Course: Risk Management in Industrial Supply Networks [T-WIWI-102826]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2581992	Risk Management in Industrial Supply Networks	2 SWS	Lecture / 🗣	Schultmann, Rosenberg
Exams					
WT 24/25	7981992	Risk Management in Industrial Supply Networks			Schultmann

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Risk Management in Industrial Supply Networks
2581992, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Students learn methods and tools to manage risks in complex and dynamically evolving supply chain networks. In the first part of the lectures, students are introduced to the key terms and concepts of risk management and decision theory for industrial application. Based on the theoretic prerequisites, students are able to determine and analyze risk diversification, risk pooling and insurance mechanisms in supply chain network management. Lastly the lectures cover the differences and connection between risk management and resilience in industrial networks.

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.378 Course: Safety Engineering [T-MACH-105171]

Responsible: Hans-Peter Kany
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	2

Events					
WT 24/25	2117061	Safety Engineering	2 SWS	Lecture / 🗣	Kany
Exams					
WT 24/25	76-T-MACH-105171	Safety Engineering			Furmans

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral exam (20 min.) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Safety Engineering

2117061, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Media
Presentations

Learning content
The course provides basic knowledge of safety engineering. In particular the basics of health at the working place, job safety in Germany, national and European safety rules and the basics of safe machine design are covered. The implementation of these aspects will be illustrated by examples of material handling and storage technology. This course focuses on: basics of safety at work, safety regulations, basic safety principles of machine design, protection devices, system security with risk analysis, electronics in safety engineering, safety engineering for storage and material handling technique, electrical dangers and ergonomics. So, mainly, the technical measures of risk reduction in specific technical circumstances are covered.

Learning goals
The students are able to:

- Name and describe relevant safety concepts of safety engineering,
- Discuss basics of health at work and labour protection in Germany,
- Evaluate the basics for the safe methods of design of machinery with the national and European safety regulations and
- Realize these objectives by using examples in the field of storage and material handling systems.

Recommendations
None

Workload
Regular attendance: 21 hours
Self-study: 99 hours

Organizational issues
Termine: siehe ILIAS.

Literature

Defren/Wickert: Sicherheit für den Maschinen- und Anlagenbau, Druckerei und Verlag: H. von Ameln, Ratingen

T 5.379 Course: Safety Management in Highway Engineering [T-BGU-101674]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101066 - Safety, Computing and Law in Highway Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6233906	Safety Management in Highway Engineering	2 SWS	Lecture / Practice (/ 🗣	Zimmermann

Legend: 🖥 Online, ✿ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam with 15 minutes

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 5.380 Course: Selected Issues in Critical Information Infrastructures [T-WIWI-109251]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	3

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-113026 - Trustworthy Emerging Technologies must not have been started.

Annotation
T-WIWI-113026 "Trustworthy Emerging Technologies" ersetzt ab WS23/24 "Selected Issues in Critical Information Infrastructures" [TWIWI-109251]

Workload
135 hours

T 5.381 Course: Selected Legal Issues of Internet Law [T-INFO-108462]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2025	24821	Selected legal issues of Internet law	2 SWS	Colloquium (K / 🗣	Sattler
Exams					
ST 2025	7500099	Selected Legal Issues of Internet Law			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as an examination of another type (§ 4 Abs. 2 No. 3 SPO).

The overall impression is evaluated. The following partial aspects are included in the grading: oral presentation and discussion.

Prerequisites
The course **Internet Law T-INFO-101307** must not have started.

Recommendation
Keine.

Annotation
Lecture (with written exam) **Internet Law** T-INFO-101307 is offered in the winter semester.

Colloquium (other type of examination) **Selected Legal Issues of Internet Law** T-INFO-108462 offered in the summer semester

5.382 Course: Selected topics of system integration for micro- and nanotechnology [T-MACH-105695]

Responsible: apl. Prof. Dr. Ulrich Gengenbach
Prof. Dr. Veit Hagenmeyer
Dr. Liane Koker
apl. Prof. Dr. Ingo Sieber

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	2

Competence Certificate
oral exam (Duration: 30min)

Prerequisites
T-MACH-108809 "Micro- and nanosystem integration for medical, fluidic and optical applications" must not be started.

Workload
120 hours

T 5.383 Course: Selected Topics on Optics and Microoptics for Mechanical Engineers [T-MACH-102165]

Responsible: Dr. Mathias Heckele
Dr.-Ing. Timo Mappes

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101290 - BioMEMS

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	1

Competence Certificate
Oral examination

Prerequisites
none

T 5.384 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-111440]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	2

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.385 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-111439]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	2	Grade to a third	2

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.386 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-111438]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	1	Grade to a third	2

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.387 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-113352]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	1	Grade to a third	1

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.388 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-113354]

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	1

Self service assignment of supplementary stdues

This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation

Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.389 Course: Self-Booking-HOC-SPZ-FORUM-STK-Graded [T-WIWI-113353]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	2	Grade to a third	1

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a graded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.390 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-113357]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	3	pass/fail	1

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.391 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-113356]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.392 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-111441]

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	1	pass/fail	1

Self service assignment of supplementary stdues

This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation

Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.393 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-111442]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	2	pass/fail	1

Self service assignment of supplementary stdues
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation
Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.394 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-113355]

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	1	pass/fail	1

Self service assignment of supplementary stdues

This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation

Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.395 Course: Self-Booking-HOC-SPZ-FORUM-STK-Ungraded [T-WIWI-111443]

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Completed coursework	3	pass/fail	1

Self service assignment of supplementary stdues

This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Studium Generale. Forum Wissenschaft und Gesellschaft (FORUM) (ehem. ZAK)
- Studienkolleg

Annotation

Placeholder for self-booking of a ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.

T 5.396 Course: Semantic Web Technologies [T-WIWI-110848]

Responsible: Dr.-Ing. Tobias Käfer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2511310	Semantic Web Technologies	2 SWS	Lecture / 🗣	Käfer, Braun, Kinder, Kubelka
ST 2025	2511311	Exercises to Semantic Web Technologies	1 SWS	Practice / 🗣	Käfer, Braun, Kinder
Exams					
WT 24/25	79AIFB_SWebT_A2	Semantic Web Technologies			Käfer
ST 2025	79AIFB_SWebT_A4	Semantic Web Technologies (Registration until 21.07.2025)			Käfer

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

The exam takes place every semester and can be repeated at every regular examination date.

Prerequisites
None

Recommendation
Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required.

Below you will find excerpts from events related to this course:

V **Semantic Web Technologies** **Lecture (V)**
2511310, SS 2025, 2 SWS, Language: English, Open in study portal **On-Site**

Content

The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals

Central concepts are the representation of knowledge in form of RDF and ontologies, the access via Linked Data, as well as querying the data by using SPARQL. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:

The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preperation and postprocessing: 60 hours
- Exam and exam preperation: 30 hours

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web – Grundlagen. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. Weaving the Web. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/
- Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.

V **Exercises to Semantic Web Technologies**

2511311, SS 2025, 1 SWS, Language: English, Open in study portal

Practice (Ü)
On-Site

Content
The exercises are related to the lecture Semantic Web Technologies.

Multiple exercises are held that capture the topics, held in the lecture Semantic Web Technologies, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:

The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Organizational issues
Die Übungen finden im Rahmen der Termine der Blockvorlesung statt.

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web – Grundlagen. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. Weaving the Web. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/
- Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.

T 5.397 Course: Seminar Application of Artificial Intelligence in Production [T-MACH-112121]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105968 - Artificial Intelligence in Production
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	5

Events					
ST 2025	2150910	Seminar Application of Artificial Intelligence in Production	2 SWS	Seminar / 🗣	Fleischer
Exams					
ST 2025	76-T-MACH-112121	Seminar Application of Artificial Intelligence in Production			Fleischer

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative test achievement (graded):

- Presentation of the results (approx. 20 min) followed by a colloquium (approx. 15 min) with weighting 25%
- Written processing of the results with weighting 75%

Prerequisites
none

Recommendation
Previous participation in the lecture 2149921 "Artificial Intelligence in Production" or advanced knowledge of Python.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Seminar Application of Artificial Intelligence in Production

2150910, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content

The module AI in Production is designed to teach students the practical, holistic integration of machine learning methods and the application of artificial intelligence in production. The course is based on the phases of the CRISP-DM process with the aim of developing a deep understanding of the necessary steps and content aspects (methods) within the individual phases. In addition to teaching the practice-relevant aspects for integrating the most important methods of machine learning, the focus here is primarily on the necessary steps for data generation and data preparation, as well as the implementation and safeguarding of the methods in an industrial environment.

The lecture “Seminar on the Application of Artificial Intelligence in Production” aims at the practical integration of current methods of machine learning using realistic industrial use cases. The content of the course is based on the holistic, practical implementation of an AI project in production. In doing so, students solve a problem from a production context using methods of data analysis, processing and machine learning.

Learning Outcomes:

The students

- are able to independently analyze a practical problem in production with regard to the application of machine learning methods.
- will be able to independently apply common deep learning algorithms to practical data sets, validate them, and analyze the results.
- understand the challenges of using deep learning methods in production.
- will know the main action areas and open research questions for the successful implementation of AI in production and for the implementation of autonomous machines.
- are able to evaluate the results of current deep learning methods and, based on these, to develop and practically apply proposed solutions (from the field of machine learning).

Workload:

regular attendance: 21 hours
self-study: 99 hours

Organizational issues

Auftaktveranstaltung am 25.04.2025.
Alle nachfolgenden Termine werden über Ilias (https://ilias.studium.kit.edu/) bekanntgegeben.

Die Teilnehmerzahl für die Lehrveranstaltung ist begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Informationen zur Bewerbung und zum Ablauf der Lehrveranstaltung werden auf der Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php) bereitgestellt.

The number of participants for the course is limited. Consequently, a selection process will take place. Information on how to apply and how the course will be run will be provided on the wbk homepage (https://www.wbk.kit.edu/english/education.php).

Zur Vertiefung des im Rahmen der Lehrveranstaltung erworbenen Wissens werden die theoretischen Vorlesungseinheiten durch Praxiseinheiten im Umfeld der Karlsruher Forschungsfabrik (https://www.karlsruher-forschungsfabrik.de) unterstützt.

The theoretical lectures are complemented by practical lectures in the Karlsruhe Research Factory (https://www.karlsruher-forschungsfabrik.de/en.html) to deepen the acquired knowledge.

Literature

Materialien zur Lehrveranstaltung werden über Ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Course materials will be provided onIlias (https://ilias.studium.kit.edu/).

T 5.398 Course: Seminar Creating a Patent Specification [T-ETIT-100754]

Responsible: Prof. Dr. Wilhelm Stork
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	3	pass/fail	Each summer term	1

Events					
ST 2025	2311633	Seminar Creating a Patent Specification	2 SWS	Seminar / 🗣	Stork

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

T 5.399 Course: Seminar Data-Mining in Production [T-MACH-108737]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	2

Events					
WT 24/25	2151643	Seminar Data Mining in Production	2 SWS	Seminar / 🗣	Lanza
Exams					
WT 24/25	76-T-MACH-108737	Seminar Data-Mining in Production			Lanza

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

Prerequisites
none

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Seminar Data Mining in Production — **Seminar (S) On-Site**
2151643, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

Learning Outcomes:

The students ...

- can name, describe and distinguish between different methods, procedures and techniques of production data analysis.
- can perform basic data analyses with the data mining tool KNIME.
- can analyze and evaluate the results of data analyses in the production environment.
- are able to derive suitable recommendations for action.
- are able to explain and apply the CRISP-DM model.

Workload:

regular attendance: 10 hours
self-study: 80 hours

Organizational issues

Die Teilnehmerzahl ist auf zwölf Studierende begrenzt. Termine und Fristen zur Veranstaltung werden unter https://www.wbk.kit.edu/studium-und-lehre.php bekanntgegeben.

The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Literature

Medien:
KNIME Analytics Platform

Media:
KNIME Analytics Platform

T 5.400 Course: Seminar Development of Automated Production Systems [T-MACH-113999]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101298 - Automated Manufacturing Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each winter term	1

Competence Certificate
Alternative test achievement (graded):

- Presentation of the results (approx. 20 min) followed by a colloquium (approx. 15 min) with weighting 25%
- Written processing of the results with weighting 75%

Prerequisites
T-MACH-108844 - Automated production systems must not be started

Workload
120 hours

T 5.401 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]

Responsible: Professorenschaft des Fachbereichs Betriebswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	00063	Seminar Social Sentiment in Times of Crises	2 SWS	Seminar	Fegert
WT 24/25	2500006	Digital Citizen Science	2 SWS	Seminar /	Greif-Winzrieth
WT 24/25	2500043	Development of Sustainable Digital Business Models	2 SWS	Seminar /	Weissenberger-Eibl
WT 24/25	2500045	Digital Democracy - Challenges and Opportunities of the Digital Society	2 SWS	Seminar /	Fegert, Stein, Bezzaoui, Pekkip
WT 24/25	2500049	AI Innovation Ecosystems	2 SWS	Seminar /	Beyer, Weissenberger-Eibl
WT 24/25	2500125	Human-Centered Systems Seminar: Engineering	2 SWS	Seminar /	Mädche
WT 24/25	2530293		2 SWS	Seminar /	Ruckes, Benz, Luedecke, Kohl, Sarac
WT 24/25	2530586			Seminar /	Uhrig-Homburg, Molnar
WT 24/25	2540473	Business Data Analytics	2 SWS	Seminar /	Grote, Schulz, Motz
WT 24/25	2540475	Positive Information Systems	2 SWS	Seminar /	Knierim, del Puppo
WT 24/25	2540478	Smart Grids and Energy Markets	2 SWS	Seminar /	Weinhardt, Semmelmann, Miskiw
WT 24/25	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar /	Geyer-Schulz, Nazemi
WT 24/25	2540557	Human-Centered Systems Seminar: Research	2 SWS	Seminar /	Mädche
WT 24/25	2545105	Case studies seminar: Innovation management	2 SWS	Seminar /	Weissenberger-Eibl
WT 24/25	2550493	Hospital Management	2 SWS	Block /	Hansis
WT 24/25	2571181	Seminar Digital Marketing (Master)	2 SWS	Seminar /	Kupfer
WT 24/25	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter
WT 24/25	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter
WT 24/25	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar /	Wouters, Dickemann
WT 24/25	2581030	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Sloot
WT 24/25	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar /	Schultmann, Rudi
WT 24/25	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar /	Volk, Schultmann
WT 24/25	2581978	Seminar in Production and Operations Management	2 SWS	Seminar /	Schultmann, Rosenberg
WT 24/25	2581979	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Kleinebrahm
WT 24/25	2581980	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Sandmeier
WT 24/25	2581981	Seminar in Energy Economics	2 SWS	Seminar /	Ardone, Fichtner, Sledney

ST 2025	00063	Seminar Social Sentiment in Times of Crises	2 SWS	Seminar	Fegert
ST 2025	2500018	Successful transformation through innovation	2 SWS	Seminar / 🗣	Busch
ST 2025	2500020	Digital Democracy - Challenges and opportunities of the digital society	2 SWS	Seminar / 🧩	Fegert
ST 2025	2500032	ERPSim Seminar	2 SWS	Seminar / 🧩	Mädche
ST 2025	2500033	Pioneering Leadership in the German Mittelstand	2 SWS	Seminar / 🗣	Weissenberger-Eibl
ST 2025	2500056	ABBA Summer School Seminar: Biosignal-Adaptive GenAI Systems	2 SWS	Seminar / 🧩	Mädche
ST 2025	2500125	Human-Centered Systems Seminar: Engineering	3 SWS	Seminar / 🧩	Mädche
ST 2025	2530580	Seminar in Finance (Master)	2 SWS	Seminar / 🗣	Uhrig-Homburg, Müller, Thimme, Walter
ST 2025	2540469	Master Seminar: Trustworthy AI	2 SWS	Seminar / 🗣	Gutschow
ST 2025	2540473	Business Data Analytics	2 SWS	Seminar	Hariharan
ST 2025	2540475	Positive Information Systems	2 SWS	Seminar	Knierim
ST 2025	2540478	Smart Grid Economics & Energy Markets	2 SWS	Seminar	Weinhardt
ST 2025	2540493	Data Science for Industrial Applications	2 SWS	Seminar / 🗣	Spitzer, Holstein, Hendriks
ST 2025	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar	Geyer-Schulz
ST 2025	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar / 🧩	Mädche, Beigl
ST 2025	2540557	Human-Centered Systems Seminar: Research	3 SWS	Seminar / 🧩	Mädche
ST 2025	2545002	Entrepreneurship Research	2 SWS	Seminar / 🗣	Malik
ST 2025	2550493	Hospital Management	2 SWS	Block / 📱	Hansis
ST 2025	2571180	Seminar in Marketing and Sales (Master)	2 SWS	Seminar / 🗣	Klarmann, Mitarbeiter
ST 2025	2571182	Seminar "The Future of Marketing" (Master)	2 SWS	Seminar / 🗣	Kupfer
ST 2025	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar / 🗣	Nieken, Mitarbeiter, Gorny
ST 2025	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar / 🗣	Nieken, Mitarbeiter, Walther
ST 2025	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar / 🗣	Letmathe
ST 2025	2581030	Seminar Energiewirtschaft IV	2 SWS	Seminar / 🗣	Fichtner, Sloot
ST 2025	2581031	Seminar Energiewirtschaft V	2 SWS	Seminar / 🗣	Plötz
ST 2025	2581032	Seminar Energiewirtschaft VI	2 SWS	Seminar / 🗣	Slednev, Fichtner
ST 2025	2581976	Seminar Produktionswirtschaft und Logistik I	2 SWS	Seminar / 🗣	Schultmann, Rudi
ST 2025	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar / 🗣	Volk, Schultmann
ST 2025	2581978	Seminar Produktionswirtschaft und Logistik III	2 SWS	Seminar / 🗣	Schultmann
ST 2025	2581979	Seminar Energiewirtschaft I	2 SWS	Seminar / 🗣	Fichtner, Kleinebrahm
ST 2025	2581981	Seminar Energiewirtschaft III	2 SWS	Seminar / 🗣	Ardone, Fichtner
Exams					
WT 24/25	00064	Seminar Social Sentiment in Times of Crises			Weinhardt
WT 24/25	00072	Seminar Positive Information Systems			Weinhardt
WT 24/25	00074	Seminar Business Data Analytics			Weinhardt
WT 24/25	7900017	Seminar Smart Grid and Energy Markets			Weinhardt

WT 24/25	7900050	Development of Sustainable Business Models	Weissenberger-Eibl
WT 24/25	7900069	Human-Centered Systems Seminar: Engineering	Mädche
WT 24/25	7900106	Hospital Management	Hansis
WT 24/25	7900151	Master Seminar in Data Science and Machine Learning	Geyer-Schulz
WT 24/25	7900163	Seminar Human Resource Management (Master)	Nieken
WT 24/25	7900164	Seminar Human Resources and Organizations (Master)	Nieken
WT 24/25	7900184	Seminar in Finance (Master)	Ruckes
WT 24/25	7900203	Seminar "Finance in a nutshell"	Uhrig-Homburg
WT 24/25	7900233	Human-Centered Systems Seminar: Research	Mädche
WT 24/25	7900237	Case Studies Seminar: Innovation Management	Weissenberger-Eibl
WT 24/25	7900318	Bond Markets - Models & Derivatives	Uhrig-Homburg
WT 24/25	7900333	Seminar Digital Marketing (Master)	Kupfer
WT 24/25	7900335	Seminar Energy Economics IV	Fichtner
WT 24/25	7900344	Explainable AI in Computer Vision Applications: Reasoning the Segmentation	Satzger
WT 24/25	7900355	AI Innovation Ecosystems	Weissenberger-Eibl, Beyer
WT 24/25	7900364	Connecting the Challenges of Servitization with Circular Economy: A Literature Review	Satzger
WT 24/25	79-2579919-M	Seminar Management Accounting - Sustainability Topics (Master)	Wouters
WT 24/25	7981976	Seminar in Production and Operations Management I	Schultmann
WT 24/25	7981977	Seminar in Production and Operations Management II	Schultmann
WT 24/25	7981978	Seminar in Production and Operations Management III	Schultmann
WT 24/25	7981979	Seminar Energy Economics I	Fichtner
WT 24/25	7981980	Seminar Energy Economics II	Fichtner
WT 24/25	7981981	Seminar Energy Economics III	Fichtner
ST 2025	7900008	Hospital Management	Hansis
ST 2025	7900025	Successful Transformation Through Innovation	Busch
ST 2025	7900050	Language Models for Structured Literature Reviews	Satzger
ST 2025	7900101	Seminar Human Resource Management (Master)	Nieken
ST 2025	7900127	Seminar in Finance (Master)	Uhrig-Homburg
ST 2025	7900231	Seminar Human Resources and Organizations (Master)	Nieken
ST 2025	7900233	Seminar in Marketing and Sales (Master)	Klarmann
ST 2025	7900318	Practical Seminar: Data Science for Industrial Applications	Satzger
ST 2025	7900319	Service Design Thinking	Satzger
ST 2025	7900320	Practical Seminar Service Innovation	Satzger
ST 2025	792581030	Seminar Energy Economics IV	Fichtner
ST 2025	792581031	Seminar Energy Economics V	Plötz
ST 2025	7981976	Seminar in Production and Operations Management I	Schultmann
ST 2025	7981977	Seminar in Production and Operations Management II	Schultmann
ST 2025	7981979	Seminar Energy Economics I	Fichtner
ST 2025	7981981	Seminar Energy Economics III	Fichtner

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Development of Sustainable Digital Business Models**
2500043, WS 24/25, 2 SWS, Language: German, Open in study portal
Seminar (S)
On-Site

Content
The topic of sustainability is becoming increasingly important for companies in Europe. For example, the demand for sustainable products has risen sharply in many sectors. More and more companies are obliged by guidelines and standards to report on the sustainability of their activities. At the same time, the digital transformation is progressing and offers companies opportunities to implement or communicate their plans digitally. The seminar examines how the topic of sustainability is anchored in the digital business modelling of companies.

Students first learn about the dimensions of business models and sustainability. The seminar then discusses various concepts from the literature that take sustainability into account in business modelling. Students develop their own approach to sustainable digital business modelling and apply it to selected company examples from different sectors. The results are 1) presented and discussed in presentations and 2) recorded in seminar papers.

V **AI Innovation Ecosystems**
2500049, WS 24/25, 2 SWS, Language: German/English, Open in study portal
Seminar (S)
Online

Content
This research seminar uses the example of three innovation clusters in Baden-Württemberg to analyse innovation ecosystems and their potential special features in the field of artificial intelligence. The practical seminar benefits from expert input, but also places a clear focus on research methods and scientific work. A toolbox will be developed together, including literature reviews and interview techniques, which will later facilitate the work on the Master's thesis.
Firstly, the concept of innovation ecosystems is examined. Despite the frequently used term, the state of the art is still relatively open and an overview can be developed together. Then, using the example of the AI Health Innovation Cluster, a cluster is presented and its political history, structure and goal (achievement) are analysed. In the following two sessions, the IPAI and Cyber Valley will be analysed by experts and groups of students.
Since the students will be responsible for much of the seminar themselves, in addition to practical and methodological inputs, a preliminary meeting will take place on 31 October (6-7 pm) to allow sufficient preparation time. The seminar will take place virtually.

V
2530586, WS 24/25, SWS, Language: German, Open in study portal
Seminar (S)
On-Site

Content
Within this seminar eLearning videos are produced to different topics out of the contents of our lectures. The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance.Through conduction of the video the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

The success is monitored by the development of an eLearning video and by the writing of a project report (according to §4(2), 3 SPO).

The overall grade is made up of these partial performances.

Recommendations:

Knowledge of the content of the modules *Essentials of Finance* [WW3BWLFBV1] (for bachelor students) and *F1 (Finance)* [WW4BWLFBV1] (for master students) is assumed.

The total workload for this course is approximately 90 hours. For further information see German version.

Organizational issues
Kickoff am 21.10.24 um 16 Uhr, Zwischenpräsentation am 10.12.24, 16 Uhr und Abschlusspräsentation am 21.01.25, 17:45 Uhr am Campus B (Geb. 09.21), Raum 209

V	**Business Data Analytics** 2540473, WS 24/25, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **On-Site**

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

V	**Master Seminar in Data Science and Machine Learning** 2540510, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

V	**Case studies seminar: Innovation management** 2545105, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course. A short introduction to presentation techniques is planned to help students prepare the seminar papers.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

V	**Hospital Management** 2550493, WS 24/25, 2 SWS, Language: German, Open in study portal	**Block (B)** **Online**

V	**Seminar Human Resource Management (Master)** 2573012, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

V	**Seminar Human Resources and Organizations (Master)** 2573013, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

V	**Seminar Management Accounting - Sustainability Topics** 2579919, WS 24/25, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Examination:

- The performance review is carried out in the form of a “Prüfungsleistung anderer Art” (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade is made up of the grade of the seminar paper, the presentation and the contributions in the seminar sessions.

Required prior Courses:

- The course requires a basic knowledge of finance and accounting.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 8 students.

Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature
Will be announced in the course.

V	**Successful transformation through innovation** 2500018, SS 2025, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
This seminar uses strategic innovation management theory and concepts such as organisational ambidexterity, boundary spanning and stakeholder approaches how companies can increase their innovative increase their innovative capacity through innovation. The students will use a core paper to illustrate the steps towards becoming an innovative organisation. The aim is to understand how -with the help of the concepts mentioned above - medium-sized companies, in the context of organisational inertia and path dependency, may become innovation-driven organisations. The seminar will analyse the role of different stakeholders, which role the different stakeholders play and how companies may become part of an innovation ecosystems. Based on the core paper, the students will apply the concepts they have learned to selected companies and present the results in class. In addition to a presentation, the students will submit the results in seminar papers.

Organizational issues
Weblink: https://itm.entechnon.kit.edu/192_1281.php

V	**Pioneering Leadership in the German Mittelstand** 2500033, SS 2025, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
Participants
- learn about the particular specifics of management and the cultural constitution of medium-sized and, in particular, family-run companies in Germany.
- understand the core elements of owner strategy and corporate strategy and why both strategies are linked in family businesses.
- gain an overview of the complex challenges facing German SMEs and the entrepreneurial barriers and success factors that significantly determine competitiveness and innovative ability.
- have understood what role leadership skills play in this, what key skills there are, how they are measured and how they are used in business practice.
- have internalized which competencies constitute so-called “pioneering leadership” and can assess these in themselves as well as medium-sized companies - as attractive future employers - with regard to innovative ability and competitiveness.
- consolidate what they have learned using current examples and case studies from business practice in German SMEs as well as management consulting and HR consulting practice.

V **ABBA Summer School Seminar: Biosignal-Adaptive GenAI Systems**
2500056, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
Blended (On-Site/Online)

Content
Background: In the ABBA Summer School Seminar hosted at the Karlsruhe Decision & Design Lab (KD^{2}Lab) at KIT, we aim to enable students to explore biosignal sensors for designing user-adaptive systems. This comprehensive three-day program is designed for both bachelor's and master's students who want to gain an understanding of biosignal and the development of user-adaptive systems. The learning objective is to design human-centered biosignal-adaptive systems to address user needs in learning scenarios.

Course Content: Throughout the summer school, students will learn the foundations of biosignal-adaptive systems through a series of lectures and apply the knowledge in practical group work. For the group work, we offer students two contexts for their research topics: literature research during thesis writing and programming with LLM. Aiming to address user challenges in these two contexts, we provide two biosignal sensors: EEG or eye-tracking sensors. By collecting biosignal data with the sensors, we encourage students to integrate cutting-edge AI algorithms for their design and implementation. In the end, students should present their results to showcase the functionality, innovation, and a prototype of their biosignal-adaptive systems.

Learning Outcome: By successfully achieving the learning objective, students will receive a certificate from KIT and will have the opportunity to apply their acquired skills and knowledge for further research.

The seminar will be held in a three-day format from 23th to 25th September with 3 ECTS. For any questions, please ask Luke (shi.liu@kit.edu) for more information!

V **Human-Centered Systems Seminar: Engineering**
2500125, SS 2025, 3 SWS, Language: English, Open in study portal
Seminar (S)
Blended (On-Site/Online)

Content
Formerly known as "Current Topics in Digital Transformation"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the human-centered systems lab (Prof. Mädche). Students will work on a dedicated topic in the context of human-centered systems and apply a pre-defined research method. A broad spectrum of topics is offered every semester, topics may range from creating an experimental design, analyzing collected data, or systematically comparing existing software prototypes in a specific field of interest.

V **Master Seminar: Trustworthy AI**
2540469, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
Artificial Intelligence is shaping critical areas of society, but ensuring fairness, transparency, and trust remains a challenge. Our master seminar, "Trustworthy AI," explores key issues such as bias detection, intersectional fairness, and explainability in AI systems. We address bias in AI-driven decision-making, particularly in critical areas like credit scoring, which is classified as a high-risk application context by the AI Act, and examine methods to enhance fairness. A crucial focus is on developing transparent AI models and understanding how explanations influence trust in automated systems. Additionally, we analyze large language models, their limitations, and innovative retrieval methods such as GraphRAG, which enhance knowledge representation in AI.

This seminar is offered by the newly established Information Systems III research group headed by Prof. Dr. Jella Pfeiffer at the Institute for Information Systems (WIN). To learn more about us, please visit our website (WIN - Information Systems III).

V **Data Science for Industrial Applications**
2540493, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content

Learning Objectives

This seminar will require you to screen, select, and apply information systems theories and methodologies to solve contemporary challenges in the manufacturing and adjacent industries. This will include both critical reviews of the literature state-of-the-art [1-2] as well as the systematic conduct of design science research and machine learning methods [3-4]. You will identify key problems in real-world use cases, derive relevant research questions, and systematically gather, choose, and apply academic knowledge to develop solutions in the form of proof-of-concepts or prototypes.

Course Credits

The seminar can be credited as Seminar Betriebswirtschaftslehre A [T-WIWI-103474], Seminar Betriebswirtschaftslehre B [T-WIWI-103476] or Seminar Wirtschaftsinformatik [T-WIWI-109827] (3 ECTS). Other courses may be credited upon request.

Seminar Description

The Internet of Things (IoT) is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, connectivity/internet access, and the economic application of sensors [5], physical products are providing vast amounts of data, enabling the development of smart services [6]. While such IoT use cases are projected to open a market potential valued at $3.3 billion in 2030 [7], the industry is still far from exploiting its full capabilities. To solve this challenge, cutting-edge academic knowledge in information systems and machine learning is key to generating valuable insights from machine data.

The seminar is held in cooperation with international industry partners, who provide real-world datasets and ongoing access to subject matter experts. Students will work in teams of 2-4 on different topics and datasets. The assignments will be handed out in a joint kick-off event – to be scheduled once participating students have been selected. Attendance at this kick-off event is mandatory and a prerequisite for participation. Students are required to submit a seminar paper of 12-15 pages on an individual basis.

Expertise in Python and Data Science / Machine Learning as well as successful participation in the course “Artificial Intelligence in Service Systems” (T-WIWI-108715) are strongly recommended.

Contact

Daniel Hendricks – daniel.hendriks@kit.edu

Philipp Spitzer - philipp.spitzer@kit.edu

Joshua Holstein – joshua.holstein@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.

[1] Webster, J., Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. MIS Quarterly, 26 (2) xiii-xxiii.

[2] Brocke, J. v. et al. (2009), Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. *Proceedings of the European Conference on Information Systems*, paper 161.

[3] Wirth, R., Hipp, J. (2000). CRISP-DM: Towards a Standard Process Model for Data Mining. Proceedings of the 4th International Conference on the Practical Applications of Knowledge Discovery and Data Mining, 29-40.

[4] Peffers, K., Tuunanen, T., Rothenberger, M., Chatterjee, S. (2008). A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems, 24 (3) 45–78.

[5] Martin, D.; Kühl, N.; Satzger, G. (2021). Virtual Sensors. Business & Information Systems Engineering, 63 (3) 315-323.

[6] Hunke, F., Heinz, D. Satzger, G. (2022). Creating customer value from data: foundations and archetypes of analytics-based services. Electronic Markets, 32, 503–521.

[7] Chui, M., Collins, M., Patel, M. (2021). IoT value set to accelerate through 2030: Where and how to capture it. McKinsey & Company. URL: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/iot-value-set-to-accelerate-through-2030-where-and-how-to-capture-it

V **Master Seminar in Data Science and Machine Learning** — **Seminar (S)**

2540510, SS 2025, 2 SWS, Language: German/English, Open in study portal

V **User-Adaptive Systems Seminar** — **Seminar (S)** **Blended (On-Site/Online)**

2540553, SS 2025, 2 SWS, Language: English, Open in study portal

Content

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (h-lab, Prof. Mädche). It is offered as part of the DFG-funded graduate school “KD2School: Designing Adaptive Systems for Economic Decisions“ (https://kd2school.info/)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

V **Human-Centered Systems Seminar: Research**

2540557, SS 2025, 3 SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group “Information Systems I” (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V **Entrepreneurship Research** **Seminar (S) On-Site**

2545002, SS 2025, 2 SWS, Language: English, Open in study portal

Content

Content

In this course, the students choose from various relevant and current research topics in entrepreneurship and independently develop a topic that suits them in small teams. Initially, there is an introduction to standard methods such as systematic literature review, design science, qualitative and quantitative data analysis, and more. The seminar topic must be scientifically prepared and presented in 15-20 pages as part of a written elaboration. The seminar results are presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives

The foundations of independent scholarly work (literature review, argumentation + discussion, citation of literature sources, application of qualitative, quantitative, and simulation methods) are developed as part of the written elaboration. The competencies acquired in the seminar can be utilized in preparing for a potential master's thesis. Therefore, the seminar is mainly aimed at students who intend to write their thesis at the Chair of Entrepreneurship and Technology Management and wish to gain substantial experience in entrepreneurship research.

Organizational issues

Thursday, 08.05.2025, 10.00-16.00

Thursday, 05.06.2025, 10.00-16.00

Thursday, 10.07.2025, 09.00-12.00

Registration is via the Wiwi-Portal.

Literature

Will be announced in the seminar.

V

Hospital Management

2550493, SS 2025, 2 SWS, Language: German, Open in study portal

Block (B)
Online

Content

The "Hospital Management" seminar is intended to help students in higher semesters to simulate some of the organizational and management tasks that arise in a medium-sized service company using a specific example (here: management of a medium-sized hospital). The seminar thus represents a kind of "bracket" for a large number of individual skills that the students have acquired during their studies. The seminar takes place as a webinar.

Students will be asked about the typical interaction of a medium-sized hospital with its environment in 5 thematic blocks: Interaction with the customer (patients) / Interaction with employees* / Interaction with business partners / Interaction with stakeholders / Summarizing opportunities and risks.

Organizational issues

Das Seminar wird als Blockveranstaltung stattfinden. Die Termine werden bei der Bewerbung über das Wiwi-Portal bekanntgegeben.

V

Seminar Human Resource Management (Master)

2573012, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V

Seminar Human Resources and Organizations (Master)

2573013, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V	**Seminar Management Accounting - Sustainability Topics** 2579919, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:

- The performance review is carried out in the form of a “Prüfungsleistung anderer Art” (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade is made up of the grade of the seminar paper, the presentation and the contributions in the seminar sessions.

Required prior Courses:

- The course requires a basic knowledge of finance and accounting.

Note:

- Maximum of 8 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.

T 5.402 Course: Seminar in Business Administration B (Master) [T-WIWI-103476]

Responsible: Professorenschaft des Fachbereichs Betriebswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	00063	Seminar Social Sentiment in Times of Crises	2 SWS	Seminar	Fegert
WT 24/25	2500006	Digital Citizen Science	2 SWS	Seminar /	Greif-Winzrieth
WT 24/25	2500043	Development of Sustainable Digital Business Models	2 SWS	Seminar /	Weissenberger-Eibl
WT 24/25	2500045	Digital Democracy - Challenges and Opportunities of the Digital Society	2 SWS	Seminar /	Fegert, Stein, Bezzaoui, Pekkip
WT 24/25	2500049	AI Innovation Ecosystems	2 SWS	Seminar /	Beyer, Weissenberger-Eibl
WT 24/25	2500125	Human-Centered Systems Seminar: Engineering	2 SWS	Seminar /	Mädche
WT 24/25	2530293		2 SWS	Seminar /	Ruckes, Benz, Luedecke, Kohl, Sarac
WT 24/25	2530586			Seminar /	Uhrig-Homburg, Molnar
WT 24/25	2540473	Business Data Analytics	2 SWS	Seminar /	Grote, Schulz, Motz
WT 24/25	2540475	Positive Information Systems	2 SWS	Seminar /	Knierim, del Puppo
WT 24/25	2540478	Smart Grids and Energy Markets	2 SWS	Seminar /	Weinhardt, Semmelmann, Miskiw
WT 24/25	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar /	Geyer-Schulz, Nazemi
WT 24/25	2540557	Human-Centered Systems Seminar: Research	2 SWS	Seminar /	Mädche
WT 24/25	2545105	Case studies seminar: Innovation management	2 SWS	Seminar /	Weissenberger-Eibl
WT 24/25	2550493	Hospital Management	2 SWS	Block /	Hansis
WT 24/25	2571181	Seminar Digital Marketing (Master)	2 SWS	Seminar /	Kupfer
WT 24/25	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter
WT 24/25	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter
WT 24/25	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar /	Wouters, Dickemann
WT 24/25	2581030	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Sloot
WT 24/25	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar /	Schultmann, Rudi
WT 24/25	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar /	Volk, Schultmann
WT 24/25	2581978	Seminar in Production and Operations Management	2 SWS	Seminar /	Schultmann, Rosenberg
WT 24/25	2581979	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Kleinebrahm
WT 24/25	2581980	Seminar in Energy Economics	2 SWS	Seminar /	Fichtner, Sandmeier
WT 24/25	2581981	Seminar in Energy Economics	2 SWS	Seminar /	Ardone, Fichtner, Slednev

ST 2025	00063	Seminar Social Sentiment in Times of Crises	2 SWS	Seminar	Fegert
ST 2025	2500018	Successful transformation through innovation	2 SWS	Seminar /	Busch
ST 2025	2500020	Digital Democracy - Challenges and opportunities of the digital society	2 SWS	Seminar /	Fegert
ST 2025	2500032	ERPSim Seminar	2 SWS	Seminar /	Mädche
ST 2025	2500033	Pioneering Leadership in the German Mittelstand	2 SWS	Seminar /	Weissenberger-Eibl
ST 2025	2500056	ABBA Summer School Seminar: Biosignal-Adaptive GenAI Systems	2 SWS	Seminar /	Mädche
ST 2025	2500125	Human-Centered Systems Seminar: Engineering	3 SWS	Seminar /	Mädche
ST 2025	2530580	Seminar in Finance (Master)	2 SWS	Seminar /	Uhrig-Homburg, Müller, Thimme, Walter
ST 2025	2540469	Master Seminar: Trustworthy AI	2 SWS	Seminar /	Gutschow
ST 2025	2540473	Business Data Analytics	2 SWS	Seminar	Hariharan
ST 2025	2540475	Positive Information Systems	2 SWS	Seminar	Knierim
ST 2025	2540478	Smart Grid Economics & Energy Markets	2 SWS	Seminar	Weinhardt
ST 2025	2540493	Data Science for Industrial Applications	2 SWS	Seminar /	Spitzer, Holstein, Hendriks
ST 2025	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar	Geyer-Schulz
ST 2025	2540553	User-Adaptive Systems Seminar	2 SWS	Seminar /	Mädche, Beigl
ST 2025	2540557	Human-Centered Systems Seminar: Research	3 SWS	Seminar /	Mädche
ST 2025	2545002	Entrepreneurship Research	2 SWS	Seminar /	Malik
ST 2025	2550493	Hospital Management	2 SWS	Block /	Hansis
ST 2025	2571180	Seminar in Marketing and Sales (Master)	2 SWS	Seminar /	Klarmann, Mitarbeiter
ST 2025	2571182	Seminar "The Future of Marketing" (Master)	2 SWS	Seminar /	Kupfer
ST 2025	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter, Gorny
ST 2025	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar /	Nieken, Mitarbeiter, Walther
ST 2025	2579919	Seminar Management Accounting - Sustainability Topics	2 SWS	Seminar /	Letmathe
ST 2025	2581030	Seminar Energiewirtschaft IV	2 SWS	Seminar /	Fichtner, Sloot
ST 2025	2581031	Seminar Energiewirtschaft V	2 SWS	Seminar /	Plötz
ST 2025	2581032	Seminar Energiewirtschaft VI	2 SWS	Seminar /	Slednev, Fichtner
ST 2025	2581976	Seminar Produktionswirtschaft und Logistik I	2 SWS	Seminar /	Schultmann, Rudi
ST 2025	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar /	Volk, Schultmann
ST 2025	2581978	Seminar Produktionswirtschaft und Logistik III	2 SWS	Seminar /	Schultmann
ST 2025	2581979	Seminar Energiewirtschaft I	2 SWS	Seminar /	Fichtner, Kleinebrahm
ST 2025	2581981	Seminar Energiewirtschaft III	2 SWS	Seminar /	Ardone, Fichtner
Exams					
WT 24/25	00064	Seminar Social Sentiment in Times of Crises			Weinhardt
WT 24/25	00072	Seminar Positive Information Systems			Weinhardt
WT 24/25	00074	Seminar Business Data Analytics			Weinhardt
WT 24/25	7900017	Seminar Smart Grid and Energy Markets			Weinhardt

WT 24/25	7900050	Development of Sustainable Business Models	Weissenberger-Eibl
WT 24/25	7900069	Human-Centered Systems Seminar: Engineering	Mädche
WT 24/25	7900106	Hospital Management	Hansis
WT 24/25	7900151	Master Seminar in Data Science and Machine Learning	Geyer-Schulz
WT 24/25	7900163	Seminar Human Resource Management (Master)	Nieken
WT 24/25	7900164	Seminar Human Resources and Organizations (Master)	Nieken
WT 24/25	7900184	Seminar in Finance (Master)	Ruckes
WT 24/25	7900203	Seminar "Finance in a nutshell"	Uhrig-Homburg
WT 24/25	7900233	Human-Centered Systems Seminar: Research	Mädche
WT 24/25	7900237	Case Studies Seminar: Innovation Management	Weissenberger-Eibl
WT 24/25	7900318	Bond Markets - Models & Derivatives	Uhrig-Homburg
WT 24/25	7900333	Seminar Digital Marketing (Master)	Kupfer
WT 24/25	7900335	Seminar Energy Economics IV	Fichtner
WT 24/25	7900355	AI Innovation Ecosystems	Weissenberger-Eibl, Beyer
WT 24/25	7900364	Connecting the Challenges of Servitization with Circular Economy: A Literature Review	Satzger
WT 24/25	79-2579919-M	Seminar Management Accounting - Sustainability Topics (Master)	Wouters
WT 24/25	7981976	Seminar in Production and Operations Management I	Schultmann
WT 24/25	7981977	Seminar in Production and Operations Management II	Schultmann
WT 24/25	7981978	Seminar in Production and Operations Management III	Schultmann
WT 24/25	7981979	Seminar Energy Economics I	Fichtner
WT 24/25	7981980	Seminar Energy Economics II	Fichtner
WT 24/25	7981981	Seminar Energy Economics III	Fichtner
ST 2025	7900008	Hospital Management	Hansis
ST 2025	7900025	Successful Transformation Through Innovation	Busch
ST 2025	7900050	Language Models for Structured Literature Reviews	Satzger
ST 2025	7900101	Seminar Human Resource Management (Master)	Nieken
ST 2025	7900127	Seminar in Finance (Master)	Uhrig-Homburg
ST 2025	7900231	Seminar Human Resources and Organizations (Master)	Nieken
ST 2025	7900233	Seminar in Marketing and Sales (Master)	Klarmann
ST 2025	7900318	Practical Seminar: Data Science for Industrial Applications	Satzger
ST 2025	7900319	Service Design Thinking	Satzger
ST 2025	7900320	Practical Seminar Service Innovation	Satzger
ST 2025	792581030	Seminar Energy Economics IV	Fichtner
ST 2025	792581031	Seminar Energy Economics V	Plötz
ST 2025	7981976	Seminar in Production and Operations Management I	Schultmann
ST 2025	7981977	Seminar in Production and Operations Management II	Schultmann
ST 2025	7981979	Seminar Energy Economics I	Fichtner
ST 2025	7981981	Seminar Energy Economics III	Fichtner

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Development of Sustainable Digital Business Models** — **Seminar (S) On-Site**
2500043, WS 24/25, 2 SWS, Language: German, Open in study portal

Content
The topic of sustainability is becoming increasingly important for companies in Europe. For example, the demand for sustainable products has risen sharply in many sectors. More and more companies are obliged by guidelines and standards to report on the sustainability of their activities. At the same time, the digital transformation is progressing and offers companies opportunities to implement or communicate their plans digitally. The seminar examines how the topic of sustainability is anchored in the digital business modelling of companies.

Students first learn about the dimensions of business models and sustainability. The seminar then discusses various concepts from the literature that take sustainability into account in business modelling. Students develop their own approach to sustainable digital business modelling and apply it to selected company examples from different sectors. The results are 1) presented and discussed in presentations and 2) recorded in seminar papers.

V **AI Innovation Ecosystems** — **Seminar (S) Online**
2500049, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Content
This research seminar uses the example of three innovation clusters in Baden-Württemberg to analyse innovation ecosystems and their potential special features in the field of artificial intelligence. The practical seminar benefits from expert input, but also places a clear focus on research methods and scientific work. A toolbox will be developed together, including literature reviews and interview techniques, which will later facilitate the work on the Master's thesis.
Firstly, the concept of innovation ecosystems is examined. Despite the frequently used term, the state of the art is still relatively open and an overview can be developed together. Then, using the example of the AI Health Innovation Cluster, a cluster is presented and its political history, structure and goal (achievement) are analysed. In the following two sessions, the IPAI and Cyber Valley will be analysed by experts and groups of students.
Since the students will be responsible for much of the seminar themselves, in addition to practical and methodological inputs, a preliminary meeting will take place on 31 October (6-7 pm) to allow sufficient preparation time. The seminar will take place virtually.

V — **Seminar (S) On-Site**
2530586, WS 24/25, SWS, Language: German, Open in study portal

Content
Within this seminar eLearning videos are produced to different topics out of the contents of our lectures. The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance.Through conduction of the video the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

The success is monitored by the development of an eLearning video and by the writing of a project report (according to §4(2), 3 SPO).

The overall grade is made up of these partial performances.

Recommendations:

Knowledge of the content of the modules *Essentials of Finance* [WW3BWLFBV1] (for bachelor students) and *F1 (Finance)* [WW4BWLFBV1] (for master students) is assumed.

The total workload for this course is approximately 90 hours. For further information see German version.

Organizational issues
Kickoff am 21.10.24 um 16 Uhr, Zwischenpräsentation am 10.12.24, 16 Uhr und Abschlusspräsentation am 21.01.25, 17:45 Uhr am Campus B (Geb. 09.21), Raum 209

V	**Business Data Analytics** 2540473, WS 24/25, 2 SWS, Language: German/English, Open in study portal	**Seminar (S) On-Site**

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

V	**Master Seminar in Data Science and Machine Learning** 2540510, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S) Blended (On-Site/Online)**

V	**Case studies seminar: Innovation management** 2545105, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S) On-Site**

Content
The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course. A short introduction to presentation techniques is planned to help students prepare the seminar papers.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

V	**Hospital Management** 2550493, WS 24/25, 2 SWS, Language: German, Open in study portal	**Block (B) Online**

V	**Seminar Human Resource Management (Master)** 2573012, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S) On-Site**

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

V Seminar Human Resources and Organizations (Master)

2573013, WS 24/25, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

V Seminar Management Accounting - Sustainability Topics

2579919, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Examination:

- The performance review is carried out in the form of a “Prüfungsleistung anderer Art” (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade is made up of the grade of the seminar paper, the presentation and the contributions in the seminar sessions.

Required prior Courses:

- The course requires a basic knowledge of finance and accounting.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 8 students.

Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature
Will be announced in the course.

V	**Successful transformation through innovation** 2500018, SS 2025, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
This seminar uses strategic innovation management theory and concepts such as organisational ambidexterity, boundary spanning and stakeholder approaches how companies can increase their innovative increase their innovative capacity through innovation. The students will use a core paper to illustrate the steps towards becoming an innovative organisation. The aim is to understand how -with the help of the concepts mentioned above - medium-sized companies, in the context of organisational inertia and path dependency, may become innovation-driven organisations. The seminar will analyse the role of different stakeholders, which role the different stakeholders play and how companies may become part of an innovation ecosystems. Based on the core paper, the students will apply the concepts they have learned to selected companies and present the results in class. In addition to a presentation, the students will submit the results in seminar papers.

Organizational issues
Weblink: https://itm.entechnon.kit.edu/192_1281.php

V	**Pioneering Leadership in the German Mittelstand** 2500033, SS 2025, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
Participants
- learn about the particular specifics of management and the cultural constitution of medium-sized and, in particular, family-run companies in Germany.
- understand the core elements of owner strategy and corporate strategy and why both strategies are linked in family businesses.
- gain an overview of the complex challenges facing German SMEs and the entrepreneurial barriers and success factors that significantly determine competitiveness and innovative ability.
- have understood what role leadership skills play in this, what key skills there are, how they are measured and how they are used in business practice.
- have internalized which competencies constitute so-called "pioneering leadership" and can assess these in themselves as well as medium-sized companies - as attractive future employers - with regard to innovative ability and competitiveness.
- consolidate what they have learned using current examples and case studies from business practice in German SMEs as well as management consulting and HR consulting practice.

V	**ABBA Summer School Seminar: Biosignal-Adaptive GenAI Systems** 2500056, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
Background: In the ABBA Summer School Seminar hosted at the Karlsruhe Decision & Design Lab (KD²Lab) at KIT, we aim to enable students to explore biosignal sensors for designing user-adaptive systems. This comprehensive three-day program is designed for both bachelor's and master's students who want to gain an understanding of biosignal and the development of user-adaptive systems. The learning objective is to design human-centered biosignal-adaptive systems to address user needs in learning scenarios.

Course Content: Throughout the summer school, students will learn the foundations of biosignal-adaptive systems through a series of lectures and apply the knowledge in practical group work. For the group work, we offer students two contexts for their research topics: literature research during thesis writing and programming with LLM. Aiming to address user challenges in these two contexts, we provide two biosignal sensors: EEG or eye-tracking sensors. By collecting biosignal data with the sensors, we encourage students to integrate cutting-edge AI algorithms for their design and implementation. In the end, students should present their results to showcase the functionality, innovation, and a prototype of their biosignal-adaptive systems.

Learning Outcome: By successfully achieving the learning objective, students will receive a certificate from KIT and will have the opportunity to apply their acquired skills and knowledge for further research.

The seminar will be held in a three-day format from 23th to 25th September with 3 ECTS. For any questions, please ask Luke (shi.liu@kit.edu) for more information!

V	**Human-Centered Systems Seminar: Engineering** 2500125, SS 2025, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

Formerly known as "Current Topics in Digital Transformation"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the human-centered systems lab (Prof. Mädche). Students will work on a dedicated topic in the context of human-centered systems and apply a pre-defined research method. A broad spectrum of topics is offered every semester, topics may range from creating an experimental design, analyzing collected data, or systematically comparing existing software prototypes in a specific field of interest.

V **Master Seminar: Trustworthy AI**
2540469, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Artificial Intelligence is shaping critical areas of society, but ensuring fairness, transparency, and trust remains a challenge. Our master seminar, "Trustworthy AI," explores key issues such as bias detection, intersectional fairness, and explainability in AI systems. We address bias in AI-driven decision-making, particularly in critical areas like credit scoring, which is classified as a high-risk application context by the AI Act, and examine methods to enhance fairness. A crucial focus is on developing transparent AI models and understanding how explanations influence trust in automated systems. Additionally, we analyze large language models, their limitations, and innovative retrieval methods such as GraphRAG, which enhance knowledge representation in AI.

This seminar is offered by the newly established Information Systems III research group headed by Prof. Dr. Jella Pfeiffer at the Institute for Information Systems (WIN). To learn more about us, please visit our website (WIN - Information Systems III).

V **Data Science for Industrial Applications**
2540493, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Learning Objectives

This seminar will require you to screen, select, and apply information systems theories and methodologies to solve contemporary challenges in the manufacturing and adjacent industries. This will include both critical reviews of the literature state-of-the-art [1-2] as well as the systematic conduct of design science research and machine learning methods [3-4]. You will identify key problems in real-world use cases, derive relevant research questions, and systematically gather, choose, and apply academic knowledge to develop solutions in the form of proof-of-concepts or prototypes.

Course Credits

The seminar can be credited as Seminar Betriebswirtschaftslehre A [T-WIWI-103474], Seminar Betriebswirtschaftslehre B [T-WIWI-103476] or Seminar Wirtschaftsinformatik [T-WIWI-109827] (3 ECTS). Other courses may be credited upon request.

Seminar Description

The Internet of Things (IoT) is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, connectivity/internet access, and the economic application of sensors [5], physical products are providing vast amounts of data, enabling the development of smart services [6]. While such IoT use cases are projected to open a market potential valued at $3.3 billion in 2030 [7], the industry is still far from exploiting its full capabilities. To solve this challenge, cutting-edge academic knowledge in information systems and machine learning is key to generating valuable insights from machine data.

The seminar is held in cooperation with international industry partners, who provide real-world datasets and ongoing access to subject matter experts. Students will work in teams of 2-4 on different topics and datasets. The assignments will be handed out in a joint kick-off event – to be scheduled once participating students have been selected. Attendance at this kick-off event is mandatory and a prerequisite for participation. Students are required to submit a seminar paper of 12-15 pages on an individual basis.

Expertise in Python and Data Science / Machine Learning as well as successful participation in the course “Artificial Intelligence in Service Systems” (T-WIWI-108715) are strongly recommended.

Contact

Daniel Hendricks – daniel.hendriks@kit.edu

Philipp Spitzer - philipp.spitzer@kit.edu

Joshua Holstein – joshua.holstein@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.

[1] Webster, J., Watson, R. T. (2002). Analyzing the Past to Prepare for the Future: Writing a Literature Review. MIS Quarterly, 26 (2) xiii-xxiii.

[2] Brocke, J. v. et al. (2009), Reconstructing the Giant: On the Importance of Rigour in Documenting the Literature Search Process. *Proceedings of the European Conference on Information Systems*, paper 161.

[3] Wirth, R., Hipp, J. (2000). CRISP-DM: Towards a Standard Process Model for Data Mining. Proceedings of the 4th International Conference on the Practical Applications of Knowledge Discovery and Data Mining, 29-40.

[4] Peffers, K., Tuunanen, T., Rothenberger, M., Chatterjee, S. (2008). A Design Science Research Methodology for Information Systems Research. Journal of Management Information Systems, 24 (3) 45–78.

[5] Martin, D.; Kühl, N.; Satzger, G. (2021). Virtual Sensors. Business & Information Systems Engineering, 63 (3) 315-323.

[6] Hunke, F., Heinz, D. Satzger, G. (2022). Creating customer value from data: foundations and archetypes of analytics-based services. Electronic Markets, 32, 503–521.

[7] Chui, M., Collins, M., Patel, M. (2021). IoT value set to accelerate through 2030: Where and how to capture it. McKinsey & Company. URL: https://www.mckinsey.com/capabilities/mckinsey-digital/our-insights/iot-value-set-to-accelerate-through-2030-where-and-how-to-capture-it

V **Master Seminar in Data Science and Machine Learning** — **Seminar (S)**

2540510, SS 2025, 2 SWS, Language: German/English, Open in study portal

V **User-Adaptive Systems Seminar** — **Seminar (S)** **Blended (On-Site/Online)**

2540553, SS 2025, 2 SWS, Language: English, Open in study portal

Content

User-adaptive systems collect and analyze biosignals from users to recognize user states as a basis for adaptation. Thermic, mechanical, electric, acoustic, and optical signals are collected using sensors which are integrated in wearables, e.g. glasses, earphones, belts, or bracelets. The collected data is processed with analytics and machine learning techniques in order to determine short-term, evolving over time, and long-term user states in the form of user characteristics, affective-cognitive states, or behavior. Finally, the recognized user states are leveraged for realizing user-centric adaptations.

In this seminar, interdisciplinary teams of students design, develop, and evaluate a user-adaptive system prototype leveraging state-of-the-art hard- and software. This seminar follows an interdisciplinary approach. Students from the fields of computer science, information systems and industrial engineering & management collaborate in the prototype design, development, and evaluation.

The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (h-lab, Prof. Mädche). It is offered as part of the DFG-funded graduate school "KD2School: Designing Adaptive Systems for Economic Decisions" (https://kd2school.info/)

Learning objectives of the seminar

- Explain what a user-adaptive system is and how it can be conceptualized
- Suggest and evaluate different design solutions for addressing the identified problem
- Build a user-adaptive system prototype using state-of-the-art hard- and software
- Perform a user-centric evaluation of the user-adaptive system prototype

Prerequisites

Strong analytical abilities and profound software development skills are required.

Organizational issues

Termine werden bekannt gegeben

Literature

Required literature will be made available in the seminar.

V	**Human-Centered Systems Seminar: Research** 2540557, SS 2025, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

Formerly known as "Information Systems and Service Design Seminar"

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group IS I (Prof. Mädche). The research group “Information Systems I” (IS I) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V **Entrepreneurship Research**

2545002, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Content

In this course, the students choose from various relevant and current research topics in entrepreneurship and independently develop a topic that suits them in small teams. Initially, there is an introduction to standard methods such as systematic literature review, design science, qualitative and quantitative data analysis, and more. The seminar topic must be scientifically prepared and presented in 15-20 pages as part of a written elaboration. The seminar results are presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives

The foundations of independent scholarly work (literature review, argumentation + discussion, citation of literature sources, application of qualitative, quantitative, and simulation methods) are developed as part of the written elaboration. The competencies acquired in the seminar can be utilized in preparing for a potential master's thesis. Therefore, the seminar is mainly aimed at students who intend to write their thesis at the Chair of Entrepreneurship and Technology Management and wish to gain substantial experience in entrepreneurship research.

Organizational issues

Thursday, 08.05.2025, 10.00-16.00

Thursday, 05.06.2025, 10.00-16.00

Thursday, 10.07.2025, 09.00-12.00

Registration is via the Wiwi-Portal.

Literature

Will be announced in the seminar.

V Hospital Management

2550493, SS 2025, 2 SWS, Language: German, Open in study portal

Block (B)
Online

Content

The "Hospital Management" seminar is intended to help students in higher semesters to simulate some of the organizational and management tasks that arise in a medium-sized service company using a specific example (here: management of a medium-sized hospital). The seminar thus represents a kind of "bracket" for a large number of individual skills that the students have acquired during their studies. The seminar takes place as a webinar.

Students will be asked about the typical interaction of a medium-sized hospital with its environment in 5 thematic blocks: Interaction with the customer (patients) / Interaction with employees* / Interaction with business partners / Interaction with stakeholders / Summarizing opportunities and risks.

Organizational issues

Das Seminar wird als Blockveranstaltung stattfinden. Die Termine werden bei der Bewerbung über das Wiwi-Portal bekanntgegeben.

V Seminar Human Resource Management (Master)

2573012, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V Seminar Human Resources and Organizations (Master)

2573013, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V	**Seminar Management Accounting - Sustainability Topics** 2579919, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade is made up of the grade of the seminar paper, the presentation and the contributions in the seminar sessions.

Required prior Courses:

- The course requires a basic knowledge of finance and accounting.

Note:

- Maximum of 8 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.

T 5.403 Course: Seminar in Economic Policy [T-WIWI-102789]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-107011 - Economics of Innovation and Growth

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Exams			
WT 24/25	7900212	Seminar in Economic Policy	Ott
ST 2025	7900051	Seminar in Economic Policy	Ott

Competence Certificate
The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO).

The final grade is composed of the weighted scored examinations (Essay 50%, 40% oral presentation, active participation 10%).

Prerequisites
None

Recommendation
At least one of the lectures "Theory of Endogenous Growth" or "Innovation Theory and Policy" should be attended in advance, if possible.

T 5.404 Course: Seminar in Economics A (Master) [T-WIWI-103478]

Responsible: Professorenschaft des Fachbereichs Volkswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	25000111	Statistics and Epidemics		Seminar /	Bracher
WT 24/25	2500024	Wirtschaftstheoretisches Seminar IV (Master)	2 SWS	Seminar /	Puppe, Kretz, Ammann, Okulicz
WT 24/25	2500047	Advanced Topics in Econometrics, Statistics and Data Science	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Bracher, Sobolová
WT 24/25	2520405	Topics in Experimental Economics		Seminar /	Reiß, Peters
WT 24/25	2520500	Workshop on Economics, Finance and Statistics	2 SWS	Seminar	Puppe, Brumm, Nieken, Ott, Reiß, Ruckes, Schienle, Uhrig-Homburg, Wigger, Krüger
WT 24/25	2520563	Wirtschaftstheoretisches Seminar III (Master)	2 SWS	Seminar /	Ammann, Kretz
WT 24/25	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Rüter
WT 24/25	2560130	Seminar Public Finance	2 SWS	Seminar /	Wigger, Schmelzer
WT 24/25	2560142	Seminar Game Theory and Behavioral Economics (Master)	2 SWS	Seminar /	Rau, Rosar
WT 24/25	2560143	AI and Digitization for Society (Master)	2 SWS	Seminar /	Zhao
WT 24/25	2560282	Seminar in Economic Policy	2 SWS	Seminar /	Ott, Assistenten
WT 24/25	2560400	Seminar in Macroeconomics I	2 SWS	Seminar /	Brumm, Pegorari, Frank
WT 24/25	2561208	Selected aspects of European transport planning and -modelling	2 SWS	Seminar	Szimba, Mitusch
ST 2025	2500040	Seminar zur Bahnökonomie und -politik	2 SWS	Seminar /	Krenn, Mitusch
ST 2025	2520367	Strategische Entscheidungen	2 SWS	Seminar /	Ehrhart
ST 2025	2520536	Seminar in Economic Theory II	2 SWS	Seminar /	Ammann, Kretz, Okulicz
ST 2025	2520563	Wirtschaftstheoretisches Seminar III	2 SWS	Seminar /	Ammann, Kretz, Okulicz
ST 2025	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Buse, Rüter, Bracher, Eberl
ST 2025	2560130	Seminar Public Finance	2 SWS	Block /	Wigger, Schmelzer
ST 2025	2560282	Seminar in economic policy	2 SWS	Seminar /	Ott, Assistenten
ST 2025	2560400	Seminar in Macroeconomics I	2 SWS	Seminar /	Brumm, Kissling, Frank
ST 2025	2560552	Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy (Master)	2 SWS	Seminar /	Rosar
ST 2025	2560554	Seminar Lying and Cheating in Economic Decision Situations (Master)	2 SWS	Seminar /	Rau
Exams					

WT 24/25	79000111	Statistics and Epidemics	Bracher
WT 24/25	7900021	Seminar: How to Make Democracy Work? Voting Methods in Theory and Practice (Master)	Puppe
WT 24/25	7900090	Advanced Topics in Econometrics, Statistics and Data Science	Schienle
WT 24/25	7900139	Selected Aspects of European Transport Planning and Modelling	Mitusch
WT 24/25	7900140	Seminar Game Theory and Behavioral Economics (Master)	Puppe
WT 24/25	7900212	Seminar in Economic Policy	Ott
WT 24/25	7900296	Seminar AI and Digitization for Society (Master)	Puppe
WT 24/25	79100005	Topics in Experimental Economics	Reiß
WT 24/25	79sefi2	Seminar Public Finance A (Master)	Wigger
ST 2025	7900051	Seminar in Economic Policy	Ott
ST 2025	7900164	Seminar in Economics (Bachelor)	Mitusch

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Statistics and Epidemics** — **Seminar (S) On-Site**
25000111, WS 24/25, SWS, Language: English, Open in study portal

Content

Motivation

Infectious disease epidemiology gives rise to a large variety of real-time data streams. During the COVID-19 pandemic, the interpretation and statistical analysis of these data has proven crucial, but also highly challenging. In this seminar, students will get to know central concepts of infectious disease surveillance and modelling from a statistical perspective. Following an overview of various aspects in the form of blocked lectures, students will choose a more specific topic for their seminar thesis.

Learning Goals

Students develop an understanding of central modeling tasks and methods, including

- estimation of reproductive numbers
- compartment models of disease spread
- nowcasting and short-term forecasting of disease spread
- detection of outbreaks
- diagnostic testing

Moreover, they get to know various data types commonly used in the analysis of disease spread.

Logistics

The project seminar is worth 4.5 credit points (Leistungspunkte). There will be three blocked lectures (approx. 135 minutes each) in the beginning of the lecture period. For the various topics covered, subjects for seminar theses will be proposed (and students are allowed to propose their own topics). Towards the end of the semester, students present their progress on the chosen topics to the group. Grades will be based on this presentation (25%) and the final report (75%).

Organizational issues

Prerequisites

Students should have a very good working knowledge of statistics, including proficiency in a programming language for applied data analysis. The lecture VWL3 Introduction to Econometrics is a prerequisite for the project seminar. Most available software in the field is in R, but in principle Python can be used as well. Advanced knowledge of biology, medicine or epidemiology is not required.

Application Procedure

Please submit a transcript of records as well as a short letter of motivation (roughly 200 words) via WIWI-Portal: https://portal.wiwi.kit.edu/ys/8223

Application time frame: July 20th, 2024 to September, 30th, 2024.

V	**Advanced Topics in Econometrics, Statistics and Data Science** 2500047, WS 24/25, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

V	**Topics in Experimental Economics** 2520405, WS 24/25, SWS, Language: German/English, Open in study portal	**Seminar (S)** **On-Site**

Organizational issues

Blockseminar; Blücherstraße 17; Termine werden separat bekannt gegeben

Literature

Als Pflichtliteratur dienen ausgewählte Paper.

V	**Topics in Econometrics** 2521310, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Organizational issues
Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

V	**Seminar Game Theory and Behavioral Economics (Master)** 2560142, WS 24/25, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Application is possible via https://portal.wiwi.kit.edu/Seminare

Kick-off: 23.10.24, 14.00 - 15.30 h, Bdg. 01.85, KD2Lab (1. floor über Außentreppe), Team Room

Presentations: 13.01.2025, 14.00 - 18.00 h, Bdg. 01.85, KD2Lab (1. floor über Außentreppe), Team Room

V	**AI and Digitization for Society (Master)** 2560143, WS 24/25, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Application is possible via https://portal.wiwi.kit.edu/Seminare

Kick-off: 23.10.2024, 11.00 - 12.00 (online)

Presentations: 17.01.2025, 14.00 - 18.00 h, Geb. 01.85, KD2Lab Team room

V	**Advanced Topics in Econometrics** 2521310, SS 2025, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

V	**Seminar Public Finance** 2560130, SS 2025, 2 SWS, Language: German, Open in study portal	**Block (B)** **Blended (On-Site/Online)**

Content
See German version.

Organizational issues
Termine werden bekannt gegeben.

Literature
Literatur wird zu Beginn des jeweiligen Seminars vorgestellt.

V	**Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy (Master)** 2560552, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content

6 Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy

This seminar offers an alternative perspective on game theory that is more applied, complementing the more mathematical approach taught in standard university courses (e.g., “Einführung in die Spieltheorie”).

Traditional game theory focuses on abstract mathematical models. The insights from these models are useful in real-life situations, particularly in business contexts. However, strategic interactions in such contexts are often complex, and it is not always obvious what *the ‘right game’* looks like. Moreover, effectively communicating game-theoretical principles to colleagues, subordinates, and stakeholders is just as important as the analysis itself.

In their 1996 book “Co-opetition”, Nalebuff and Brandenburger address these issues by explaining game-theoretic principles using real-world business examples rather than mathematical models. The authors argue rigorously but ‘*hide*’ the underlying mathematical models. While many of the book’s stories now seem outdated, the lessons remain valuable for anyone interested in *applying* game theory.

6.1 Seminar Objectives

In this seminar, students will either work alone or in small groups. Each group will be assigned one chapter of the book and will address three key tasks:

1. **Presentation of Ideas**: Each group will demonstrate their understanding of the assigned chapter by clearly communicating its key insights in their own words.
2. **Application to Modern Contexts**: Each group will transfer the chapter’s ideas to examples from today's digital economy, such as platform markets, AI-driven business models, digital advertising strategies, and data-driven competition.
3. **Linking to Game Theory**: Each group will demonstrate their ability to engage with academic literature by identifying literature related to their book chapter and discussing these connections.

6.2 Seminar Organization

Introductory Meeting: The seminar will start with a kick-off meeting on April 24, 2024, at 14:00. In this meeting, students will be assigned to groups and chapters of the book and receive further guidance on expectations. The meeting will last approximately one hour.

Presentations: Each group will give a 30-minute presentation, followed by a discussion, in a blocked event on June 27. Attendance at all presentations is mandatory for successful completion of the seminar.

Seminar paper: Each group must submit a 12-page seminar paper by August 3. The seminar paper is a polished version of the presentation, incorporating useful feedback from the discussion on the seminar presentation day.

For further questions, don't hesitate to get in touch with **Dr. Frank Rosar** (rosar@kit.edu).

6.3 References

Nalebuff, Barry J., Brandenburger, A. (1996). Co-opetition. Currency.

Organizational issues

Registration via WiWi-Portal

Kick-off Meeting: 24.04.2025

Seminar Presentations: 27.06.2025

V **Seminar Lying and Cheating in Economic Decision Situations (Master)** — **Seminar (S) On-Site**

2560554, SS 2025, 2 SWS, Language: English, Open in study portal

Content

Objective of the seminar: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 12–15 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (60%). There may be a bonus on the grade for actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Obligatory: Application via WiWi-Portal during the seminar registration period

Introduction: 23.04.2025, 14.45 - 15.30, KD2Lab Teamraum

Presentations: 02.07.2025, KD2Lab Teamraum

Seminar Topics in Political Economy

T 6.405 Course: Seminar in Economics B (Master) [T-WIWI-103477]

Responsible: Professorenschaft des Fachbereichs Volkswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	25000111	Statistics and Epidemics		Seminar /	Bracher
WT 24/25	2500024	Wirtschaftstheoretisches Seminar IV (Master)	2 SWS	Seminar /	Puppe, Kretz, Ammann, Okulicz
WT 24/25	2500047	Advanced Topics in Econometrics, Statistics and Data Science	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Bracher, Sobolová
WT 24/25	2520405	Topics in Experimental Economics		Seminar /	Reiß, Peters
WT 24/25	2520500	Workshop on Economics, Finance and Statistics	2 SWS	Seminar	Puppe, Brumm, Nieken, Ott, Reiß, Ruckes, Schienle, Uhrig-Homburg, Wigger, Krüger
WT 24/25	2520563	Wirtschaftstheoretisches Seminar III (Master)	2 SWS	Seminar /	Ammann, Kretz
WT 24/25	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Rüter
WT 24/25	2560130	Seminar Public Finance	2 SWS	Seminar /	Wigger, Schmelzer
WT 24/25	2560142	Seminar Game Theory and Behavioral Economics (Master)	2 SWS	Seminar /	Rau, Rosar
WT 24/25	2560282	Seminar in Economic Policy	2 SWS	Seminar /	Ott, Assistenten
WT 24/25	2560400	Seminar in Macroeconomics I	2 SWS	Seminar /	Brumm, Pegorari, Frank
WT 24/25	2561208	Selected aspects of European transport planning and -modelling	2 SWS	Seminar	Szimba, Mitusch
ST 2025	2500040	Seminar zur Bahnökonomie und -politik	2 SWS	Seminar /	Krenn, Mitusch
ST 2025	2520367	Strategische Entscheidungen	2 SWS	Seminar /	Ehrhart
ST 2025	2520536	Seminar in Economic Theory II	2 SWS	Seminar /	Ammann, Kretz, Okulicz
ST 2025	2520563	Wirtschaftstheoretisches Seminar III	2 SWS	Seminar /	Ammann, Kretz, Okulicz
ST 2025	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Buse, Rüter, Bracher, Eberl
ST 2025	2560130	Seminar Public Finance	2 SWS	Block /	Wigger, Schmelzer
ST 2025	2560259	Organisation and Management of Development Projects	2 SWS	Seminar /	Sieber
ST 2025	2560282	Seminar in economic policy	2 SWS	Seminar /	Ott, Assistenten
ST 2025	2560400	Seminar in Macroeconomics I	2 SWS	Seminar /	Brumm, Kissling, Frank
ST 2025	2560552	Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy (Master)	2 SWS	Seminar /	Rosar
ST 2025	2560554	Seminar Lying and Cheating in Economic Decision Situations (Master)	2 SWS	Seminar /	Rau
Exams					

WT 24/25	79000111	Statistics and Epidemics	Bracher
WT 24/25	7900090	Advanced Topics in Econometrics, Statistics and Data Science	Schienle
WT 24/25	7900139	Selected Aspects of European Transport Planning and Modelling	Mitusch
WT 24/25	7900140	Seminar Game Theory and Behavioral Economics (Master)	Puppe
WT 24/25	7900212	Seminar in Economic Policy	Ott
WT 24/25	7900296	Seminar AI and Digitization for Society (Master)	Puppe
WT 24/25	79100005	Topics in Experimental Economics	Reiß
WT 24/25	79sefi3	Seminar Public Finance B (Master)	Wigger
ST 2025	7900051	Seminar in Economic Policy	Ott
ST 2025	7900164	Seminar in Economics (Bachelor)	Mitusch

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Statistics and Epidemics**
25000111, WS 24/25, SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Motivation

Infectious disease epidemiology gives rise to a large variety of real-time data streams. During the COVID-19 pandemic, the interpretation and statistical analysis of these data has proven crucial, but also highly challenging. In this seminar, students will get to know central concepts of infectious disease surveillance and modelling from a statistical perspective. Following an overview of various aspects in the form of blocked lectures, students will choose a more specific topic for their seminar thesis.

Learning Goals

Students develop an understanding of central modeling tasks and methods, including

- estimation of reproductive numbers
- compartment models of disease spread
- nowcasting and short-term forecasting of disease spread
- detection of outbreaks
- diagnostic testing

Moreover, they get to know various data types commonly used in the analysis of disease spread.

Logistics

The project seminar is worth 4.5 credit points (Leistungspunkte). There will be three blocked lectures (approx. 135 minutes each) in the beginning of the lecture period. For the various topics covered, subjects for seminar theses will be proposed (and students are allowed to propose their own topics). Towards the end of the semester, students present their progress on the chosen topics to the group. Grades will be based on this presentation (25%) and the final report (75%).

Organizational issues

Prerequisites

Students should have a very good working knowledge of statistics, including proficiency in a programming language for applied data analysis. The lecture VWL3 Introduction to Econometrics is a prerequisite for the project seminar. Most available software in the field is in R, but in principle Python can be used as well. Advanced knowledge of biology, medicine or epidemiology is not required.

Application Procedure

Please submit a transcript of records as well as a short letter of motivation (roughly 200 words) via WIWI-Portal: https://portal.wiwi.kit.edu/ys/8223

Application time frame: July 20th, 2024 to September, 30th, 2024.

V	**Advanced Topics in Econometrics, Statistics and Data Science** 2500047, WS 24/25, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

V	**Topics in Experimental Economics** 2520405, WS 24/25, SWS, Language: German/English, Open in study portal	**Seminar (S)** **On-Site**

Organizational issues

Blockseminar; Blücherstraße 17; Termine werden separat bekannt gegeben

Literature

Als Pflichtliteratur dienen ausgewählte Paper.

V	**Topics in Econometrics** 2521310, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Organizational issues
Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

V	**Seminar Game Theory and Behavioral Economics (Master)** 2560142, WS 24/25, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Application is possible via https://portal.wiwi.kit.edu/Seminare

Kick-off: 23.10.24, 14.00 - 15.30 h, Bdg. 01.85, KD2Lab (1. floor über Außentreppe), Team Room

Presentations: 13.01.2025, 14.00 - 18.00 h, Bdg. 01.85, KD2Lab (1. floor über Außentreppe), Team Room

V	**Advanced Topics in Econometrics** 2521310, SS 2025, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

V	**Seminar Public Finance** 2560130, SS 2025, 2 SWS, Language: German, Open in study portal	**Block (B)** **Blended (On-Site/Online)**

Content
See German version.

Organizational issues
Termine werden bekannt gegeben.

Literature
Literatur wird zu Beginn des jeweiligen Seminars vorgestellt.

V	**Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy (Master)** 2560552, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content

7 Seminar Co-opetition: A Practical Perspective on Game Theory in the Digital Economy

This seminar offers an alternative perspective on game theory that is more applied, complementing the more mathematical approach taught in standard university courses (e.g., "Einführung in die Spieltheorie").

Traditional game theory focuses on abstract mathematical models. The insights from these models are useful in real-life situations, particularly in business contexts. However, strategic interactions in such contexts are often complex, and it is not always obvious what *the 'right game'* looks like. Moreover, effectively communicating game-theoretical principles to colleagues, subordinates, and stakeholders is just as important as the analysis itself.

In their 1996 book "Co-opetition", Nalebuff and Brandenburger address these issues by explaining game-theoretic principles using real-world business examples rather than mathematical models. The authors argue rigorously but '*hide*' the underlying mathematical models. While many of the book's stories now seem outdated, the lessons remain valuable for anyone interested in *applying* game theory.

7.1 Seminar Objectives

In this seminar, students will either work alone or in small groups. Each group will be assigned one chapter of the book and will address three key tasks:

1. **Presentation of Ideas**: Each group will demonstrate their understanding of the assigned chapter by clearly communicating its key insights in their own words.
2. **Application to Modern Contexts**: Each group will transfer the chapter's ideas to examples from today's digital economy, such as platform markets, AI-driven business models, digital advertising strategies, and data-driven competition.
3. **Linking to Game Theory**: Each group will demonstrate their ability to engage with academic literature by identifying literature related to their book chapter and discussing these connections.

7.2 Seminar Organization

Introductory Meeting: The seminar will start with a kick-off meeting on April 24, 2024, at 14:00. In this meeting, students will be assigned to groups and chapters of the book and receive further guidance on expectations. The meeting will last approximately one hour.

Presentations: Each group will give a 30-minute presentation, followed by a discussion, in a blocked event on June 27. Attendance at all presentations is mandatory for successful completion of the seminar.

Seminar paper: Each group must submit a 12-page seminar paper by August 3. The seminar paper is a polished version of the presentation, incorporating useful feedback from the discussion on the seminar presentation day.

For further questions, don't hesitate to get in touch with **Dr. Frank Rosar** (rosar@kit.edu).

7.3 References

Nalebuff, Barry J., Brandenburger, A. (1996). Co-opetition. Currency.

Organizational issues
Registration via WiWi-Portal

Kick-off Meeting: 24.04.2025

Seminar Presentations: 27.06.2025

V **Seminar Lying and Cheating in Economic Decision Situations (Master)** — Seminar (S) On-Site
2560554, SS 2025, 2 SWS, Language: English, Open in study portal

Content

Objective of the seminar: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 12–15 pages are to be handed in.

Students' grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (60%). There may be a bonus on the grade for actively participating in the discussions of the presentations.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues

Obligatory: Application via WiWi-Portal during the seminar registration period

Introduction: 23.04.2025, 14.45 - 15.30, KD2Lab Teamraum

Presentations: 02.07.2025, KD2Lab Teamraum

Seminar Topics in Political Economy

T 7.406 Course: Seminar in Engineering Science Master (approval) [T-WIWI-108763]

Responsible: Fachvertreter ingenieurwissenschaftlicher Fakultäten
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	3

Competence Certificate
See German version.

Prerequisites
See module description.

Recommendation
None

T 7.407 Course: Seminar in Informatics A (Master) [T-WIWI-103479]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2400125	Security and Privacy Awareness	2 SWS	Seminar /	Seidel-Saul, Volkamer, Boehm, Aldag, Veit
WT 24/25	2513105	Seminar Advanced Analytics for Road Traffic Noise (Master)	2 SWS	Seminar /	Lazarova-Molnar, Demetgül
WT 24/25	2513107	Seminar Modeling and Simulation for Energy Systems (Master)	2 SWS	Seminar	Lazarova-Molnar, Mostafa
WT 24/25	2513313	Seminar Linked Data and the Semantic Web (Master)	3 SWS	Seminar /	Käfer, Braun
WT 24/25	2513314	Seminar Real-World Challenges in Data Science and Analytics (Bachelor)	3 SWS	/	Hoellig, Käfer, Thoma
WT 24/25	2513315	Seminar Real-World Challenges in Data Science and Analytics (Master)	3 SWS	/	Hoellig, Käfer, Thoma
WT 24/25	2513451	Seminar Cooperative Autonomous Vehicles (Master)	2 SWS	Seminar /	Vinel
WT 24/25	2513457	Seminar Collective Perception in Autonomous Driving (Master)	2 SWS	Seminar /	Vinel
WT 24/25	2513458	Seminar Artificial Intelligence for Autonomous Driving (Master)	2 SWS	Seminar /	Vinel, Zhao
WT 24/25	2513500	Seminar Cognitive Automobiles and Robots (Master)	2 SWS	Seminar /	Zöllner, Daaboul
WT 24/25	2513607	Seminar Knowledge Graphs and Large Language Models (Master)	2 SWS	Seminar /	Sack, Gesese, Norouzi, Vafaie, Tan
ST 2025	2512101	Seminar: From Physical Models to Digital Twins: A Data-Driven Simulation Workshop (Seminar/ Master)	2 SWS	Seminar /	Lazarova-Molnar, Khodadadi, Mostafa
ST 2025	2513103	Seminar: Applications of Digital Twins (Master)	2 SWS	Seminar /	Lazarova-Molnar, Lee
ST 2025	2513108	Seminar: New Trends in Artificial Intelligence Techniques for Noise Prediction (Master)	2 SWS	Seminar /	Demetgül, Lazarova-Molnar
ST 2025	2513109	Seminar: Agent-based Modeling and Simulation (Master)	2 SWS	Seminar	Lazarova-Molnar, Ghasemi
ST 2025	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar /	Oberweis, Forell, Frister, Fritsch, Rybinski, Schreiber, Schüler, Ullrich
ST 2025	2513309	Seminar Knowledge Discovery and Data Mining (Master)	2 SWS	Seminar /	Käfer, Noullet, Popovic, Qu , Shao, Kinder
ST 2025	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar /	Käfer, Thoma, Hoellig
ST 2025	2513455	Seminar Machine Learning in Autonomous Driving (Master)	2 SWS	Seminar /	Zhao , Vinel
ST 2025	2513459	Seminar Vulnerable Road User Technologies (Master)	2 SWS	Seminar /	Schrapel, Vinel

ST 2025	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar / 🗣	Schneider, Zöllner, Daaboul
ST 2025	2513553	Seminar E-Voting (Master)	2 SWS	Seminar / 🗣	Beckert, Müller-Quade, Volkamer, Kirsten, Hilt, Dörre
ST 2025	2513607	Large Language Model-Enhanced Representation Learning for Knowledge Graphs (Master)	2 SWS	Seminar / 🧩	Sack, Gesese, Tan
Exams					
WT 24/25	7900069	Human-Centered Systems Seminar: Engineering			Mädche
WT 24/25	7900102	Advanced Lab Information Service Engineering (Master)			Sack
WT 24/25	7900119	Seminar Cognitive Automobiles and Robots			Zöllner
WT 24/25	7900121	Security and Privacy Awareness			Volkamer
WT 24/25	7900209	Seminar Digital Twins with Lego: Hands-on Workshop in Data-driven Simulation (Master)			Lazarova-Molnar
WT 24/25	7900215	Seminar Knowledge Graphs and Large Language Models (Master)			Käfer
WT 24/25	7900226	Seminar Modeling and Simulation for Energy Systems (Master)			Lazarova-Molnar
WT 24/25	7900233	Human-Centered Systems Seminar: Research			Mädche
WT 24/25	7900236	Seminar Advanced Analytics for Road Traffic Noise (Master)			Lazarova-Molnar
WT 24/25	7900245	Seminar Cooperative Autonomous Vehicles (Master)			Vinel
WT 24/25	7900279	Seminar Collective Perception in Autonomous Driving (Master)			Vinel
WT 24/25	7900304	Seminar Linked Data and the Semantic Web (Master)			Färber
WT 24/25	7900356	Seminar Real-World Challenges in Data Science and Analytics (Master)			Sure-Vetter, Färber
WT 24/25	79AIFB_AIAD_C4	Seminar Artificial Intelligence for Autonomous Driving (Master)			Vinel

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB.

Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Security and Privacy Awareness**
2400125, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Important notes:

- Consider that legal-focused topics require you to speak and understand German legal texts
- The seminar is only for MASTER students (or Mastervorzug)
- The link to enrol is for every student, regardless of the study background

Dates (not final):

- Kick-Off: Tue, 22.10.2024, 11:30 Uhr, Raum 1C-03, Gebäude 5.20
- First version: 05.01.2025
- Final version: 23.02.2025
- Presentation: CW 12

Topics:

The advertised topics can be found in the wiwi portal [https://portal.wiwi.kit.edu/ys/8308]. They will be assigned after the kick-off.

V Seminar Advanced Analytics for Road Traffic Noise (Master)

2513105, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Road traffic noise (RTN) stands as a significant environmental pollutant encountered in daily life, profoundly impacting human health. Extensive research has empirically validated its detrimental effects on well-being, encompassing cardiovascular and mental health implications (Stansfeld et al., 2021; Lan et al., 2020). Moreover, regulatory bodies have proposed guidelines and regulations (WHO, 2018; EU, 2019) to mitigate environmental noise exposure, prompting stakeholders like vehicle manufacturers to integrate measures addressing road traffic noise into their design frameworks.

In this seminar, we diverge from the regulatory perspective on RTN and instead delve into its comprehension through data analytics and other techniques. Specifically, we present a guideline for understanding this societal concern and discuss existing road traffic noise modeling (RTNM) approaches, in particular, their formulation and considerations.

Topics:

1. Introduction to RTN
2. Overview on RTNM
3. Time series analysis
4. Data exploration and visualization
5. Machine learning for RTNM
6. Sound feature extraction and analysis

Literature

- Stansfeld, S., Clark, C., Smuk, M., Gallacher, J., & Babisch, W. (2021). Road traffic noise, noise sensitivity, noise annoyance, psychological and physical health and mortality. Environmental Health, 20, 1-15.
- Lan, Y., Roberts, H., Kwan, M. P., & Helbich, M. (2020). Transportation noise exposure and anxiety: A systematic review and meta-analysis. Environmental research, 191, 110118.
- WHO. (2018) Environmental Noise Guidelines for the European Region.
- EU. (2019) Regulation (EU) No 540/2014 of the European Parliament and of the Council of 16 April 2014 on the Sound Level of Motor Vehicles and of Replacement Silencing Systems, and Amending Directive 2007/46/EC and Repealing Directive 70/157/EEC.

V Seminar Linked Data and the Semantic Web (Master)

2513313, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

V | **Seminar Real-World Challenges in Data Science and Analytics (Bachelor)**
2513314, WS 24/25, 3 SWS, Language: German/English, Open in study portal
On-Site

Content
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

V | **Seminar Real-World Challenges in Data Science and Analytics (Master)**
2513315, WS 24/25, 3 SWS, Language: German/English, Open in study portal
On-Site

Content
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

V | **Seminar Cognitive Automobiles and Robots (Master)**
2513500, WS 24/25, 2 SWS, Language: German/English, Open in study portal
Seminar (S)
Blended (On-Site/Online)

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V **Seminar Knowledge Graphs and Large Language Models (Master)**
2513607, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content

Large language models (LLMs) such as GPT-3 have shown remarkable capabilities in transforming various natural language processing (NLP) tasks across different domains. However, LLMs often generate incorrect answers, known as hallucinations, posing significant challenges to their usability and reliability. Additionally, LLMs operate as black boxes, making it difficult to understand how they arrive at specific conclusions, leading to transparency and explainability issues. Combining LLMs with KGs creates a powerful synergy that significantly enhances the capabilities of artificial intelligence across various tasks. This integration leverages the strengths of both technologies, with LLMs excelling at understanding and generating human-like text, and KGs providing structured, reliable information about entities and their relationships. Together, they offer a robust approach to problem-solving across diverse domains.

This seminar will focus on the intersection of LLMs and KGs, covering areas of interest including, but not limited to:

- KG completion using LLMs
- Question answering with KGs and LLMs
- Explainability of LLMs with KG integration
- Reasoning with LLMs and KGs
- Enhanced prompt engineering using KGs

Contributions of the students:

Each student will be assigned one paper on the topic, which could be a research paper discussing a novel approach or a resource paper presenting datasets, tools, etc. The student will be responsible for the following tasks:

1. **Report Writing**: Read the assigned paper thoroughly and write a 15-page seminar report explaining the methods and findings in their own words.
2. **Presenting**: Prepare and deliver a seminar presentation to share insights from the paper with other seminar participants.
3. **Conducting Experiments**: If the authors provide code, re-implement it for small-scale experiments using Google Colab or make the implementation available via GitHub.

V **Seminar: From Physical Models to Digital Twins: A Data-Driven Simulation Workshop (Seminar/Master)** — **Seminar (S) On-Site**

2512101, SS 2025, 2 SWS, Language: English, Open in study portal

Content

This seminar focuses on the data-driven discovery of simulation models in industrial settings, providing a hands-on approach to understanding and optimizing production processes.
Students will start by designing and constructing production lines using Lego Spike and similar modular systems. This activity will include developing comprehensive data-capturing pipelines to collect detailed event-logging raw data from their production lines.
Next, the seminar will explore advanced techniques for transforming this raw data into simulation models, e.g., Petri nets. Participants will learn and apply data-driven model extraction methods, such as process mining to extract workflow processes; statistical methods to fit probability distributions and analyze trends, and machine learning algorithms to model complex behaviors within the production process. Through these techniques, students will extract simulation models that reflect the real-world dynamics of their production lines. The seminar will then guide participants on how to validate the extracted simulation models to ensure their accuracy.
By the end of the seminar, students will be equipped with the skills to build model production lines, collect event logging data from them, transform event log data into actionable simulation models and use these models to drive efficiency and innovation in industrial production settings.

Grading Scheme:

Report - 50%

Presentations - 40%

Implementation - 10%

V **Seminar: Applications of Digital Twins (Master)**
2513103, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Seminar Name: Applications of Digital Twins

Size: 10 students (with 10 different topics)

Workload:

- 2 Lectures:
  - Introduction to Digital Twins and topic distribution
  - "How to Give Effective Presentations" lecture
- 10 student presentations (each 45 minutes in total)
- 10 student reports

Responsible Person: Hui Min Lee, Sanja Lazarova-Molnar

Deliverables for Grade:

- 1 Report per student and topic (8 pages, including references, IEEE Template, compulsory usage of Reference Manager – Zotero or EndNote)
- 25 mins presentation per student plus 20 min discussion (focus on the presentation topic + presentation skills) = 45 minutes for each student

Credits: 3 credits = 90 hours

Format/ Structure of the Seminar (Draft):

- 2 Lectures at the beginning of the semester
- Students have 1 week time to provide a priority list of 5 topics, distribution will be decided based on first come – first serve, ensuring that core topics are covered
- Q&As can be asked and answered over mails or ad-hoc appointments
- Students have time to work on the report and presentation during the semester
- Submission of all reports will be required 2 months after the intro lecture for ensuring fairness
- Presentations are done in blocks of 2 students per class, starting mid-June, presentations will be submitted at the day of the scheduled presentation

Approximate Time Consumption for Students (Draft):

- Lectures: 3 hours
- Student Presentations: 7.5 hours
- Topic Subscription: 1 hour
- Presentation Preparation: 15 hours
- Paper Writing and Literature Review: 63.5 hours

Description:

The seminar focuses on applications of Digital Twins and data-driven modeling, with an additional goal of improving scientific research and presentation skills for Master students. The seminar covers the diverse applications and use cases of Digital Twins in different domains such as manufacturing, energy systems, healthcare and many more, offering students an in-depth understanding of the role of Digital Twins in transforming the industries.

The seminar is structured as a literature review seminar. Each student can select a topic out of a predefined set, conduct further research and then write a comprehensive research paper. Students will also deliver presentations, synthesizing insights from both the provided starting reference literature and their own additional research.

By the end of the course, students will not only have a solid understanding of the current applications of Digital Twins and emerging trends but also be well-prepared to present their findings in an academic setting.

Topics:

1. Digital Twins for Manufacturing Systems

References:

- Zhang, Chenyuan, et al. "A reconfigurable modeling approach for digital twin-based manufacturing system." *Procedia Cirp* 83 (2019): 118-125. (96 citations)
- Kritzinger, Werner, et al. "Digital Twin in manufacturing: A categorical literature review and classification." *Ifac-PapersOnline* 51.11 (2018): 1016-1022. (1934 citations)
- Jaensch, Florian, et al. "Digital twins of manufacturing systems as a base for machine learning." *2018 25th International conference on mechatronics and machine vision in practice (M2VIP)*. IEEE, 2018. (73 citations)

2. Digital Twins for Energy Systems

References:

- Steindl, Gernot, et al. "Generic digital twin architecture for industrial energy systems." *Applied Sciences* 10.24 (2020): 8903. (78 citations)
- Granacher, Julia, et al. "Overcoming decision paralysis—A digital twin for decision making in energy system design." *Applied Energy* 306 (2022): 117954. (33 citations) -> focus on interactive digital twins
- Palensky, Peter, et al. "Digital twins and their use in future power systems." *Digital Twin* 1 (2022): 4. (37 citations)

3. Digital Twins in Healthcare

References:

- Alazab, Mamoun, et al. "Digital twins for healthcare 4.0-recent advances, architecture, and open challenges." *IEEE Consumer Electronics Magazine* (2022). (26 citations)
- Croatti, Angelo, et al. "On the integration of agents and digital twins in healthcare." *Journal of Medical Systems* 44 (2020): 1-8. (163 citations)
- Erol, Tolga, Arif Furkan Mendi, and Dilara Doğan. "The digital twin revolution in healthcare." *2020 4th international symposium on multidisciplinary studies and innovative technologies (ISMSIT)*. IEEE, 2020. (106 citations)

4. Digital Twins of City Infrastructures (in Smart Cities)

References:

- Deren, Li, Yu Wenbo, and Shao Zhenfeng. "Smart city based on digital twins." *Computational Urban Science* 1 (2021): 1-11. (110 citations)
- Deng, Tianhu, Keren Zhang, and Zuo-Jun Max Shen. "A systematic review of a digital twin city: A new pattern of urban governance toward smart cities." *Journal of Management Science and Engineering* 6.2 (2021): 125-134. (192 citations)
- Mylonas, Georgios, et al. "Digital twins from smart manufacturing to smart cities: A survey." *Ieee Access* 9 (2021): 143222-143249. (99 citations)

5. Digital Twins in Logistics

References:

- Moshood, Taofeeq D., et al. "Digital twins driven supply chain visibility within logistics: A new paradigm for future logistics." *Applied System Innovation* 4.2 (2021): 29. (71 citations)
- Agalianos, K., et al. "Discrete event simulation and digital twins: review and challenges for logistics." *Procedia Manufacturing* 51 (2020): 1636-1641. (74 citations)
- Korth, Benjamin, Christian Schwede, and Markus Zajac. "Simulation-ready digital twin for realtime management of logistics systems." *2018 IEEE international conference on big data (big data)*. IEEE, 2018. (64 citations)

6. Cognitive Digital Twins

References:

- Al Faruque, Mohammad Abdullah, et al. "Cognitive digital twin for manufacturing systems." *2021 Design, Automation & Test in Europe Conference & Exhibition (DATE)*. IEEE, 2021. (28 citations)
- Zhang, Nan, Rami Bahsoon, and Georgios Theodoropoulos. "Towards engineering cognitive digital twins with self-awareness." *2020 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*. IEEE, 2020. (22 citations)
- Zheng, Xiaochen, Jinzhi Lu, and Dimitris Kiritsis. "The emergence of cognitive digital twin: vision, challenges and opportunities." *International Journal of Production Research* 60.24 (2022): 7610-7632. (92 citations)

7. Fusing Data and Human Expert Knowledge in Digital Twins

References:

- Kulkarni, Vinay, Souvik Barat, and Tony Clark. "Towards adaptive enterprises using digital twins." *2019 winter simulation conference (WSC)*. IEEE, 2019. (22 citations)
- Vogel-Heuser, Birgit, et al. "Potential for combining semantics and data analysis in the context of digital twins." *Philosophical Transactions of the Royal Society A* 379.2207 (2021): 20200368. (16 citations)

- Todorovski, Ljupčo, and Sašo Džeroski. "Integrating knowledge-driven and data-driven approaches to modeling." *ecological modelling* 194.1-3 (2006): 3-13. (80 citations)

8. Digital Twins for Multi-agent / Complex Systems

References:

- Pretel, Elena, Alejandro Moya, Elena Navarro, Víctor López-Jaquero, and Pascual González. "Analysing the synergies between Multi-agent Systems and Digital Twins: A systematic literature review." *Information and Software Technology* (2024): 107503. (2 citations)
- Mariani, S., Picone, M., Ricci, A. (2022). About Digital Twins, Agents, and Multiagent Systems: A Cross-Fertilisation Journey. In: Melo, F.S., Fang, F. (eds) *Autonomous Agents and Multiagent Systems. Best and Visionary Papers. AAMAS 2022*. Lecture Notes in Computer Science, vol 13441. (11 citations)
- Marah H, Challenger M. Adaptive hybrid reasoning for agent-based digital twins of distributed multi-robot systems. *SIMULATION.* 2024;100(9):931-957. (0 citations – new articles)

9. Digital Twins for Energy Systems

References:

- Kabir, Md Rafiul, Dipal Halder, and Sandip Ray. "Digital Twins for IoT-driven Energy Systems: A Survey." *IEEE Access* (2024). (0 citations – new articles)
- Brosinsky, Christoph, Rainer Krebs, and Dirk Westermann. "Embedded Digital Twins in future energy management systems: paving the way for automated grid control." *at-Automatisierungstechnik* 68, no. 9 (2020): 750-764.(21 citations)
- Song, Zhao, Christoph M. Hackl, Abhinav Anand, Andre Thommessen, Jonas Petzschmann, Omar Kamel, Robert Braunbehrens, Anton Kaifel, Christian Roos, and Stefan Hauptmann. "Digital twins for the future power system: An overview and a future perspective." *Sustainability* 15, no. 6 (2023): 5259. .(32 citations)
- Mostafa, Omar & Lazarova-Molnar, Sanja. (2024). Enhancing Reliability of Energy Systems with Digital Twins: Challenges and Opportunities. (0 citations – new articles)

10. Digital Twins in Transportation and Automotive

References:

- Schwarz, Chris, and Ziran Wang. "The role of digital twins in connected and automated vehicles." *IEEE Intelligent Transportation Systems Magazine* 14, no. 6 (2022): 41-51. (91 citations)
- Bhatti, Ghanishtha, Harshit Mohan, and R. Raja Singh. "Towards the future of smart electric vehicles: Digital twin technology." *Renewable and Sustainable Energy Reviews* 141 (2021): 110801. (422 citations)
- Almeaibed, Sadeq, Saba Al-Rubaye, Antonios Tsourdos, and Nicolas P. Avdelidis. "Digital twin analysis to promote safety and security in autonomous vehicles." *IEEE Communications Standards Magazine* 5, no. 1 (2021): 40-46. (135 citations)

11. Digital Twins for Environment and Sustainability

References:

- Tzachor, Asaf, Soheil Sabri, Catherine E. Richards, Abbas Rajabifard, and Michele Acuto. "Potential and limitations of digital twins to achieve the sustainable development goals." *Nature Sustainability* 5, no. 10 (2022): 822-829. (110 citations)
- Corrado, Casey R., Suzanne M. DeLong, Emily G. Holt, Edward Y. Hua, and Andreas Tolk. "Combining green metrics and digital twins for sustainability planning and governance of smart buildings and cities." *Sustainability* 14, no. 20 (2022): 12988. (36 citations)
- Kim, Byungmo, Jaewon Oh, and Cheonhong Min. "Development of a simulation model for digital twin of an oscillating water column wave power generator structure with ocean environmental effect." *Sensors* 23, no. 23 (2023): 9472. (3 citations)

12. Digital Twins in Agriculture

References:

- Peladarinos, Nikolaos, Dimitrios Piromalis, Vasileios Cheimaras, Efthymios Tserepas, Radu Adrian Munteanu, and Panagiotis Papageorgas. "Enhancing smart agriculture by implementing digital twins: A comprehensive review." *Sensors* 23, no. 16 (2023): 7128. (60 citations)
- Escribà-Gelonch, Marc, Shu Liang, Pieter van Schalkwyk, Ian Fisk, Nguyen Van Duc Long, and Volker Hessel. "Digital Twins in Agriculture: Orchestration and Applications." *Journal of Agricultural and Food Chemistry* 72, no. 19 (2024): 10737-10752. (12 citations)
- Verdouw, Cor, Bedir Tekinerdogan, Adrie Beulens, and Sjaak Wolfert. "Digital twins in smart farming." *Agricultural Systems* 189 (2021): 103046. (494 citations)

V **Seminar: New Trends in Artificial Intelligence Techniques for Noise Prediction (Master)**
2513108, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
Noise, especially in urban areas, is a major environmental issue that impacts quality of life and health, contributing to stress, sleep disturbances, and cardiovascular problems. Traffic noise, primarily from tire-road interactions, has become more prominent as electric vehicles reduce engine noise. Tackling this issue involves both passive methods, like noise barriers, and active solutions such as noise cancellation technologies.

In recent years, artificial intelligence (AI) has emerged as a powerful tool for managing noise. AI-based systems can classify noise sources, create noise maps, and develop control strategies. Advanced AI techniques, including Generative Adversarial Networks (GANs), AutoEncoders, Bi-Long Short-Term Memory (LSTM), and Bi-Gated Recurrent Units (GRUs), Graphical Convolutional Networks (GCN), Physics-informed neural networks, YOLO, Transformer, show great potential for reducing noise. Additionally, many computer vision techniques are used to improve noise conditions. This seminar will explore these AI methods and their role in enhancing conditions safety, minimizing environmental noise, and supporting intelligent transportation systems.

In this seminar, we try to understand Noise through data analysis and other techniques. We discuss current approaches to noise prediction and innovative AI approaches based on data science and machine learning.

Topics:

Introduction to Noise and Tire-Road Noise

Overview on Noise and Tire-Road Noise

Time Series Analysis and Image Analysis

Data Exploration and Visualization

Noise Feature Extraction and Analysis

Machine learning and Deep Learning Approach for Tire-Road Noise

Who are we looking for:

We are looking for students who want to expand their specialist knowledge and practical experience in artificial intelligence, signal processing, computer vision and road-tire noise. Participation provides the opportunity to actively participate in shaping the future of using artificial intelligence, computer vision and signal processing to reduce road-tire and traffic noise.

What we offer:

We provide you with tyre-road noise data. With this data, you can apply many signal processing, computer vision and artificial intelligence algorithms. This is where you can let your creativity run free and implement innovative solutions with our guidance.

Organizational:

- Kickoff meeting **on April 24, 2025**: Introduction to topics, information about data, clarification of organizational questions. In the Kickoff Meeting, Groups come together and each group has a theme.
- Interim presentation **29 May 2025**: Presentation of the current situation and information sharing.
- Final presentation on **July 17, 2025**: Presentation of results and submission of documents

Registration: Please briefly state your motivation for taking this course. Optionally you can attach your Transcript of Records and CV.

Deliverables (per team): 1 Report (min 10 pages, scientific paper format, including references) + Presentations (2) + Implementation Files(codes)

Grading relevant Parts: Written Report, Presentations and Implementation

V **Seminar Knowledge Discovery and Data Mining (Master)**
2513309, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market
- Scientific Publications

Further Information: https://aifb.kit.edu/web/Lehre/Praktikum_Knowledge_Discovery_and_Data_Science

The exact dates and information for registration will be announced at the event page.

Organizational issues
Die Anmeldung erfolgt über das WiWi-Portal https://portal.wiwi.kit.edu/ .

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligenThemen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B.aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning
- McGraw Hill, Cook, D.J. and Holder, L.B. (Editors) Mining Graph Data, ISBN:0-471-73190-0
- Wiley, Manning, C. and Schütze, H.; Foundations of Statistical NLP, MIT Press, 1999.

V **Seminar Data Science & Real-time Big Data Analytics (Master)**
2513311, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Die Anmeldung erfolgt über das WiWi-Portal https://portal.wiwi.kit.edu/ .

V **Cognitive Automobiles and Robots**
2513500, SS 2025, 2 SWS, Language: German/English, Open in study portal
Seminar (S)
On-Site

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Seminar E-Voting (Master)** 2513553, SS 2025, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **On-Site**

Content

What should a voting procedure fulfill? When is a voting procedure secure? Which components need to be examined? Which methods can be used to investigate this?

Cryptographic voting procedures and algorithmic voting (counting) procedures are examined from different perspectives (cryptographic methods, formal correctness, human factors).

This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website (https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Organizational issues

Die Anmeldung für das Seminar ist bis zum t.b.a. über https://portal.wiwi.kit.edu/ys/TODO möglich.

V	**Large Language Model-Enhanced Representation Learning for Knowledge Graphs (Master)** 2513607, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

Effective feature representation is critical for optimizing the performances of machine learning algorithms. Recently, Representation Learning (RL) has advanced significantly, focusing on embedding words and Knowledge Graphs (KGs) into low-dimensional vector spaces. Word embeddings encode words as vectors, capturing context, semantic similarity, and relationships. Similarly, KG representation learning (KGRL) algorithms (a.k.a. KG embedding (KGE) models) are used to represent entities and relations as vectors in a low-dimensional vector space, preserving structure and semantic connections.

KGE models can be unimodal, using a single source of information, or multimodal, integrating multiple sources such as relations between entities, text literals, numeric literals, images, etc. Capturing information from these sources ensures semantically rich representations. Multimodal KGE models either create separate representations for each source in non-unified spaces or a unified representation for KG elements. These embeddings are commonly used for KG completion tasks such as link prediction and entity classification.

Emerging methodologies for KGRL leverage LLMs such as LLaMA, GPT 3.5, and PaLM2. The integration of LLMs with KG KGRL signifies a pivotal advancement in the field of artificial intelligence, enhancing the ability to capture and utilize complex knowledge structures.

In this seminar, we aim to explore state-of-the-art approaches that utilize LLMs for Knowledge Graph representation learning.

Contributions of the students:

Each student will be assigned one paper on the topic, which could be a research paper discussing a novel approach or a resource paper presenting datasets, tools, etc. The student will be responsible for the following tasks:

1. **Report Writing**: Read the assigned paper thoroughly and write a 15-page seminar report explaining the methods and findings in their own words.
2. **Presenting**: Prepare and deliver a seminar presentation to share insights from the paper with other seminar participants.
3. **Conducting Experiments**: If the authors provide code, re-implement it for small-scale experiments using Google Colab or make the implementation available via GitHub.

T 7.408 Course: Seminar in Informatics B (Master) [T-WIWI-103480]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2400125	Security and Privacy Awareness	2 SWS	Seminar /	Seidel-Saul, Volkamer, Boehm, Aldag, Veit
WT 24/25	2513105	Seminar Advanced Analytics for Road Traffic Noise (Master)	2 SWS	Seminar /	Lazarova-Molnar, Demetgül
WT 24/25	2513107	Seminar Modeling and Simulation for Energy Systems (Master)	2 SWS	Seminar	Lazarova-Molnar, Mostafa
WT 24/25	2513313	Seminar Linked Data and the Semantic Web (Master)	3 SWS	Seminar /	Käfer, Braun
WT 24/25	2513314	Seminar Real-World Challenges in Data Science and Analytics (Bachelor)	3 SWS	/	Hoellig, Käfer, Thoma
WT 24/25	2513315	Seminar Real-World Challenges in Data Science and Analytics (Master)	3 SWS	/	Hoellig, Käfer, Thoma
WT 24/25	2513451	Seminar Cooperative Autonomous Vehicles (Master)	2 SWS	Seminar /	Vinel
WT 24/25	2513457	Seminar Collective Perception in Autonomous Driving (Master)	2 SWS	Seminar /	Vinel
WT 24/25	2513458	Seminar Artificial Intelligence for Autonomous Driving (Master)	2 SWS	Seminar /	Vinel, Zhao
WT 24/25	2513500	Seminar Cognitive Automobiles and Robots (Master)	2 SWS	Seminar /	Zöllner, Daaboul
WT 24/25	2513607	Seminar Knowledge Graphs and Large Language Models (Master)	2 SWS	Seminar /	Sack, Gesese, Norouzi, Vafaie, Tan
ST 2025	2512101	Seminar: From Physical Models to Digital Twins: A Data-Driven Simulation Workshop (Seminar/ Master)	2 SWS	Seminar /	Lazarova-Molnar, Khodadadi, Mostafa
ST 2025	2513103	Seminar: Applications of Digital Twins (Master)	2 SWS	Seminar /	Lazarova-Molnar, Lee
ST 2025	2513108	Seminar: New Trends in Artificial Intelligence Techniques for Noise Prediction (Master)	2 SWS	Seminar /	Demetgül, Lazarova-Molnar
ST 2025	2513109	Seminar: Agent-based Modeling and Simulation (Master)	2 SWS	Seminar	Lazarova-Molnar, Ghasemi
ST 2025	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar /	Oberweis, Forell, Frister, Fritsch, Rybinski, Schreiber, Schüler, Ullrich
ST 2025	2513309	Seminar Knowledge Discovery and Data Mining (Master)	2 SWS	Seminar /	Käfer, Noullet, Popovic, Qu , Shao, Kinder
ST 2025	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar /	Käfer, Thoma, Hoellig
ST 2025	2513455	Seminar Machine Learning in Autonomous Driving (Master)	2 SWS	Seminar /	Zhao , Vinel
ST 2025	2513459	Seminar Vulnerable Road User Technologies (Master)	2 SWS	Seminar /	Schrapel, Vinel

ST 2025	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar /	Schneider, Zöllner, Daaboul
ST 2025	2513553	Seminar E-Voting (Master)	2 SWS	Seminar /	Beckert, Müller-Quade, Volkamer, Kirsten, Hilt, Dörre
ST 2025	2513607	Large Language Model-Enhanced Representation Learning for Knowledge Graphs (Master)	2 SWS	Seminar /	Sack, Gesese, Tan
Exams					
WT 24/25	7500175	Seminar: Energy Informatics			Hagenmeyer, Bläsius
WT 24/25	7500220	Seminar Ubiquitous Computing			Beigl
WT 24/25	7900102	Advanced Lab Information Service Engineering (Master)			Sack
WT 24/25	7900119	Seminar Cognitive Automobiles and Robots			Zöllner
WT 24/25	7900121	Security and Privacy Awareness			Volkamer
WT 24/25	7900209	Seminar Digital Twins with Lego: Hands-on Workshop in Data-driven Simulation (Master)			Lazarova-Molnar
WT 24/25	7900215	Seminar Knowledge Graphs and Large Language Models (Master)			Käfer
WT 24/25	7900226	Seminar Modeling and Simulation for Energy Systems (Master)			Lazarova-Molnar
WT 24/25	7900236	Seminar Advanced Analytics for Road Traffic Noise (Master)			Lazarova-Molnar
WT 24/25	7900245	Seminar Cooperative Autonomous Vehicles (Master)			Vinel
WT 24/25	7900279	Seminar Collective Perception in Autonomous Driving (Master)			Vinel
WT 24/25	7900304	Seminar Linked Data and the Semantic Web (Master)			Färber
WT 24/25	7900356	Seminar Real-World Challenges in Data Science and Analytics (Master)			Sure-Vetter, Färber
WT 24/25	79AIFB_AIAD_C4	Seminar Artificial Intelligence for Autonomous Driving (Master)			Vinel

Legend: Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB.

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Security and Privacy Awareness**
2400125, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Important notes:

- Consider that legal-focused topics require you to speak and understand German legal texts
- The seminar is only for MASTER students (or Mastervorzug)
- The link to enrol is for every student, regardless of the study background

Dates (not final):

- Kick-Off: Tue, 22.10.2024, 11:30 Uhr, Raum 1C-03, Gebäude 5.20
- First version: 05.01.2025
- Final version: 23.02.2025
- Presentation: CW 12

Topics:

The advertised topics can be found in the wiwi portal [https://portal.wiwi.kit.edu/ys/8308]. They will be assigned after the kick-off.

V Seminar Advanced Analytics for Road Traffic Noise (Master)

2513105, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Road traffic noise (RTN) stands as a significant environmental pollutant encountered in daily life, profoundly impacting human health. Extensive research has empirically validated its detrimental effects on well-being, encompassing cardiovascular and mental health implications (Stansfeld et al., 2021; Lan et al., 2020). Moreover, regulatory bodies have proposed guidelines and regulations (WHO, 2018; EU, 2019) to mitigate environmental noise exposure, prompting stakeholders like vehicle manufacturers to integrate measures addressing road traffic noise into their design frameworks.

In this seminar, we diverge from the regulatory perspective on RTN and instead delve into its comprehension through data analytics and other techniques. Specifically, we present a guideline for understanding this societal concern and discuss existing road traffic noise modeling (RTNM) approaches, in particular, their formulation and considerations.

Topics:

1. Introduction to RTN
2. Overview on RTNM
3. Time series analysis
4. Data exploration and visualization
5. Machine learning for RTNM
6. Sound feature extraction and analysis

Literature

- Stansfeld, S., Clark, C., Smuk, M., Gallacher, J., & Babisch, W. (2021). Road traffic noise, noise sensitivity, noise annoyance, psychological and physical health and mortality. Environmental Health, 20, 1-15.
- Lan, Y., Roberts, H., Kwan, M. P., & Helbich, M. (2020). Transportation noise exposure and anxiety: A systematic review and meta-analysis. Environmental research, 191, 110118.
- WHO. (2018) Environmental Noise Guidelines for the European Region.
- EU. (2019) Regulation (EU) No 540/2014 of the European Parliament and of the Council of 16 April 2014 on the Sound Level of Motor Vehicles and of Replacement Silencing Systems, and Amending Directive 2007/46/EC and Repealing Directive 70/157/EEC.

V Seminar Linked Data and the Semantic Web (Master)

2513313, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

V **Seminar Real-World Challenges in Data Science and Analytics (Bachelor)**
2513314, WS 24/25, 3 SWS, Language: German/English, Open in study portal
On-Site

Content
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

V **Seminar Real-World Challenges in Data Science and Analytics (Master)**
2513315, WS 24/25, 3 SWS, Language: German/English, Open in study portal
On-Site

Content
In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

The exact dates and information for registration will be announced at the course page.

V **Seminar Cognitive Automobiles and Robots (Master)**
2513500, WS 24/25, 2 SWS, Language: German/English, Open in study portal
Seminar (S)
Blended (On-Site/Online)

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Seminar Knowledge Graphs and Large Language Models (Master)** 2513607, WS 24/25, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

Large language models (LLMs) such as GPT-3 have shown remarkable capabilities in transforming various natural language processing (NLP) tasks across different domains. However, LLMs often generate incorrect answers, known as hallucinations, posing significant challenges to their usability and reliability. Additionally, LLMs operate as black boxes, making it difficult to understand how they arrive at specific conclusions, leading to transparency and explainability issues. Combining LLMs with KGs creates a powerful synergy that significantly enhances the capabilities of artificial intelligence across various tasks. This integration leverages the strengths of both technologies, with LLMs excelling at understanding and generating human-like text, and KGs providing structured, reliable information about entities and their relationships. Together, they offer a robust approach to problem-solving across diverse domains.

This seminar will focus on the intersection of LLMs and KGs, covering areas of interest including, but not limited to:

- KG completion using LLMs
- Question answering with KGs and LLMs
- Explainability of LLMs with KG integration
- Reasoning with LLMs and KGs
- Enhanced prompt engineering using KGs

Contributions of the students:

Each student will be assigned one paper on the topic, which could be a research paper discussing a novel approach or a resource paper presenting datasets, tools, etc. The student will be responsible for the following tasks:

1. **Report Writing**: Read the assigned paper thoroughly and write a 15-page seminar report explaining the methods and findings in their own words.
2. **Presenting**: Prepare and deliver a seminar presentation to share insights from the paper with other seminar participants.
3. **Conducting Experiments**: If the authors provide code, re-implement it for small-scale experiments using Google Colab or make the implementation available via GitHub.

V **Seminar: From Physical Models to Digital Twins: A Data-Driven Simulation Workshop (Seminar/Master)**
Seminar (S)
On-Site
2512101, SS 2025, 2 SWS, Language: English, Open in study portal

Content
This seminar focuses on the data-driven discovery of simulation models in industrial settings, providing a hands-on approach to understanding and optimizing production processes.
Students will start by designing and constructing production lines using Lego Spike and similar modular systems. This activity will include developing comprehensive data-capturing pipelines to collect detailed event-logging raw data from their production lines.
Next, the seminar will explore advanced techniques for transforming this raw data into simulation models, e.g., Petri nets. Participants will learn and apply data-driven model extraction methods, such as process mining to extract workflow processes; statistical methods to fit probability distributions and analyze trends, and machine learning algorithms to model complex behaviors within the production process. Through these techniques, students will extract simulation models that reflect the real-world dynamics of their production lines. The seminar will then guide participants on how to validate the extracted simulation models to ensure their accuracy.
By the end of the seminar, students will be equipped with the skills to build model production lines, collect event logging data from them, transform event log data into actionable simulation models and use these models to drive efficiency and innovation in industrial production settings.

Grading Scheme:

Report - 50%

Presentations - 40%

Implementation - 10%

V **Seminar: Applications of Digital Twins (Master)**
2513103, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

Seminar Name: Applications of Digital Twins

Size: 10 students (with 10 different topics)

Workload:

- 2 Lectures:
  - Introduction to Digital Twins and topic distribution
  - “How to Give Effective Presentations” lecture
- 10 student presentations (each 45 minutes in total)
- 10 student reports

Responsible Person: Hui Min Lee, Sanja Lazarova-Molnar

Deliverables for Grade:

- 1 Report per student and topic (8 pages, including references, IEEE Template, compulsory usage of Reference Manager – Zotero or EndNote)
- 25 mins presentation per student plus 20 min discussion (focus on the presentation topic + presentation skills) = 45 minutes for each student

Credits: 3 credits = 90 hours

Format/ Structure of the Seminar (Draft):

- 2 Lectures at the beginning of the semester
- Students have 1 week time to provide a priority list of 5 topics, distribution will be decided based on first come – first serve, ensuring that core topics are covered
- Q&As can be asked and answered over mails or ad-hoc appointments
- Students have time to work on the report and presentation during the semester
- Submission of all reports will be required 2 months after the intro lecture for ensuring fairness
- Presentations are done in blocks of 2 students per class, starting mid-June, presentations will be submitted at the day of the scheduled presentation

Approximate Time Consumption for Students (Draft):

- Lectures: 3 hours
- Student Presentations: 7.5 hours
- Topic Subscription: 1 hour
- Presentation Preparation: 15 hours
- Paper Writing and Literature Review: 63.5 hours

Description:

The seminar focuses on applications of Digital Twins and data-driven modeling, with an additional goal of improving scientific research and presentation skills for Master students. The seminar covers the diverse applications and use cases of Digital Twins in different domains such as manufacturing, energy systems, healthcare and many more, offering students an in-depth understanding of the role of Digital Twins in transforming the industries.

The seminar is structured as a literature review seminar. Each student can select a topic out of a predefined set, conduct further research and then write a comprehensive research paper. Students will also deliver presentations, synthesizing insights from both the provided starting reference literature and their own additional research.

By the end of the course, students will not only have a solid understanding of the current applications of Digital Twins and emerging trends but also be well-prepared to present their findings in an academic setting.

Topics:

1. Digital Twins for Manufacturing Systems

References:

- Zhang, Chenyuan, et al. "A reconfigurable modeling approach for digital twin-based manufacturing system." *Procedia Cirp* 83 (2019): 118-125. (96 citations)
- Kritzinger, Werner, et al. "Digital Twin in manufacturing: A categorical literature review and classification." *Ifac-PapersOnline* 51.11 (2018): 1016-1022. (1934 citations)
- Jaensch, Florian, et al. "Digital twins of manufacturing systems as a base for machine learning." *2018 25th International conference on mechatronics and machine vision in practice (M2VIP)*. IEEE, 2018. (73 citations)

2. Digital Twins for Energy Systems

References:

- Steindl, Gernot, et al. "Generic digital twin architecture for industrial energy systems." *Applied Sciences* 10.24 (2020): 8903. (78 citations)
- Granacher, Julia, et al. "Overcoming decision paralysis—A digital twin for decision making in energy system design." *Applied Energy* 306 (2022): 117954. (33 citations) -> focus on interactive digital twins
- Palensky, Peter, et al. "Digital twins and their use in future power systems." *Digital Twin* 1 (2022): 4. (37 citations)

3. Digital Twins in Healthcare

References:

- Alazab, Mamoun, et al. "Digital twins for healthcare 4.0-recent advances, architecture, and open challenges." *IEEE Consumer Electronics Magazine* (2022). (26 citations)
- Croatti, Angelo, et al. "On the integration of agents and digital twins in healthcare." *Journal of Medical Systems* 44 (2020): 1-8. (163 citations)
- Erol, Tolga, Arif Furkan Mendi, and Dilara Doğan. "The digital twin revolution in healthcare." *2020 4th international symposium on multidisciplinary studies and innovative technologies (ISMSIT)*. IEEE, 2020. (106 citations)

4. Digital Twins of City Infrastructures (in Smart Cities)

References:

- Deren, Li, Yu Wenbo, and Shao Zhenfeng. "Smart city based on digital twins." *Computational Urban Science* 1 (2021): 1-11. (110 citations)
- Deng, Tianhu, Keren Zhang, and Zuo-Jun Max Shen. "A systematic review of a digital twin city: A new pattern of urban governance toward smart cities." *Journal of Management Science and Engineering* 6.2 (2021): 125-134. (192 citations)
- Mylonas, Georgios, et al. "Digital twins from smart manufacturing to smart cities: A survey." *Ieee Access* 9 (2021): 143222-143249. (99 citations)

5. Digital Twins in Logistics

References:

- Moshood, Taofeeq D., et al. "Digital twins driven supply chain visibility within logistics: A new paradigm for future logistics." *Applied System Innovation* 4.2 (2021): 29. (71 citations)
- Agalianos, K., et al. "Discrete event simulation and digital twins: review and challenges for logistics." *Procedia Manufacturing* 51 (2020): 1636-1641. (74 citations)
- Korth, Benjamin, Christian Schwede, and Markus Zajac. "Simulation-ready digital twin for realtime management of logistics systems." *2018 IEEE international conference on big data (big data)*. IEEE, 2018. (64 citations)

6. Cognitive Digital Twins

References:

- Al Faruque, Mohammad Abdullah, et al. "Cognitive digital twin for manufacturing systems." *2021 Design, Automation & Test in Europe Conference & Exhibition (DATE)*. IEEE, 2021. (28 citations)
- Zhang, Nan, Rami Bahsoon, and Georgios Theodoropoulos. "Towards engineering cognitive digital twins with self-awareness." *2020 IEEE International Conference on Systems, Man, and Cybernetics (SMC)*. IEEE, 2020. (22 citations)
- Zheng, Xiaochen, Jinzhi Lu, and Dimitris Kiritsis. "The emergence of cognitive digital twin: vision, challenges and opportunities." *International Journal of Production Research* 60.24 (2022): 7610-7632. (92 citations)

7. Fusing Data and Human Expert Knowledge in Digital Twins

References:

- Kulkarni, Vinay, Souvik Barat, and Tony Clark. "Towards adaptive enterprises using digital twins." *2019 winter simulation conference (WSC)*. IEEE, 2019. (22 citations)
- Vogel-Heuser, Birgit, et al. "Potential for combining semantics and data analysis in the context of digital twins." *Philosophical Transactions of the Royal Society A* 379.2207 (2021): 20200368. (16 citations)

- Todorovski, Ljupčo, and Sašo Džeroski. "Integrating knowledge-driven and data-driven approaches to modeling." *ecological modelling* 194.1-3 (2006): 3-13. (80 citations)

8. Digital Twins for Multi-agent / Complex Systems

References:

- Pretel, Elena, Alejandro Moya, Elena Navarro, Víctor López-Jaquero, and Pascual González. "Analysing the synergies between Multi-agent Systems and Digital Twins: A systematic literature review." *Information and Software Technology* (2024): 107503. (2 citations)
- Mariani, S., Picone, M., Ricci, A. (2022). About Digital Twins, Agents, and Multiagent Systems: A Cross-Fertilisation Journey. In: Melo, F.S., Fang, F. (eds) *Autonomous Agents and Multiagent Systems. Best and Visionary Papers. AAMAS 2022*. Lecture Notes in Computer Science, vol 13441. (11 citations)
- Marah H, Challenger M. Adaptive hybrid reasoning for agent-based digital twins of distributed multi-robot systems. *SIMULATION.* 2024;100(9):931-957. (0 citations – new articles)

9. Digital Twins for Energy Systems

References:

- Kabir, Md Rafiul, Dipal Halder, and Sandip Ray. "Digital Twins for IoT-driven Energy Systems: A Survey." *IEEE Access* (2024). (0 citations – new articles)
- Brosinsky, Christoph, Rainer Krebs, and Dirk Westermann. "Embedded Digital Twins in future energy management systems: paving the way for automated grid control." *at-Automatisierungstechnik* 68, no. 9 (2020): 750-764.(21 citations)
- Song, Zhao, Christoph M. Hackl, Abhinav Anand, Andre Thommessen, Jonas Petzschmann, Omar Kamel, Robert Braunbehrens, Anton Kaifel, Christian Roos, and Stefan Hauptmann. "Digital twins for the future power system: An overview and a future perspective." *Sustainability* 15, no. 6 (2023): 5259. .(32 citations)
- Mostafa, Omar & Lazarova-Molnar, Sanja. (2024). Enhancing Reliability of Energy Systems with Digital Twins: Challenges and Opportunities. (0 citations – new articles)

10. Digital Twins in Transportation and Automotive

References:

- Schwarz, Chris, and Ziran Wang. "The role of digital twins in connected and automated vehicles." *IEEE Intelligent Transportation Systems Magazine* 14, no. 6 (2022): 41-51. (91 citations)
- Bhatti, Ghanishtha, Harshit Mohan, and R. Raja Singh. "Towards the future of smart electric vehicles: Digital twin technology." *Renewable and Sustainable Energy Reviews* 141 (2021): 110801. (422 citations)
- Almeaibed, Sadeq, Saba Al-Rubaye, Antonios Tsourdos, and Nicolas P. Avdelidis. "Digital twin analysis to promote safety and security in autonomous vehicles." *IEEE Communications Standards Magazine* 5, no. 1 (2021): 40-46. (135 citations)

11. Digital Twins for Environment and Sustainability

References:

- Tzachor, Asaf, Soheil Sabri, Catherine E. Richards, Abbas Rajabifard, and Michele Acuto. "Potential and limitations of digital twins to achieve the sustainable development goals." *Nature Sustainability* 5, no. 10 (2022): 822-829. (110 citations)
- Corrado, Casey R., Suzanne M. DeLong, Emily G. Holt, Edward Y. Hua, and Andreas Tolk. "Combining green metrics and digital twins for sustainability planning and governance of smart buildings and cities." *Sustainability* 14, no. 20 (2022): 12988. (36 citations)
- Kim, Byungmo, Jaewon Oh, and Cheonhong Min. "Development of a simulation model for digital twin of an oscillating water column wave power generator structure with ocean environmental effect." *Sensors* 23, no. 23 (2023): 9472. (3 citations)

12. Digital Twins in Agriculture

References:

- Peladarinos, Nikolaos, Dimitrios Piromalis, Vasileios Cheimaras, Efthymios Tserepas, Radu Adrian Munteanu, and Panagiotis Papageorgas. "Enhancing smart agriculture by implementing digital twins: A comprehensive review." *Sensors* 23, no. 16 (2023): 7128. (60 citations)
- Escribà-Gelonch, Marc, Shu Liang, Pieter van Schalkwyk, Ian Fisk, Nguyen Van Duc Long, and Volker Hessel. "Digital Twins in Agriculture: Orchestration and Applications." *Journal of Agricultural and Food Chemistry* 72, no. 19 (2024): 10737-10752. (12 citations)
- Verdouw, Cor, Bedir Tekinerdogan, Adrie Beulens, and Sjaak Wolfert. "Digital twins in smart farming." *Agricultural Systems* 189 (2021): 103046. (494 citations)

V **Seminar: New Trends in Artificial Intelligence Techniques for Noise Prediction (Master)**
2513108, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
Noise, especially in urban areas, is a major environmental issue that impacts quality of life and health, contributing to stress, sleep disturbances, and cardiovascular problems. Traffic noise, primarily from tire-road interactions, has become more prominent as electric vehicles reduce engine noise. Tackling this issue involves both passive methods, like noise barriers, and active solutions such as noise cancellation technologies.

In recent years, artificial intelligence (AI) has emerged as a powerful tool for managing noise. AI-based systems can classify noise sources, create noise maps, and develop control strategies. Advanced AI techniques, including Generative Adversarial Networks (GANs), AutoEncoders, Bi-Long Short-Term Memory (LSTM), and Bi-Gated Recurrent Units (GRUs), Graphical Convolutional Networks (GCN), Physics-informed neural networks, YOLO, Transformer, show great potential for reducing noise. Additionally, many computer vision techniques are used to improve noise conditions. This seminar will explore these AI methods and their role in enhancing conditions safety, minimizing environmental noise, and supporting intelligent transportation systems.

In this seminar, we try to understand Noise through data analysis and other techniques. We discuss current approaches to noise prediction and innovative AI approaches based on data science and machine learning.

Topics:

Introduction to Noise and Tire-Road Noise

Overview on Noise and Tire-Road Noise

Time Series Analysis and Image Analysis

Data Exploration and Visualization

Noise Feature Extraction and Analysis

Machine learning and Deep Learning Approach for Tire-Road Noise

Who are we looking for:

We are looking for students who want to expand their specialist knowledge and practical experience in artificial intelligence, signal processing, computer vision and road-tire noise. Participation provides the opportunity to actively participate in shaping the future of using artificial intelligence, computer vision and signal processing to reduce road-tire and traffic noise.

What we offer:

We provide you with tyre-road noise data. With this data, you can apply many signal processing, computer vision and artificial intelligence algorithms. This is where you can let your creativity run free and implement innovative solutions with our guidance.

Organizational:

- Kickoff meeting **on April 24, 2025**: Introduction to topics, information about data, clarification of organizational questions. In the Kickoff Meeting, Groups come together and each group has a theme.
- Interim presentation **29 May 2025**: Presentation of the current situation and information sharing.
- Final presentation on **July 17, 2025**: Presentation of results and submission of documents

Registration: Please briefly state your motivation for taking this course. Optionally you can attach your Transcript of Records and CV.

Deliverables (per team): 1 Report (min 10 pages, scientific paper format, including references) + Presentations (2) + Implementation Files(codes)

Grading relevant Parts: Written Report, Presentations and Implementation

V **Seminar Knowledge Discovery and Data Mining (Master)**
2513309, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market
- Scientific Publications

Further Information: https://aifb.kit.edu/web/Lehre/Praktikum_Knowledge_Discovery_and_Data_Science

The exact dates and information for registration will be announced at the event page.

Organizational issues
Die Anmeldung erfolgt über das WiWi-Portal https://portal.wiwi.kit.edu/ .

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligenThemen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B.aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning
- McGraw Hill, Cook, D.J. and Holder, L.B. (Editors) Mining Graph Data, ISBN:0-471-73190-0
- Wiley, Manning, C. and Schütze, H.; Foundations of Statistical NLP, MIT Press, 1999.

V **Seminar Data Science & Real-time Big Data Analytics (Master)**
2513311, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Die Anmeldung erfolgt über das WiWi-Portal https://portal.wiwi.kit.edu/ .

V **Cognitive Automobiles and Robots**
2513500, SS 2025, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V

Seminar E-Voting (Master)

2513553, SS 2025, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
On-Site

Content

What should a voting procedure fulfill? When is a voting procedure secure? Which components need to be examined? Which methods can be used to investigate this?

Cryptographic voting procedures and algorithmic voting (counting) procedures are examined from different perspectives (cryptographic methods, formal correctness, human factors).

This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website (https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Organizational issues

Die Anmeldung für das Seminar ist bis zum t.b.a. über https://portal.wiwi.kit.edu/ys/TODO möglich.

V

Large Language Model-Enhanced Representation Learning for Knowledge Graphs (Master)

2513607, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content

Effective feature representation is critical for optimizing the performances of machine learning algorithms. Recently, Representation Learning (RL) has advanced significantly, focusing on embedding words and Knowledge Graphs (KGs) into low-dimensional vector spaces. Word embeddings encode words as vectors, capturing context, semantic similarity, and relationships. Similarly, KG representation learning (KGRL) algorithms (a.k.a. KG embedding (KGE) models) are used to represent entities and relations as vectors in a low-dimensional vector space, preserving structure and semantic connections.

KGE models can be unimodal, using a single source of information, or multimodal, integrating multiple sources such as relations between entities, text literals, numeric literals, images, etc. Capturing information from these sources ensures semantically rich representations. Multimodal KGE models either create separate representations for each source in non-unified spaces or a unified representation for KG elements. These embeddings are commonly used for KG completion tasks such as link prediction and entity classification.

Emerging methodologies for KGRL leverage LLMs such as LLaMA, GPT 3.5, and PaLM2. The integration of LLMs with KG KGRL signifies a pivotal advancement in the field of artificial intelligence, enhancing the ability to capture and utilize complex knowledge structures.

In this seminar, we aim to explore state-of-the-art approaches that utilize LLMs for Knowledge Graph representation learning.

Contributions of the students:

Each student will be assigned one paper on the topic, which could be a research paper discussing a novel approach or a resource paper presenting datasets, tools, etc. The student will be responsible for the following tasks:

1. **Report Writing**: Read the assigned paper thoroughly and write a 15-page seminar report explaining the methods and findings in their own words.
2. **Presenting**: Prepare and deliver a seminar presentation to share insights from the paper with other seminar participants.
3. **Conducting Experiments**: If the authors provide code, re-implement it for small-scale experiments using Google Colab or make the implementation available via GitHub.

T 7.409 Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2550131	Seminar on Methodical Foundations of Operations Research (B)	2 SWS	Seminar / 🗣	Stein, Beck, Schwarze
WT 24/25	2550132	Seminar zur Mathematischen Optimierung (MA)	2 SWS	Seminar / 🗣	Stein, Beck, Schwarze
WT 24/25	2550462	Seminar on Trending Topics in Optimization and Machine Learning (Master)	2 SWS	Seminar / 🧩	Rebennack, Warwicker, Kandora
WT 24/25	2550473	Seminar on Energy and Power Systems Optimization (Master)	2 SWS	Seminar / 🧩	Rebennack, Warwicker, Kandora
WT 24/25	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / 🧩	Nickel, Mitarbeiter
ST 2025	2500028	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / 🧩	Nickel, Mitarbeiter, Pomes
ST 2025	2550131	Seminar on Methodical Foundations of Operations Research (BA)	2 SWS	Seminar / 🗣	Stein, Beck, Schwarze, Neussel
ST 2025	2550132	Seminar on Mathematical Optimization (MA)	2 SWS	Seminar / 🗣	Stein, Beck, Schwarze, Neussel
ST 2025	2550462	Seminar: Trending Topics in Machine Learning and Optimization (Master)	2 SWS	Seminar / 🧩	Rebennack, Warwicker, Kandora
ST 2025	2550473	Seminar: Energy and Power Systems Optimization (Master)	2 SWS	Seminar / 🧩	Rebennack, Warwicker, Kandora
ST 2025	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / 🧩	Nickel, Mitarbeiter

Exams			
WT 24/25	7900011_WS2425	Seminar in Operations Research B (Bachelor)	Stein
WT 24/25	7900012_WS2425	Seminar in Operations Research A (Master)	Stein
WT 24/25	7900169	Seminar Trending Topics in Optimization and Machine Learning (Master)	Rebennack
WT 24/25	7900314	Seminar on Power Systems Optimization (Master)	Rebennack
WT 24/25	7900342	Seminar Modern OR and Innovative Logistics	Nickel
ST 2025	7900295	Seminar Trending Topics in Machine Learning and Opt. - Operations Research A (Master)	Rebennack
ST 2025	7900349	Seminar on Power Systems Optimization (Master)	Rebennack

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V	**Seminar on Methodical Foundations of Operations Research (B)** 2550131, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor studenst are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientifc reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Literaur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a prepatory meeting.

V	**Seminar: Modern OR and Innovative Logistics** 2550491, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
Anmeldezeitraum: 11.09.24 bis 30.09.24 im Wiwi Portal

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar: Modern OR and Innovative Logistics**
2500028, SS 2025, 2 SWS, Language: German, Open in study portal
Seminar (S)
Blended (On-Site/Online)

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
Anmeldung erfolgt über das Wiwi-Portal. Nähere Informationen hierzu finden Sie hier zu einem späteren Zeitpunkt.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar on Methodical Foundations of Operations Research (BA)**
2550131, SS 2025, 2 SWS, Language: German, Open in study portal
Seminar (S)
On-Site

Content
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor studenst are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientifc reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Literaur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a prepatory meeting.

V

Seminar: Modern OR and Innovative Logistics

2550491, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:

The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:

If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:

The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

7.410 Course: Seminar in Operations Research B (Master) [T-WIWI-103482]

Responsible: Prof. Dr. Stefan Nickel
Prof. Dr. Steffen Rebennack
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2550131	Seminar on Methodical Foundations of Operations Research (B)	2 SWS	Seminar / On-Site	Stein, Beck, Schwarze
WT 24/25	2550132	Seminar zur Mathematischen Optimierung (MA)	2 SWS	Seminar / On-Site	Stein, Beck, Schwarze
WT 24/25	2550462	Seminar on Trending Topics in Optimization and Machine Learning (Master)	2 SWS	Seminar / Blended	Rebennack, Warwicker, Kandora
WT 24/25	2550473	Seminar on Energy and Power Systems Optimization (Master)	2 SWS	Seminar / Blended	Rebennack, Warwicker, Kandora
WT 24/25	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / Blended	Nickel, Mitarbeiter
ST 2025	2500028	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / Blended	Nickel, Mitarbeiter, Pomes
ST 2025	2550131	Seminar on Methodical Foundations of Operations Research (BA)	2 SWS	Seminar / On-Site	Stein, Beck, Schwarze, Neussel
ST 2025	2550132	Seminar on Mathematical Optimization (MA)	2 SWS	Seminar / On-Site	Stein, Beck, Schwarze, Neussel
ST 2025	2550462	Seminar: Trending Topics in Machine Learning and Optimization (Master)	2 SWS	Seminar / Blended	Rebennack, Warwicker, Kandora
ST 2025	2550473	Seminar: Energy and Power Systems Optimization (Master)	2 SWS	Seminar / Blended	Rebennack, Warwicker, Kandora
ST 2025	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / Blended	Nickel, Mitarbeiter
Exams					
WT 24/25	7900011_WS2425	Seminar in Operations Research B (Bachelor)			Stein
WT 24/25	7900012_WS2425	Seminar in Operations Research A (Master)			Stein
WT 24/25	7900314	Seminar on Power Systems Optimization (Master)			Rebennack
WT 24/25	7900342	Seminar Modern OR and Innovative Logistics			Nickel
ST 2025	7900296	Seminar in Operations Research B (Master)			Rebennack

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V	**Seminar on Methodical Foundations of Operations Research (B)** 2550131, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **On-Site**

Content
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor studenst are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientifc reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Literaur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a prepatory meeting.

V	**Seminar: Modern OR and Innovative Logistics** 2550491, WS 24/25, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
Anmeldezeitraum: 11.09.24 bis 30.09.24 im Wiwi Portal

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar: Modern OR and Innovative Logistics**
2500028, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
Anmeldung erfolgt über das Wiwi-Portal. Nähere Informationen hierzu finden Sie hier zu einem späteren Zeitpunkt.

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V **Seminar on Methodical Foundations of Operations Research (BA)**
2550131, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content
The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor studenst are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientifc reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Die Literaur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a prepatory meeting.

V **Seminar: Modern OR and Innovative Logistics**
2550491, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:

The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:

If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:

The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

T 7.411 Course: Seminar in Statistics A (Master) [T-WIWI-103483]

Responsible: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	25000111	Statistics and Epidemics		Seminar / 🗣	Bracher
WT 24/25	2500012		2 SWS	Seminar / 🗣	Grothe, Kaplan, Liu
WT 24/25	2500047	Advanced Topics in Econometrics, Statistics and Data Science	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Bracher, Sobolová
WT 24/25	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Rüter
ST 2025	2500208	Statistics and Large Language Models	2 SWS	Seminar	Krüger, Eberl
ST 2025	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Buse, Rüter, Bracher, Eberl
ST 2025	2550561	Fortgeschrittene Themen zu Statistik, Datenanalyse und maschinellem Lernen (Master)	2 SWS	Seminar / 🗣	Grothe, Liu

Exams			
WT 24/25	79000111	Statistics and Epidemics	Bracher
WT 24/25	7900090	Advanced Topics in Econometrics, Statistics and Data Science	Schienle
WT 24/25	7900144	Topics in Econometrics	Schienle
WT 24/25	7900216	Seminar in Statistics A (Master)	Grothe

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V | **Statistics and Epidemics**
25000111, WS 24/25, SWS, Language: English, Open in study portal | **Seminar (S) On-Site**

Content

Motivation

Infectious disease epidemiology gives rise to a large variety of real-time data streams. During the COVID-19 pandemic, the interpretation and statistical analysis of these data has proven crucial, but also highly challenging. In this seminar, students will get to know central concepts of infectious disease surveillance and modelling from a statistical perspective. Following an overview of various aspects in the form of blocked lectures, students will choose a more specific topic for their seminar thesis.

Learning Goals

Students develop an understanding of central modeling tasks and methods, including

- estimation of reproductive numbers
- compartment models of disease spread
- nowcasting and short-term forecasting of disease spread
- detection of outbreaks
- diagnostic testing

Moreover, they get to know various data types commonly used in the analysis of disease spread.

Logistics

The project seminar is worth 4.5 credit points (Leistungspunkte). There will be three blocked lectures (approx. 135 minutes each) in the beginning of the lecture period. For the various topics covered, subjects for seminar theses will be proposed (and students are allowed to propose their own topics). Towards the end of the semester, students present their progress on the chosen topics to the group. Grades will be based on this presentation (25%) and the final report (75%).

Organizational issues

Prerequisites

Students should have a very good working knowledge of statistics, including proficiency in a programming language for applied data analysis. The lecture VWL3 Introduction to Econometrics is a prerequisite for the project seminar. Most available software in the field is in R, but in principle Python can be used as well. Advanced knowledge of biology, medicine or epidemiology is not required.

Application Procedure

Please submit a transcript of records as well as a short letter of motivation (roughly 200 words) via WIWI-Portal: https://portal.wiwi.kit.edu/ys/8223

Application time frame: July 20th, 2024 to September, 30th, 2024.

V | **Advanced Topics in Econometrics, Statistics and Data Science**
2500047, WS 24/25, 2 SWS, Language: German/English, Open in study portal | **Seminar (S)**

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

V | **Topics in Econometrics**
2521310, WS 24/25, 2 SWS, Language: German, Open in study portal | **Seminar (S)**

Organizational issues

Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

V

Advanced Topics in Econometrics

2521310, SS 2025, 2 SWS, Language: German/English, Open in study portal

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

T 7.412 Course: Seminar in Statistics B (Master) [T-WIWI-103484]

Responsible: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	25000111	Statistics and Epidemics		Seminar / 🗣	Bracher
WT 24/25	2500012		2 SWS	Seminar / 🗣	Grothe, Kaplan, Liu
WT 24/25	2500047	Advanced Topics in Econometrics, Statistics and Data Science	2 SWS	Seminar	Schienle, Krüger, Buse, Rüter, Bracher, Sobolová
WT 24/25	2521310	Topics in Econometrics	2 SWS	Seminar	Schienle, Krüger, Rüter
ST 2025	2500208	Statistics and Large Language Models	2 SWS	Seminar	Krüger, Eberl
ST 2025	2521310	Advanced Topics in Econometrics	2 SWS	Seminar	Schienle, Buse, Rüter, Bracher, Eberl
ST 2025	2550561	Fortgeschrittene Themen zu Statistik, Datenanalyse und maschinellem Lernen (Master)	2 SWS	Seminar / 🗣	Grothe, Liu
Exams					
WT 24/25	79000111	Statistics and Epidemics			Bracher
WT 24/25	7900089	Seminar in Statistics B (Master)			Schienle
WT 24/25	7900090	Advanced Topics in Econometrics, Statistics and Data Science			Schienle
WT 24/25	7900241	Seminar in Statistics B (Master)			Grothe

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

Workload
90 hours

Below you will find excerpts from events related to this course:

V **Statistics and Epidemics**
25000111, WS 24/25, SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content

Motivation

Infectious disease epidemiology gives rise to a large variety of real-time data streams. During the COVID-19 pandemic, the interpretation and statistical analysis of these data has proven crucial, but also highly challenging. In this seminar, students will get to know central concepts of infectious disease surveillance and modelling from a statistical perspective. Following an overview of various aspects in the form of blocked lectures, students will choose a more specific topic for their seminar thesis.

Learning Goals

Students develop an understanding of central modeling tasks and methods, including

- estimation of reproductive numbers
- compartment models of disease spread
- nowcasting and short-term forecasting of disease spread
- detection of outbreaks
- diagnostic testing

Moreover, they get to know various data types commonly used in the analysis of disease spread.

Logistics

The project seminar is worth 4.5 credit points (Leistungspunkte). There will be three blocked lectures (approx. 135 minutes each) in the beginning of the lecture period. For the various topics covered, subjects for seminar theses will be proposed (and students are allowed to propose their own topics). Towards the end of the semester, students present their progress on the chosen topics to the group. Grades will be based on this presentation (25%) and the final report (75%).

Organizational issues

Prerequisites

Students should have a very good working knowledge of statistics, including proficiency in a programming language for applied data analysis. The lecture VWL3 Introduction to Econometrics is a prerequisite for the project seminar. Most available software in the field is in R, but in principle Python can be used as well. Advanced knowledge of biology, medicine or epidemiology is not required.

Application Procedure

Please submit a transcript of records as well as a short letter of motivation (roughly 200 words) via WIWI-Portal: https://portal.wiwi.kit.edu/ys/8223

Application time frame: July 20th, 2024 to September, 30th, 2024.

V **Advanced Topics in Econometrics, Statistics and Data Science**
2500047, WS 24/25, 2 SWS, Language: German/English, Open in study portal
Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

V **Topics in Econometrics**
2521310, WS 24/25, 2 SWS, Language: German, Open in study portal
Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

V

Advanced Topics in Econometrics

2521310, SS 2025, 2 SWS, Language: German/English, Open in study portal

Seminar (S)

Organizational issues

Blockveranstaltung, Termine werden bekannt gegeben

T 7.413 Course: Seminar in Transportation [T-BGU-100014]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Prof. Dr.-Ing. Peter Vortisch

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6232903	Seminar Transport Studies	2 SWS	Seminar / On-Site	Vortisch, Kagerbauer
ST 2025	6232903	Seminar Verkehrswesen	2 SWS	Seminar / Blended	Vortisch, Kagerbauer
Exams					
WT 24/25	8245100014	Seminar in Transportation			Vortisch, Chlond

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
seminar paper, appr. 10 pages, and presentation, appr. 10 min.

Prerequisites
The seminar is subject to approval. The approval must be applied for at the examination secretariat of the Department of Economics and Management. The application for admission is made via the corresponding engineering seminar form on the department's download page.

Recommendation
none

Annotation
none

Workload
90 hours

T 7.414 Course: Seminar on Modeling and Simulation in Transportation [T-BGU-112552]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Prof. Dr.-Ing. Peter Vortisch

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	3	Grade to a third	Each winter term	1 terms	1

Events					
WT 24/25	6232907	Seminar Modeling and Simulation in Transportation	2 SWS	Seminar / 🗣	Vortisch, Kagerbauer, Mitarbeiter/innen
Exams					
WT 24/25	8245112552	Seminar on Modeling and Simulation in Transportation			Vortisch, Kagerbauer

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
work on a practical problem in the area of traffic engineering, traffic simulation or in the area of microscopic travel demand modeling:

final report, appr. 5 pages, and presentation, appr. 10 min.

Prerequisites
The seminar is subject to approval if it is to be credited in the seminar module. The approval must be applied for at the examination secretariat of the Department of Economics and Management. The application for admission is made via the corresponding engineering seminar form on the department's download page.

Recommendation
none

Annotation
none

Workload
90 hours

T 7.415 Course: Seminar Production Technology [T-MACH-109062]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer
Prof. Dr.-Ing. Gisela Lanza
Prof. Dr.-Ing. Volker Schulze

Organisation: KIT Department of Mechanical Engineering

Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2025	2149665	Seminar Production Technology	1 SWS	Seminar /	Fleischer, Lanza, Schulze, Zanger
Exams					
WT 24/25	76-T-MACH-109062	Seminar Production Technology			Fleischer, Lanza, Schulze
ST 2025	76-T-MACH-109062	Seminar Production Technology			Fleischer, Lanza, Schulze, Zanger

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Alternative test achievement (graded):

- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

Prerequisites
none

Annotation
The specific topics are published on the homepage of the wbk Institute of Production Science.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Seminar Production Technology
2149665, SS 2025, 1 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content

In course of the seminar Production Technology current issues of the wbk main fields of research "Manufacturing and Materials Technology", "Machines, Equipment and Process Automation" as well as "Production Systems" are discussed.

The specific topics are published on the homepage of the wbk Institute of Production Science.

Learning Outcomes:

The students …

- are in a position to independently handle current, research-based tasks according to scientific criteria.
- are able to research, analyze, abstract and critically review the information.
- can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Workload:

regular attendance: 10 hours
self-study: 80 hours

Organizational issues

siehe http://www.wbk.kit.edu/seminare.php

T 7.416 Course: Seminar Sensors [T-ETIT-100707]

Responsible: Dr. Wolfgang Menesklou
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101158 - Sensor Technology I

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2304233	Seminar Sensor Technology	2 SWS	Seminar / 🗣	Menesklou
ST 2025	2304233	Seminar Sensorik	2 SWS	Seminar / 🗣	Menesklou
Exams					
WT 24/25	7304233	Seminar Sensors			Menesklou
ST 2025	7304233	Seminar Sensors			Menesklou

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
none

T 7.417 Course: Seminar Sensors – practical part [T-ETIT-113577]

Responsible: Dr. Wolfgang Menesklou
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101158 - Sensor Technology I

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Prerequisites
Only in combination with "T-ETIT-100707 - Seminar Sensor Technology". I.e. "T-ETIT-100707" must have started.

7.418 Course: Seminar: Commercial and Corporate Law in the IT Industry [T-INFO-111405]

Responsible: Dr. Georg Nolte
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2400165	Seminar Commercial and Corporate Law in Information Technology	2 SWS	Seminar / 🖥	Nolte
Exams					
WT 24/25	7500182	Seminar: Legal Studies II			Boehm, Raabe, Sattler
WT 24/25	7500310	Seminar: Commercial and Corporate Law in the IT Industry			Sattler

Legend: 🖥 Online, Blended (On-Site/Online), On-Site, ✕ Cancelled

T 7.419 Course: Seminar: IT- Security Law [T-INFO-111404]

Responsible: Martin Schallbruch
Organisation: KIT Department of Informatics
Part of: M-INFO-106754 - Public Economic and Technology Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2424389	Seminar "IT security law"	2 SWS	Seminar / 🗣	Schallbruch
Exams					
WT 24/25	7500249	Seminar: IT- Security Law			Zufall

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 7.420 Course: Seminar: Legal Studies I [T-INFO-101997]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
WT 24/25	2400060	Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection	2 SWS	Seminar / 🗣	Reussner, Raabe, Werner, Müller-Quade
WT 24/25	2400184	EU Digital Regulatory Framework	2 SWS	Seminar / 🗣	Zufall
WT 24/25	2400203	(Smart) City in and as a Network	2 SWS	Seminar / 🗣	Kasper
WT 24/25	2400209	Rechtliche Herausforderungen für die Europäische Datenökonomie	2 SWS	Seminar / 🗣	Sattler
WT 24/25	2400216	(Generative) KI und Recht	2 SWS	Seminar / 🧩	Boehm, Vettermann
WT 24/25	2513214	Seminar Information security and Data protection (Bachelor)	2 SWS	Seminar / 🗣	Volkamer, Raabe, Schiefer, Hennig, Werner, Ullrich
ST 2025	2400005	Governance, Risk & Compliance	2 SWS	Seminar / 🗣	Herzig, Siddiq
ST 2025	2400171	Regulating AI: from ethics to law	2 SWS	Seminar / 🗣	Gil Gasiola
ST 2025	2400177	Designing Data Governance of Digital Systems (en)	2 SWS	Seminar / 🗣	Pathak
ST 2025	2400190	EU Digital Regulatory Framework	2 SWS	Seminar / 🗣	Zufall
ST 2025	2400204	(Generative) KI und Recht	2 SWS	Seminar / 🧩	Boehm
ST 2025	2400207	Rechtlicher Rahmen für die Europäische Datenökonomie	2 SWS	Seminar / 🗣	Sattler
ST 2025	2400208	Rechtlicher Rahmen für Künstliche Intelligenz	2 SWS	Seminar / 🗣	Sattler
ST 2025	24820	Current Issues in Patent Law	2 SWS	Seminar / 🗣	Melullis
Exams					
WT 24/25	7500035	Seminar: Legal Studies II			Zufall
WT 24/25	7500182	Seminar: Legal Studies II			Boehm, Raabe, Sattler
WT 24/25	7500232	Seminar Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection			Reussner
WT 24/25	7500249	Seminar: IT- Security Law			Zufall
ST 2025	7500140	Seminar: Legal Studies I			Raabe, Melullis, Boehm, Sattler
ST 2025	7500159	Seminar: Legal Studies I			Zufall
ST 2025	7500237	Seminar: Law and Legal Studies			Zufall

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Below you will find excerpts from events related to this course:

V EU Digital Regulatory Framework

2400184, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content

This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act, the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact which each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a two-pages report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 40 %, two-pages report: 40 %, discussion: 20 %).

Organizational issues
WS 2024/25

Hierbei handelt es sich NICHT um eine Pro-Seminar, sondern um ein Seminar (aus Rechtswissenschaften).

Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!

***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*Erläuterung: nach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

V	**Regulating AI: from ethics to law** 2400171, SS 2025, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **On-Site**

Content
Credit points = ECTS

3 ECTS

Language:

English

Competency Goals:

Students comprehend the role of technology regulation.

They are able to identify different types of regulation and their impact on different stakeholders.

They know the main aspects of the regulation of AI systems.

They understand the foundations of the AI Act of the EU.

They know the content of AI principles and are able to assess their implementation in specific projects.

Content:

This seminar will provide an overview of the regulation of technologies and in particular the regulation of AI systems. After an introduction to forms of regulation, students will explore the different regulatory instruments from the perspective of the consolidated principles of AI: fairness, transparency, privacy, security and accountability. This will allow students to discuss how the principles and rules governing AI can be implemented in concrete cases. The seminar will cover the following topics:

- Introduction to technology regulation
- Objectives of regulation
- Types of regulation
- Challenges in regulating new / disruptive technologies
- Specific challenges in regulating AI
- Fragmented/vertical regulation of AI
- AI Act
- AI principles: fairness, transparency, privacy, security, and accountability
- The role of principles in regulating AI
    - Dealing with principles when developing and implementing AI systems

Competency certificate:

The assessment of this course is carried out by the following aspects, which will be considered in the grading (§ 4 Abs. 2 Nr. 3 SPO): term paper (approx. 5 pages), presentation (approx. 20 min.) and discussion.

The grading scale will be announced in the course. Students may redraw from the examination during the first two weeks after the topic has been communicated.

Organizational issues
Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!
***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*ErläuterungNach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

Blockseminar im SoSe 2025 (2 Termine): Termine und Uhrzeit:

Donnerstag, 24.04.2025, 13:30 - 17:30 Uhr

Donnerstag, 10.07.2025, 13:30 - 17:30 Uhr.

Raum: jeweils im Seminarraum Nr. 313 (Geb. 07.08)**English:**Please register for the seminar ONLY via the WiWi-Portal!
*Please register for the exam ONLY via CAS (Campus-Portal)!

*ExplanationAfter attending the introductory event, which is mandatory for participation in the seminar, please register via the campus system (necessary for recording the grade of the seminar paper).

Block seminar in summer term 2024 (2 dates):

Dates and time:

Thursday, 24th April 2025, 13:30 - 17:30 h

Thursday, 10th July 2025, 13:30 - 17:30 h.

Room:each time in seminar room no. 313 (building 07.08)

V Designing Data Governance of Digital Systems (en)

2400177, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
The latest regulations in the digital sector at EU level represent a highly topical and important regulatory instrument with enormous practical relevance for students of computer science and business informatics. The seminar not only enables students to acquire important knowledge in this area, but also to apply it specifically to the governance of digital systems and to learn the practical design of digital systems against the background of legal framework conditions.

Organizational issues
Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal! (Anmeldezeitraum für das Seminar: 01.03.2025 - 28.03.2025).
***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*ErläuterungNach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

English: Please register for the seminar ONLY via the WiWi-Portal!
*Please register for the exam ONLY via CAS (Campus-Portal)!

*ExplanationAfter attending the introductory event, which is mandatory for participation in the seminar, please register via the campus system (necessary for recording the grade of the seminar paper).

Kick-off:

Friday, 11th April 2025: 10:00 - 12:00 h.

Room Nr. 313, building 07.08 (Vincenz-Prießnitz-Str. 3, KA)

Date for the final-presenations is not yet defined (as per 25.02.2025, sf).

V EU Digital Regulatory Framework

2400190, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Note:
This class is mainly intended for Bachelor and Master students in Business Informatics and those wth Law as a minor subject, but also open interested students from other disciplines.

This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act (proposal), the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact which each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a two-pages report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 40 %, two-pages report: 40 %, discussion: 20 %).

Organizational issues
Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!

***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*Erläuterung: nach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

Termine im SoSe **2025:**

Mittwoch, den 7. Mai 2025, 16-19 Uhr (Kick-off)

Donnerstag, den 17. Juli 2025, 14:00 - 18:00 Uhr (Präsentationen).

Raum:

jeweils im Seminarraum Nr. 313, Geb. 07.08.

English:

Please register for the seminar ONLY via the WiWi-Portal!

**Please register for the exam ONLY via CAS (Campus-Portal)!*

**Explanation: after attending the introductory event, which is mandatory for participation in the seminar, please register via Campus System (necessary for recording the grade of the seminar papers).*

Dates in summer term 2025:

Wednesday, 7 May 2025, 16-19h (kick-off)

Thursday, 17th July 2025, 14:00 - 18:00 h (presentations).

Room:

In seminar room no. 313, building 07.08.

T 7.421 Course: Seminar: Legal Studies II [T-INFO-105945]

Responsible: N.N.
Organisation: KIT Department of Informatics
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Version
Examination of another type	3	Grade to a third	1

Events					
WT 24/25	2400014	Current Issues in Patent Law	2 SWS	Seminar / On-Site	Melullis
WT 24/25	2400060	Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection	2 SWS	Seminar / On-Site	Reussner, Raabe, Werner, Müller-Quade
WT 24/25	2400125	Security and Privacy Awareness	2 SWS	Seminar / Blended	Seidel-Saul, Volkamer, Boehm, Aldag, Veit
WT 24/25	2400184	EU Digital Regulatory Framework	2 SWS	Seminar / On-Site	Zufall
WT 24/25	2400203	(Smart) City in and as a Network	2 SWS	Seminar / On-Site	Kasper
WT 24/25	2400209	Rechtliche Herausforderungen für die Europäische Datenökonomie	2 SWS	Seminar / On-Site	Sattler
WT 24/25	2400216	(Generative) KI und Recht	2 SWS	Seminar / Blended	Boehm, Vettermann
WT 24/25	2513214	Seminar Information security and Data protection (Bachelor)	2 SWS	Seminar / On-Site	Volkamer, Raabe, Schiefer, Hennig, Werner, Ullrich
ST 2025	2400171	Regulating AI: from ethics to law	2 SWS	Seminar / On-Site	Gil Gasiola
ST 2025	2400177	Designing Data Governance of Digital Systems (en)	2 SWS	Seminar / On-Site	Pathak
ST 2025	2400190	EU Digital Regulatory Framework	2 SWS	Seminar / On-Site	Zufall
ST 2025	2400204	(Generative) KI und Recht	2 SWS	Seminar / Blended	Boehm
ST 2025	2400207	Rechtlicher Rahmen für die Europäische Datenökonomie	2 SWS	Seminar / On-Site	Sattler
ST 2025	2400208	Rechtlicher Rahmen für Künstliche Intelligenz	2 SWS	Seminar / On-Site	Sattler
Exams					
WT 24/25	7500035	Seminar: Legal Studies II			Zufall
WT 24/25	7500182	Seminar: Legal Studies II			Boehm, Raabe, Sattler
WT 24/25	7500232	Seminar Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection			Reussner
ST 2025	7500159	Seminar: Legal Studies I			Zufall
ST 2025	7500237	Seminar: Law and Legal Studies			Zufall

Legend: Online, Blended (On-Site/Online), On-Site, x Cancelled

Below you will find excerpts from events related to this course:

V Security and Privacy Awareness
2400125, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Blended (On-Site/Online)

Content
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Important notes:

- Consider that legal-focused topics require you to speak and understand German legal texts
- The seminar is only for MASTER students (or Mastervorzug)
- The link to enrol is for every student, regardless of the study background

Dates (not final):

- Kick-Off: Tue, 22.10.2024, 11:30 Uhr, Raum 1C-03, Gebäude 5.20
- First version: 05.01.2025
- Final version: 23.02.2025
- Presentation: CW 12

Topics:
The advertised topics can be found in the wiwi portal [https://portal.wiwi.kit.edu/ys/8308]. They will be assigned after the kick-off.

V EU Digital Regulatory Framework

2400184, WS 24/25, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act, the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact which each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a two-pages report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 40 %, two-pages report: 40 %, discussion: 20 %).

Organizational issues
WS 2024/25

Hierbei handelt es sich NICHT um eine Pro-Seminar, sondern um ein Seminar (aus Rechtswissenschaften).

Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!

***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*Erläuterung: nach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

V Regulating AI: from ethics to law

2400171, SS 2025, 2 SWS, Language: English, Open in study portal

Seminar (S)
On-Site

Content
Credit points = ECTS

3 ECTS

Language:

English

Competency Goals:

Students comprehend the role of technology regulation.

They are able to identify different types of regulation and their impact on different stakeholders.

They know the main aspects of the regulation of AI systems.

They understand the foundations of the AI Act of the EU.

They know the content of AI principles and are able to assess their implementation in specific projects.

Content:

This seminar will provide an overview of the regulation of technologies and in particular the regulation of AI systems. After an introduction to forms of regulation, students will explore the different regulatory instruments from the perspective of the consolidated principles of AI: fairness, transparency, privacy, security and accountability. This will allow students to discuss how the principles and rules governing AI can be implemented in concrete cases. The seminar will cover the following topics:

- Introduction to technology regulation
- Objectives of regulation
- Types of regulation
- Challenges in regulating new / disruptive technologies
- Specific challenges in regulating AI
- Fragmented/vertical regulation of AI
- AI Act
- AI principles: fairness, transparency, privacy, security, and accountability
- The role of principles in regulating AI
    - Dealing with principles when developing and implementing AI systems

Competency certificate:

The assessment of this course is carried out by the following aspects, which will be considered in the grading (§ 4 Abs. 2 Nr. 3 SPO): term paper (approx. 5 pages), presentation (approx. 20 min.) and discussion.

The grading scale will be announced in the course. Students may redraw from the examination during the first two weeks after the topic has been communicated.

Organizational issues
Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!
***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*ErläuterungNach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

Blockseminar im SoSe 2025 (2 Termine): Termine und Uhrzeit:

Donnerstag, 24.04.2025, 13:30 - 17:30 Uhr

Donnerstag, 10.07.2025, 13:30 - 17:30 Uhr.

Raum: jeweils im Seminarraum Nr. 313 (Geb. 07.08)**English:**Please register for the seminar ONLY via the WiWi-Portal!
*Please register for the exam ONLY via CAS (Campus-Portal)!

*ExplanationAfter attending the introductory event, which is mandatory for participation in the seminar, please register via the campus system (necessary for recording the grade of the seminar paper).

Block seminar in summer term 2024 (2 dates):

Dates and time:

Thursday, 24th April 2025, 13:30 - 17:30 h

Thursday, 10th July 2025, 13:30 - 17:30 h.

Room:each time in seminar room no. 313 (building 07.08)

V **Designing Data Governance of Digital Systems (en)**
2400177, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content
The latest regulations in the digital sector at EU level represent a highly topical and important regulatory instrument with enormous practical relevance for students of computer science and business informatics. The seminar not only enables students to acquire important knowledge in this area, but also to apply it specifically to the governance of digital systems and to learn the practical design of digital systems against the background of legal framework conditions.

Organizational issues
Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal! (Anmeldezeitraum für das Seminar: 01.03.2025 - 28.03.2025).
***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*ErläuterungNach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

English: Please register for the seminar ONLY via the WiWi-Portal!
*Please register for the exam ONLY via CAS (Campus-Portal)!

*ExplanationAfter attending the introductory event, which is mandatory for participation in the seminar, please register via the campus system (necessary for recording the grade of the seminar paper).

Kick-off:

Friday, 11th April 2025: 10:00 - 12:00 h.

Room Nr. 313, building 07.08 (Vincenz-Prießnitz-Str. 3, KA)

Date for the final-presenations is not yet defined (as per 25.02.2025, sf).

V **EU Digital Regulatory Framework**
2400190, SS 2025, 2 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content

Note:
This class is mainly intended for Bachelor and Master students in Business Informatics and those wth Law as a minor subject, but also open interested students from other disciplines.

This class aims to provide an overview on the legal instruments forming the EU digital regulatory framework. Following its Digital Single Market Strategy, the EU has set up a new strategic programme for a "Digital Decade". Existing regulations like the General Data Protection Regulation (GDPR), or the E-Commerce Directive, are being complemented by a variety of new instruments that aim to set binding rules on online markets, to regulate data flows in various ways, but also to pioneer a legal framework on AI. Prominent instruments include the new AI Act (proposal), the Digital Services Act (DSA) and Digital Markets Act (DMA), the Data Act, Data Governance Act, or Open Data Directive.

The class will provide an overview on the existing framework: Which regulations and directives are relevant? How do they apply and interact which each other in a broader context?

Another objective is to provide students with the ability to read these legal instruments: How to access regulatory instruments that often have more than 100 pages (without having to read every single sentence)? How to gain a comprehensive, high-level understanding of the instrument? How to identify parts relevant to a particular legal problem?

The class will start with an introduction into EU law and regulatory instruments in general. Concrete guidance on reading, analysing and working with legal instruments in English will be given. Based on these instructions, students will be assigned legal instruments to present in the final unit along with a two-pages report.

Grades will be assigned based on the quality of these presentations and the report, as well as participation in the discussion (presentation: 40 %, two-pages report: 40 %, discussion: 20 %).

Organizational issues

Anmeldungen für das Seminar bitte NUR! über das WiWi-Portal!

***Für die Prüfung bitte NUR über CAS (Campus-Portal) anmelden!**

*Erläuterung: nach der für die Teilnahme am Seminar verbindlichen Teilnahme an der Einführungsveranstaltung bitte Anmeldung über das Campus-System (notwendig für die Erfassung der Note der Seminararbeit).

***Termine im SoSe* 2025:**

Mittwoch, den 7. Mai 2025, 16-19 Uhr (Kick-off)

Donnerstag, den 17. Juli 2025, 14:00 - 18:00 Uhr (Präsentationen).

Raum:

jeweils im Seminarraum Nr. 313, Geb. 07.08.

English:

Please register for the seminar ONLY via the WiWi-Portal!

**Please register for the exam ONLY via CAS (Campus-Portal)!*

**Explanation: after attending the introductory event, which is mandatory for participation in the seminar, please register via Campus System (necessary for recording the grade of the seminar papers).*

Dates in summer term 2025:

Wednesday, 7 May 2025, 16-19h (kick-off)

Thursday, 17th July 2025, 14:00 - 18:00 h (presentations).

Room:

In seminar room no. 313, building 07.08.

T 7.422 Course: Sensors [T-ETIT-101911]

Responsible: Dr. Wolfgang Menesklou
Organisation: KIT Department of Electrical Engineering and Information Technology
Part of: M-ETIT-101158 - Sensor Technology I

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2025	2304231	Sensors	2 SWS	Lecture / 🗣	Menesklou
Exams					
WT 24/25	7304231	Sensors			Menesklou
ST 2025	7304231	Sensors			Menesklou

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 7.423 Course: Service Design Thinking [T-WIWI-102849]

Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101503 - Service Design Thinking

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Irregular	5

Events					
WT 24/25	2595600	Service Design Thinking	2 SWS	Lecture / 🗣	Feldmann, Terzidis, Satzger
ST 2025	2595600	Service Design Thinking	2 SWS	Lecture / 🗣	Feldmann, Terzidis, Satzger
Exams					
ST 2025	7900319	Service Design Thinking			Satzger
ST 2025	7900320	Practical Seminar Service Innovation			Satzger

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Success is assessed in the form of an alternative exam assessment which consists of a case study, workshops, and a final presentation. The weighting of these components for the grade will be announced at the beginning of the course.

Prerequisites
None

Recommendation
This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

Annotation
Due to practical project work as a component of the program, access is limited. The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June. For more information on the application process and the program itself are provided in the module component description and the program's website (https://sdtkarlsruhe.de/). Furthermore, the lecturers provide an information event for applicants every year in May.

Below you will find excerpts from events related to this course:

V Service Design Thinking

2595600, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
The Service Design Thinking program is much more than a normal course. Through this program, we provide the knowledge and skills that true innovators need. In this context, we train our participants in the human-centric innovation approach “Design Thinking”. In addition, participants work in small international and interdisciplinary teams on real innovation challenges from practice.

The teams are made up of students from KIT and another university from the global SUGAR network. These include, for example, the Hasso Plattner Institute in Potsdam, Trinity College in Dublin and the University of Science and Technology of China. The program includes visits to international events of the SUGAR Network, which are usually held in places known for their high level of innovation. At these events, our participants present their (interim) results to a large audience consisting of employees from the partner companies and the universities involved.

What students will learn:

- A comprehensive understanding of the globally recognized innovation approach “Design Thinking” as introduced and promoted by the Stanford University
- Development of new, creative solutions through extensive need finding, in particular with regard to the relevant service users
- to develop prototypes of the collected ideas early and independently, to test them and improve them iteratively, thereby solving the issue defined by the partner company
- to communicate, present and network in an interdisciplinary and international environment
- to apply the learned approach in the context of a real innovation project provided by a practical partner.

Course phases (roughly 4 weeks each):

- **Kick off:**
Learning the basic method elements by solving an exercise challenge. Participation in the Global Kick-Off of the SUGAR Network consisting of method workshops, working on team challenges, networking with other universities and forming project teams for the challenges of the practical partners.
- **Design Space Exploration**:
Exploring the problem space by questioning the given innovation challenge from practice. Familiarization with the topic area of the respective challenge. Gathering first impressions of the requirements and needs of people related to the problem.
- **Critical Function Prototype:**
Building an intensive understanding of the needs of the target group of the respective challenge. Deriving critical functions from the customer's perspective that could help solve the overall problem. Building prototypes for the critical functions and testing them in real customer situations.
- **Dark Horse Prototype**:
Reversal of assumptions and experiences made so far. The goal is to develop radically new and unconventional ideas. Implementation of the ideas into simple prototypes and subsequent testing.
- **Funky Prototype**:
Integration of the individual successfully tested functions from the critical function and dark horse phase into solution concepts. These are also tested and further developed.
- **Functional Prototype**:
Selection of successful funky prototypes and development of these towards high-resolution prototypes. The final solution approach for the project is written down in detail and feedback is obtained.
- **Final Prototype**:
Implementing the final prototype and presenting it to the practical partner as well as the SUGAR Network.

Organizational issues
Bei der Vorlesung handelt es sich um eine zweisemestrige Veranstaltung, die jährlich im September startet.

Literature

- Design Thinking: Das Handbuch; Falk Uebernickel, Walter Brenner, Therese Naef, Britta Pukall, Bernhard Schindlholzer
- The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems; Michael Lewrick, Patrick Link, Larry Leifer
- The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods; Michael Lewrick, Patrick Link, Larry Leifer
- Frame Innovation: Create New Thinking by Design (Design Thinking, Design Theory); Kees Dorst

V	**Service Design Thinking** 2595600, SS 2025, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **On-Site**

Content

The Service Design Thinking program is much more than a normal course. Through this program, we provide the knowledge and skills that true innovators need. In this context, we train our participants in the human-centric innovation approach "Design Thinking". In addition, participants work in small international and interdisciplinary teams on real innovation challenges from practice.

The teams are made up of students from KIT and another university from the global SUGAR network. These include, for example, the Hasso Plattner Institute in Potsdam, Trinity College in Dublin and the University of Science and Technology of China. The program includes visits to international events of the SUGAR Network, which are usually held in places known for their high level of innovation. At these events, our participants present their (interim) results to a large audience consisting of employees from the partner companies and the universities involved.

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- **Kick off:**
  Learning the basic method elements by solving an exercise challenge. Participation in the Global Kick-Off of the SUGAR Network consisting of method workshops, working on team challenges, networking with other universities and forming project teams for the challenges of the practical partners.
- **Design Space Exploration**:
  Exploring the problem space by questioning the given innovation challenge from practice. Familiarization with the topic area of the respective challenge. Gathering first impressions of the requirements and needs of people related to the problem.
- **Critical Function Prototype:**
  Building an intensive understanding of the needs of the target group of the respective challenge. Deriving critical functions from the customer's perspective that could help solve the overall problem. Building prototypes for the critical functions and testing them in real customer situations.
- **Dark Horse Prototype**:
  Reversal of assumptions and experiences made so far. The goal is to develop radically new and unconventional ideas. Implementation of the ideas into simple prototypes and subsequent testing.
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  Integration of the individual successfully tested functions from the critical function and dark horse phase into solution concepts. These are also tested and further developed.
- **Functional Prototype**:
  Selection of successful funky prototypes and development of these towards high-resolution prototypes. The final solution approach for the project is written down in detail and feedback is obtained.
- **Final Prototype**:
  Implementing the final prototype and presenting it to the practical partner as well as the SUGAR Network.

Organizational issues

Bei der Vorlesung handelt es sich um eine zweisemestrige Veranstaltung, die jährlich im September startet.

Literature

- Design Thinking: Das Handbuch; Falk Uebernickel, Walter Brenner, Therese Naef, Britta Pukall, Bernhard Schindlholzer
- The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems; Michael Lewrick, Patrick Link, Larry Leifer
- The Design Thinking Toolbox: A Guide to Mastering the Most Popular and Valuable Innovation Methods; Michael Lewrick, Patrick Link, Larry Leifer
- Frame Innovation: Create New Thinking by Design (Design Thinking, Design Theory); Kees Dorst

T 7.424 Course: Service Operations and Cyber Security [T-WIWI-114109]

Responsible: Esther Mohr
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations
M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Exams			
ST 2025	00030	Service Operations and Cyber Security	Nickel

Competence Certificate
The assessment consists of a written paper and an oral exam of ca. 30-40 min.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-102872 - Challenges in Supply Chain Management must not have been started.

Recommendation
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

Annotation
The number of course participants is limited to 12 due to the collaborative work in project teams. As a result of this limitation, registration is required before the course begins. Further information can be found on the course's website.
The event takes place irregularly. The planned lectures and courses for the next three years will be announced online.

T 7.425 Course: SIL Entrepreneurship Emphasis [T-WIWI-110287]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105010 - Student Innovation Lab (SIL) 1

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2500002	SIL Entrepreneurship Emphasis	4 SWS	Seminar	Terzidis
Exams					
WT 24/25	7900041	SIL Entrepreneurship Emphasis			Terzidis

Competence Certificate
Alternative exam assessment (§4(2), 3 SPO). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar. In addition, smaller, ungraded tasks are provided in the course to monitor progress.

Prerequisites
None

Recommendation
None

Workload
90 hours

T 7.426 Course: SIL Entrepreneurship Project [T-WIWI-110166]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105010 - Student Innovation Lab (SIL) 1

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 24/25	2545082	SIL Entrepreneurship Project	4 SWS	Seminar	Terzidis
Exams					
WT 24/25	7900037	SIL Entrepreneurship Project			Terzidis

Competence Certificate
Alternative exam assessment (§4(2), 3 SPO). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar. In addition, smaller, ungraded tasks are provided in the course to monitor progress.

Prerequisites
None

Recommendation
None

Workload
90 hours

T 7.427 Course: Simulation Game in Energy Economics [T-WIWI-108016]

Responsible: Dr. Massimo Genoese
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3,5	Grade to a third	Each summer term	2

Events					
ST 2025	2581025	Simulation Game in Energy Economics	3 SWS	Lecture / Practice (/ 🗣	Genoese, Zimmermann

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Examination as written assignment and oral presentation (§4 (2), 1 SPO).

Prerequisites
None

Recommendation
Visiting the course "Introduction to Energy Economics"

Annotation
The number of participants is limited.
There is a registration procedure via CAS followed by a selection of the participants.

Below you will find excerpts from events related to this course:

V Simulation Game in Energy Economics

2581025, SS 2025, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content

- Introduction
- Agents and market places in the electricity industry
- Selected planning tasks of energy service companies
- Methods of modelling in the energy sector
- Agent-based simulation: The PowerACE model
- Simulation game: Simulation in energy economics (electricity and emission trading, investment decisions)

The lecture is structured in a theoretical and a practical part. In the theoretical part, the students are taught the basics to carry out simulations themselves in the practical part which comprises amongst others the simulation of the power exchange. The participants of the simulation game take a role as a power trader in the power market. Based on various sources of information (e.g. prognosis of power prices, available power plants, fuel prices), they can launch bids in the power exchange.

Assessment: presentation and written summary

Prerequisites: Basics in Energy economics ad markets are advantageous.

Organizational issues
CIP-Pool West, Raum 102, Geb. 06.41 - siehe Institutsaushang

Literature
Weiterführende Literatur:

Möst, D. und Genoese, M. (2009): Market power in the German wholesale electricity market. The Journal of Energy Markets (47–74). Volume 2/Number 2, Summer 2009

T 7.428 Course: Simulation of Coupled Systems [T-MACH-105172]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	2

Exams			
WT 24/25	76T-MACH-105172	Simulation of Coupled Systems	Geimer

Competence Certificate
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at very ordinary examination date.

A registration in mandatory, the details will be announced on the webpages of the *Institute of Vehicle System Technology / Institute of Mobile Machines.* In case of too many applications, attendance will be granted based on pre-qualification.

Prerequisites
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108888 must have been passed.

Recommendation

- Knowledge of ProE (ideally in actual version)
- Basic kniwledge of Matlab/Simulink
- Basic knowledge of dynamics of machnies
- Basic knowledge of hydraulics

Annotation
After completion of course, students are able to:

- build a coupled simulation
- parametrize models
- perform simulations
- conduct troubleshooting
- check results for plausibility

The number of participants is limited.

Content:

- Basics of multi-body and hydralics simulation programs
- Possibilities of coupled simulations
- Modelling and Simulation of Mobile Machines using a wheel loader
- Documentation of the result in a short report

Literature:

Software guide books (PDFs)

Information about wheel-type loader specifications

Workload
120 hours

T 7.429 Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development
M-MACH-101267 - Mobile Machines

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	0	pass/fail	Each summer term	1

Competence Certificate
Preparation of semester report

Prerequisites
none

T 7.430 Course: Simulation of Nanoscale Systems, without Seminar [T-PHYS-102504]

Responsible: Prof. Dr. Wolfgang Wenzel
Organisation: KIT Department of Physics
Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Irregular	1

Prerequisites
none

T 7.431 Course: Site Management [T-BGU-103427]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	1,5	Grade to a third	Each summer term	1 terms	1

Events					
ST 2025	6241801	Site Management	1 SWS	Lecture / Practice (/	N.N.
Exams					
ST 2025	8240103427	Site Management			Haghsheno

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
45 hours

T 7.432 Course: Smart Energy Infrastructure [T-WIWI-107464]

Responsible: Dr. Armin Ardone
Dr. Dr. Andrej Marko Pustisek
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each winter term	2

Events					
WT 24/25	2581023	(Smart) Energy Infrastructure	4 SWS	Lecture / 🗣	Ardone, Pustisek
Exams					
WT 24/25	7900178	Smart Energy Infrastructure NEW			Fichtner

Legend: 🖥 Online, ♲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Workload
165 hours

Below you will find excerpts from events related to this course:

V (Smart) Energy Infrastructure
2581023, WS 24/25, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
The lecture provides a techno-economic overview of different infrastructures of the energy system and their importance regarding the future energy system ("Energiewende") – in particular

- for electricity:
  - the supply side (e.g. power plants)
  - the demand side (e.g. load structures of appliances, flexibilities) as well as
  - transport infrastructures (electricity grids)
- for fuel transportation:
  - pipeline infrastructures (focus on natural gas)
  - shipping of LNG
  - crude oil and oil product transportation
  - hydrogen transportation
  - comparison of potential energy carriers for global trade of renewable energy (e.g., hydrogen and its derivates, e-fuels, reactive metals)
- storage systems (e.g. batteries)

Additionally, the lecture provides a toolbox for energy system analysis such as an overview and classification of energy systems modelling approaches as well as the usage of scenario techniques for energy systems analysis.

The lecture also provides practical examples for the relevant methods presented.

Organizational issues
Blockveranstaltung am 14.11., 15.11., 28.11., 29.11., 05.12., 06.12., 12.12., 13.12.24

T 7.433 Course: Smart Grid Applications [T-WIWI-107504]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	2

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Recommendation
None

Annotation
The lecture will no longer be offered from the coming winter semester 2023/24. It is only possible to take part in the main exam (first-time writer) and follow-up exam (repeater).

T 7.434 Course: Social Choice Theory [T-WIWI-102859]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101500 - Microeconomic Theory
M-WIWI-101504 - Collective Decision Making

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2520537	Social Choice Theory	2 SWS	Lecture / 🗣	Puppe, Kretz
ST 2025	2520539	Übung zu Social Choice Theory	1 SWS	Practice / 🗣	Puppe, Kretz
Exams					
ST 2025	7900039	Social Choice Theory (main date)			Puppe
ST 2025	7900045	Social Choice Theory (make-up date)			Puppe

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min.). The examination is offered every summer semester.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Social Choice Theory
2520537, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
How should (political) candidates be elected? What are good ways of merging individual judgments into collective judgments? Social Choice Theory is the systematic study and comparison of how groups and societies can come to collective decisions.

The course offers a rigorous and comprehensive treatment of judgment and preference aggregation as well as voting theory. It is divided into two parts. The first part deals with (general binary) aggregation theory and builds towards a general impossibility result that has the famous Arrow theorem as a corollary. The second part treats voting theory. Among other things, it includes prooving the Gibbard-Satterthwaite theorem.

Workload:
Total workload for 4.5 credit points: approx. 135 hours
Attendance: 30 hours
Self-study: 105 hours

Literature
Main texts:

- Moulin, H. 1988. *Axioms of Cooperative Decision Making*. Cambridge University Press.
- List, C. and Puppe, C. 2009. Judgement Aggregation. A survey. In: *The Handbook of rational & social choice*. P. Anand, P. Pattanaik, C. Puppe (Eds.). Oxford University Press.

Secondary texts:

- Sen, A. K. 1970. *Collective Choice and Social Welfare*. Holden-Day.
- Gaertner, W. 2009. *A Primer in Social Choice Theory*. Revised edition. Oxford University Press.
- Gaertner, W. 2001. *Domain Conditions in Social Choice Theory*. Cambridge University Press.

T 7.435 Course: Social Dimensions of Energy Transitions [T-WIWI-113935]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2025	2581051	Social Dimensions of Energy Transitions	2 SWS	Lecture / 🗣	Fichtner, Sloot

Legend: 🖥 Online, ⚭ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Written examination (60 minutes). The examination is offered every semester and can be repeated at any regular examination date.

Workload
105 hours

Below you will find excerpts from events related to this course:

V Social Dimensions of Energy Transitions

2581051, SS 2025, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content
Course topics:

Part I: Household energy use

1. Introduction: Energy use and human behavior
2. Bounded rationality and bias in decision-making
3. Identifying and measuring sustainable energy behavior
4. Financial incentives and demand response
5. Energy feedback
6. Social influence and energy behavior

Part II: Energy technology acceptance

7. Social acceptance of energy technologies
8. Efficacy and energy policy support
9. NIMBYism and local support for energy technologies
10. Framing, moral hazard and geoengineering
11. Political orientation
12. Public perceptions of energy security

T 7.436 Course: Sociotechnical Information Systems Development [T-WIWI-109249]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Exams			
WT 24/25	7900080	Advanced Lab Development of Sociotechnical Information Systems (Bachelor)	Sunyaev
WT 24/25	7900143	Advanced Lab Development of Sociotechnical Information Systems (Master)	Sunyaev

Competence Certificate
The alternative exam assessment consists of an implementation and a final thesis documenting the development and use of the application.

Prerequisites
None.

Workload
135 hours

T 7.437 Course: Software Quality Management [T-WIWI-102895]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2025	2511208	Software Quality Management	2 SWS	Lecture / 🗣	Oberweis
ST 2025	2511209	Übungen zu Software-Qualitätsmanagement	1 SWS	Practice / 🗣	Oberweis
Exams					
WT 24/25	79AIFB_STQM_C1	Software Quality Management			Oberweis
ST 2025	79AIFB_STQM_A5	Software Quality Management (Registration until 21.07.2025)			Oberweis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

Prerequisites
None

Below you will find excerpts from events related to this course:

V Software Quality Management
Lecture (V)
On-Site
2511208, SS 2025, 2 SWS, Language: German, Open in study portal

Content
This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Learning objectives:

Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the mail models of sofware certification, compare and evaluate these models,
- write scientific theses in the area of software quality management and find own solutions for given problems.

Recommendations:

Programming knowledge in Java and basic knowledge of computer science are expected.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Literature

- Helmut Balzert: Lehrbuch der Software-Technik. Spektrum-Verlag 2008
- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002
- Mauro Pezzè, Michal Young: Software testen und analysieren. Oldenbourg Verlag 2009

Weitere Literatur wird in der Vorlesung bekanntgegeben.

T 7.438 Course: Spatial Economics [T-WIWI-103107]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101485 - Transport Infrastructure Policy and Regional Development
M-WIWI-107010 - Economics in a Connected World

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2561260	Spatial Economics	2 SWS	Lecture / On-Site	Ott
WT 24/25	2561261	Exercise for Spatial Economics	1 SWS	Practice / On-Site	Ott, Mirzoyan
Exams					
WT 24/25	7900075	Spatial Economics			Ott
WT 24/25	7900276	Spatial Economics			Ott

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as an open-book examination, or as a 60-minute written examination.

Prerequisites
None

Recommendation
Basic micro- and macroeconomic knowledge is required, such as that taught in the courses "Economics I" [2600012] and "Economics II" [2600014], attendance of which is strongly recommended (but not mandatory). An interest in quantitative-mathematical modeling is also a prerequisite. Attendance of the course "Introduction to Economic Policy" [2560280] is recommended.

Below you will find excerpts from events related to this course:

V Spatial Economics
2561260, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

The course covers the following topics:

- Geography, trade and development
- Geography and economic theory
- Core models of economic geography and empirical evidence
- Agglomeration, home market effect, and spatial wages
- Applications and extensions

Learning objectives:

The student

- analyses how spatial distribution of economic activity is determined.
- uses quantitative methods within the context of economic models.
- has basic knowledge of formal-analytic methods.
- understands the link between economic theory and its empirical applications.
- understands to what extent concentration processes result from agglomeration and dispersion forces.
- is able to determine theory based policy recommendations.

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. An interest in mathematical modeling is advantageous.

Workload:

The total workload for this course is approximately 135 hours.

- Classes: ca. 30 h
- Self-study: ca. 45 h
- Exam and exam preparation: ca. 60 h

Assessment:

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Literature

Steven Brakman, Harry Garretsen, Charles van Marrewijk (2009): The New Introduction to Geographical Economics, 2nd ed, Cambridge University Press.

Weitere Literatur wird in der Vorlesung bekanntgegeben.
(Further literature will be announced in the lecture.)

T 7.439 Course: Special Topics in Highway Engineering and Environmental Impact Assessment [T-BGU-101860]

Responsible: Dr.-Ing. Matthias Zimmermann
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-100999 - Highway Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6233804	Environmental Sustainability of Roads	1 SWS	Lecture / 🗣	Zimmermann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam with 15 minutes

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 7.440 Course: Special Topics in Information Systems [T-WIWI-113725]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101506 - Service Analytics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Exams			
WT 24/25	00084	How media influence sociopolitical perspectives in the U.S., with a focus on recent events, the Middle East, and societal perceptions	Weinhardt

Competence Certificate
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

Prerequisites
see below

Recommendation
None

Annotation
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in "Information Systems" so far. With this course students majoring in "Industrial Engineering and Management" and "Economics Engineering" also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T 7.441 Course: Special Topics in Information Systems [T-WIWI-113724]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

Prerequisites
see below

Recommendation
None

Annotation
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in "Information Systems" so far. With this course students majoring in "Industrial Engineering and Management" and "Economics Engineering" also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T 7.442 Course: Special Topics in Information Systems [T-WIWI-113727]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101411 - Information Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

Prerequisites
see below

Recommendation
None

Annotation
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in “Information Systems” so far. With this course students majoring in “Industrial Engineering and Management“ and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T 7.443 Course: Special Topics in Information Systems [T-WIWI-113726]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment of this course is in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class.
Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The overall grade is composed as follows:

A total of 60 points can be achieved, of which

- A maximum of 30 points for the written documentation
- A maximum of 30 points for the practical component

In order to pass the success control, at least 15 points (written documentation / practical component) must be achieved.

Prerequisites
see below

Recommendation
None

Annotation
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in “Information Systems” so far. With this course students majoring in “Industrial Engineering and Management“ and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T 7.444 Course: Startup Experience [T-WIWI-111561]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each term	1

Events					
WT 24/25	2545004	Startup Experience	4 SWS	Seminar / 🗣	Weimar, Martjan, Terzidis
ST 2025	2545004	Startup Experience	4 SWS	Seminar / 🗣	Weimar, Terzidis, Rosales Bravo, Martjan
Exams					
WT 24/25	7900186	Startup Experience			Terzidis

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessment. Details on the design of the examination performance of other types will be announced in the course.The grade is composed of a presentation and a written paper (plus any specified documentation, e.g. work results, experience diary, reflection).

Recommendation
Lecture Entrepreneurship already completed

Annotation
The language in the seminar is English. The seminar contents will be published on the chair homepage.

Workload
180 hours

Below you will find excerpts from events related to this course:

V Startup Experience — **Seminar (S) On-Site**
2545004, WS 24/25, 4 SWS, Language: English, Open in study portal

Content
Content

In the Startup Experience seminar you will develop entrepreneurial competences that will enable you to build a new business. In an entrepreneurial project, you have three main objectives:

1. Identify and develop an opportunity. Who is your target customer and what problem or task does he or she have? How attractive and how big is this market?
2. How will you add value to it? How can you use specific resources, including technology, to develop a solution?
3. How can you design and set up a viable organisation? What business model do you propose to create, deliver and capture value?

Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. After gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

Learning Objectives

After completing this course, the course participants will be able to:

- Work effectively in a cohesive team
- Understand the role of digital entrepreneurship in healthcare
- Apply creativity techniques to ideate
- Use utility analysis approaches to select promising solutions
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method
- Apply advanced business modeling methods to develop a sound business concept
- Develop and deliver a concise presentation ("pitch") to communicate your project
- Gain basic knowledge of healthcare regulations and reimbursement ways

Additional information:

Alternative exam assessment. The grade consists of the presentation and the written elaboration. Potentially, a 'project diary' of the seminar progress may be part of the deliverables (depends on tutor and will be communicated at the kick-off).

For a successful course completion, we expect you to submit a Business Plan with the following features:

- Scope: 9000 words,
- Sound and clear structure,
- Expression and spelling are correct
- Complete and correct references, quotations, etc.
- Visual elements are chosen appropriately
- Documentation and traceability of data acquisition, analysis and evaluation,
- Content is developed according to the course instructions.

Furthermore, we expect you to deliver a team Pitch.

- Duration: will be communicated (typically 5-10 minutes)
- Content: Introduction/Purpose; Problem; Solution; Business Model; Prototype; Competition; Management Team; Current Status and next steps,
- Layout and form: appropriate choice,
- Appearance: appropriate amount of visual elements,
- Data: well researched and organized visually
- Story Line: is sound; clear and convincing.

Organizational issues

Registration is via the Wiwi portal.

In the seminar you will work on a project in teams of max. 5 persons. The groups are formed in the seminar.

V **Startup Experience**
2545004, SS 2025, 4 SWS, Language: English, Open in study portal
Seminar (S)
On-Site

Content

Content

In the Startup Experience seminar you will develop entrepreneurial competences that will enable you to build a new business. In an entrepreneurial project, you have three main objectives:

1. Identify and develop an opportunity. Who is your target customer and what problem or task does he or she have? How attractive and how big is this market?
2. How will you add value to it? How can you use specific resources, including technology, to develop a solution?
3. How can you design and set up a viable organisation? What business model do you propose to create, deliver and capture value?

Our primary focus is on digital healthcare ventures, granting you the opportunity to delve into the realm of entrepreneurship within the healthcare system. After gaining a deep understanding of healthcare needs, you will utilize creativity techniques to uncover potential business ideas that provide value for patients and doctors. Additionally, you will learn how to create viable business models, dive into health regulations, and pitch your idea to a jury.

Learning Objectives

After completing this course, the course participants will be able to:

- Work effectively in a cohesive team
- Understand the role of digital entrepreneurship in healthcare
- Apply creativity techniques to ideate
- Use utility analysis approaches to select promising solutions
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method
- Apply advanced business modeling methods to develop a sound business concept
- Develop and deliver a concise presentation (“pitch”) to communicate your project
- Gain basic knowledge of healthcare regulations and reimbursement ways

Additional information:

Alternative exam assessment. The grade consists of the presentation and the written elaboration. Potentially, a ‘project diary’ of the seminar progress may be part of the deliverables (depends on tutor and will be communicated at the kick-off).

For a successful course completion, we expect you to submit a Business Plan with the following features:

- Scope: 9000 words,
- Sound and clear structure,
- Expression and spelling are correct
- Complete and correct references, quotations, etc.
- Visual elements are chosen appropriately
- Documentation and traceability of data acquisition, analysis and evaluation,
- Content is developed according to the course instructions.

Furthermore, we expect you to deliver a team Pitch.

- Duration: will be communicated (typically 5-10 minutes)
- Content: Introduction/Purpose; Problem; Solution; Business Model; Prototype; Competition; Management Team; Current Status and next steps,
- Layout and form: appropriate choice,
- Appearance: appropriate amount of visual elements,
- Data: well researched and organized visually
- Story Line: is sound; clear and convincing.

Organizational issues

Registration is via the Wiwi-Portal.

Attention: The Startup X seminar overlaps in some instances with the entrepreneurship lecture. Please be aware of this before applying for the seminar.

In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

T 7.445 Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2521350	Statistical Modeling of Generalized Regression Models	2 SWS	Lecture	Heller
Exams					
WT 24/25	7900011	Statistical Modeling of Generalized Regression Models			Heller
WT 24/25	7900146 (WS23/24)	Statistical Modeling of generalized regression models			Heller

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Below you will find excerpts from events related to this course:

V Statistical Modeling of Generalized Regression Models

2521350, WS 24/25, 2 SWS, Open in study portal

Lecture (V)

Content
Learning objectives:

The student has profound knowledge of generalized regression models.

Requirements:

Knowledge of the contents covered by the course *Economics III: Introduction in Econometrics" [2520016].*

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

T 7.446 Course: Stochastic Calculus and Finance [T-WIWI-103129]

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2521331	Stochastic Calculus and Finance	2 SWS	Lecture	Safarian
WT 24/25	2521332	Übungen zu Stochastic Calculus and Finance	2 SWS	Practice	Safarian
Exams					
WT 24/25	7900225	Stochastic Calculus and Finance			Safarian

Competence Certificate
The assessment of this course consists of a written examination (§4(2), 1 SPOs, 180 min.).

Prerequisites
None

Annotation
For more information see http://statistik.econ.kit.edu/

Below you will find excerpts from events related to this course:

V Stochastic Calculus and Finance

2521331, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Learning objectives:

After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis we be put on both finance and the theory behind it.

Content:

The course will provide rigorous yet focused training in stochastic calculus and mathematical finance. Topics to be covered:

1. Stochastic Calculus: Stochastic Processes, Brownian Motion and Martingales, Entropy, Stopping Times, Local martingales, Doob-Meyer Decomposition, Quadratic Variation, Stochastic Integration, Ito Formula, Girsanov Theorem, Jump-diffusion Processes, Stable and Levy processes.
2. Mathematical Finance: Pricing Models, The Black-Scholes Model, State prices and Equivalent Martingale Measure, Complete Markets and Redundant Security Prices, Arbitrage Pricing with Dividends, Term-Structure Models (One Factor Models, Cox-Ingersoll-Ross Model, Affine Models), Term-Structure Derivatives and Hedging, Mortgage-Backed Securities, Derivative Assets (Forward Prices, Future Contracts, American Options, Look-back Options), Incomplete Markets, Markets with Transaction Costs, Optimal Portfolio and Consumption Choice (Stochastic Control and Merton continuous time optimization problem, CAPM), Equilibrium models, Numerical Methods.

Workload:

Total workload for 4.5 CP: approx. 135 hours
Attendance: 30 hours
Preparation and follow-up: 65 hours

Organizational issues
Blockveranstaltung, Termine werden über Ilias bekannt gegeben

Literature

- Dynamic Asset Pricing Theory, Third Edition by D. Duffie, Princeton University Press, 1996
- Stochastic Calculus for Finance II: Continuous-Time Models by S. E. Shreve, Springer, 2003
- Stochastic Finance: An Introduction in Discrete Time by H. Föllmer, A. Schied, de Gruyter, 2011
- Methods of Mathematical Finance by I. Karatzas, S. E. Shreve, Springer, 1998
- Markets with Transaction Costs by Yu. Kabanov, M. Safarian, Springer, 2010
- Introduction to Stochastic Calculus Applied to Finance by D.Lamberton, B. Lapeyre, Chapman&Hall,1996

T 7.447 Course: Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation [T-MACH-113372]

Responsible: Martin Benfer
Prof. Dr.-Ing. Gisela Lanza

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-105455 - Strategic Design of Modern Production Systems
M-MACH-106590 - Production Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each summer term	4

Events					
ST 2025	2150658	Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation	2 SWS	Lecture / 🗣	Lanza, Benfer
Exams					
ST 2025	76-T-MACH-113372	Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation			Lanza

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment takes the form of an examination with a different type of success check (in accordance with §4(2), 3 SPO). Here, the project work, the milestone-based presentation of the results in presentation form and a final presentation are included in the assessment

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-MACH-110991 - Global Production must have been passed.

Recommendation
Participation in the following lectures:
Introduction to Operations Research I [2550040] + II [2530043]

Workload
120 hours

Below you will find excerpts from events related to this course:

V Strategic Decision-Making in Global Production Network Design: A Seminar on Optimization and Simulation

Lecture (V)
On-Site

2150658, SS 2025, 2 SWS, Language: English, Open in study portal

Content

The lecture "Strategic Decision Making in the Design of Global Production Networks: A Seminar in Optimization and Simulation" offers students a comprehensive insight into the application of quantitative models from operations research in global production networks. The course places special emphasis on practical applications and allows students to deepen their skills through a real-world use case during the semester.

The classroom sessions serve to convey important basics and to introduce and present the practice-relevant cases. In the self-study phase, the topics covered are worked on in greater depth. The curriculum covers various phases. Optimization techniques for network design are covered first, followed by simulation methods for network management. Subsequently, open questions are dealt with, e.g. from the consideration of uncertainty, sustainability aspects or the search for the overall optimum in the production network.

The students are divided into small groups to work together on the questions. The methods taught in the course are implemented in python. In order to strengthen the students' presentation skills, regular presentations of interim results are planned. The progress made is supported by feedback and interaction with an internationally operating consulting firm.

The practical orientation of the course, combined with the application of quantitative models and the use of Python, enables students to prepare holistically for complex challenges in global production.

Learning Outcomes:

The students are able to

1. **put concepts of global production into practice:**
   • Understand how global production networks can be implemented in real business scenarios.
   • Develop and implement strategies for adapting global production networks to specific business requirements.
2. **in-depth knowledge and use of optimization in global production:**
   • Develop an in-depth understanding of various optimization techniques in global production processes.
   • Apply optimization models to complex production networks and continuously improve them.
3. **approach to improving network configuration, site selection and transportation routes:**
   • Understand methods to evaluate and optimize production networks.
   • Effectively plan and improve site selection decisions and transportation routes.
4. **deepen knowledge and use of simulations in global production:**
   • Understand how simulations can be used as a tool to analyze and optimize global production processes.
   • Gain experience in the application of simulation techniques for modeling and analyzing production processes.
5. **approach to improving delivery reliability:**
   • Develop and implement strategies to improve delivery reliability.
   • Optimize processes that can affect delivery reliability.
6. **consider uncertainties, aspects of sustainability and multidimensionality:**
   • Recognize and manage uncertainties in global production environments.
   • Consider sustainability aspects and multidimensional challenges when making decisions in global production.
7. **linking results and models:**
   • Link models and analytical results to create holistic solutions to complex problems in global production.
   • Strengthen the ability to iteratively improve models based on real-world results.
8. **presentations to management:**
   • Present complex global manufacturing concepts to management in an understandable and persuasive manner.
   • Build confidence in the use of visual aids and effective communication techniques in front of management levels.

Workload:

regular attendance: ~ 30 hours
self-study: ~ 99 hours

Media:

E-learning plattform Ilias, Powerpoint, photo protocol.
The Media are provided through Ilias (https://ilias.studium.kit.edu/).

Organizational issues

Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung auf 20 Studierende begrenzt. Termine und Fristen zur Veranstaltung werden über die Homepage des wbk (https://www.wbk.kit.edu/studium-und-lehre.php) bekannt gegeben.

For organizational reasons the number of students is limited to 20. Dates and deadlines for the seminar will be announced via the homepage of wbk (https://www.wbk.kit.edu/studium-und-lehre.php).

Literature

Vorlesungsskript der Lehrveranstaltungen / Lecture notes of the courses:
Abele et al. (2008): Global Production [978-3-540-71652-5]
Domschke et al. (2015): Einführung in das Operations Research [Einführung in Operations Research]
Friedli et al. (2021): Global Manufacturing Management: From Excellent Plants Toward Network Optimization [978-3-030-72739-0]

T 7.448 Course: Strategic Transport Planning [T-BGU-103426]

Responsible: Volker Waßmuth
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6232808	Strategic Traffic Planning	2 SWS	Lecture / 🗣	Waßmuth
Exams					
WT 24/25	8240103426	Strategic Transport Planning			Vortisch

Legend: 🖥 Online, ❖ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 7.449 Course: Strategy and Management Theory: Developments and "Classics" [T-WIWI-106190]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar / 🗣	Lindstädt
Exams					
WT 24/25	7900120	Strategy and Management Theory: Developments and "Classics"			Lindstädt

Legend: 📱 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a conclusion meeting. Details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization" is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Strategy and Management Theory: Developments and "Classics" (Master)

Seminar (S)
On-Site

2577921, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

This course covers highly topical issues of great relevance to the management of organizations. Students will be enabled to take strategic management positions. By applying appropriate models from the fields of strategy and management - or models developed in-house - participants will learn to evaluate the strategic starting position of an organization and derive precise and well-founded recommendations for action based on this.

This course offers students the opportunity to explore current management issues and sharpen their skills in strategic analysis and evaluation. Through intensive collaboration and practical application of the knowledge learned, students are optimally prepared for the demands and challenges of modern business management.

Structure

The course begins with an overarching theme, based on which students are divided into groups of two. The core of the course consists of the preparation of a written paper as well as the presentation and discussion of the results.

Learning Objectives

Upon completion of the course, students will be able to,

- analyze complex business situations, think strategically and derive sound management decisions.
- compose clear and convincing written papers that accurately present the analyses and recommendations developed.
- present results in an engaging manner and actively participate in substantive discussions.

Recommendations:

Prior attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

Total effort approx. 90 hours

Attendance time: 15 hours

Preparation and follow-up: 75 hours

Examination and preparation: not applicable

Verification:

The success control according to § 4(2), 3 SPO is done by writing a scientific paper and a presentation of the results of the paper in the context of a final event. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

Organizational issues

Termin am 22. Januar 2025 findet im Raum 2A-12.1 im Gebäude 05.20 am IBU statt.

7.450 Course: Structural and Phase Analysis [T-MACH-102170]

Responsible: Dr.-Ing. Susanne Wagner
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Exams			
WT 24/25	76-T-MACH-102170	Structural and Phase Analysis	Wagner, Hinterstein
ST 2025	76-T-MACH-102170	Structural and Phase Analysis	Wagner

Competence Certificate
Oral examination

Prerequisites
none

T 7.451 Course: Successful Transformation Through Innovation [T-WIWI-111823]

Responsible: Malte Busch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2025	2500018	Successful transformation through innovation	2 SWS	Seminar / 🗣	Busch
Exams					
ST 2025	7900025	Successful Transformation Through Innovation			Busch

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Alternative exam assessments. The grade consists of an presentation of the results (50%) and a seminar paper (50%).

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.

Annotation
Teaching and learning format: Seminar

Workload
90 hours

Below you will find excerpts from events related to this course:

V Successful transformation through innovation

Seminar (S)
On-Site

2500018, SS 2025, 2 SWS, Language: German, Open in study portal

Content
This seminar uses strategic innovation management theory and concepts such as organisational ambidexterity, boundary spanning and stakeholder approaches how companies can increase their innovative increase their innovative capacity through innovation. The students will use a core paper to illustrate the steps towards becoming an innovative organisation. The aim is to understand how -with the help of the concepts mentioned above - medium-sized companies, in the context of organisational inertia and path dependency, may become innovation-driven organisations. The seminar will analyse the role of different stakeholders, which role the different stakeholders play and how companies may become part of an innovation ecosystems. Based on the core paper, the students will apply the concepts they have learned to selected companies and present the results in class. In addition to a presentation, the students will submit the results in seminar papers.

Organizational issues
Weblink: https://itm.entechnon.kit.edu/192_1281.php

T 7.452 Course: Superhard Thin Film Materials [T-MACH-102103]

Responsible: Prof. Sven Ulrich
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	3

Events					
WT 24/25	2177618	Superhard Thin Film Materials	2 SWS	Lecture / 🗣	Ulrich
Exams					
WT 24/25	76-T-MACH-102103	Superhard Thin Film Materials			Ulrich
ST 2025	76-T-MACH-102103	Superhard Thin Film Materials			Ulrich

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral examination (ca. 30 Minuten)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Superhard Thin Film Materials — **Lecture (V) On-Site**
2177618, WS 24/25, 2 SWS, Language: German, Open in study portal

Content

oral examination (about 30 min), no tools or reference materials

Teaching Content:

Introduction

Basics

Plasma diagnostics

Particle flux analysis

Sputtering and ion implantation

Computer simulations

Properties of materials, thin film deposition technology,
thin film analysis and modelling of superhard materials

Amorphous hydrogenated carbon

Diamond like carbon

Diamond

Cubic Boronnitride

Materials of the system metall-boron-carbon-nitrogen-silicon

regular attendance: 22 hours
self-study: 98 hours

Superhard materials are solids with a hardness higher than 4000 HV 0,05. The main topics of this lecture are modelling, deposition, characterization and application of superhard thin film materials.

Recommendations: none

Organizational issues

Falls die Vorlesung online stattfinden muss, bitte um Anmeldung unter sven.ulrich@kit.edu bis zum 22.10.24.

Den entsprechenden MS Teams Link erhalten Sie dann per E-Mail am 23.10.24.

Literature

G. Kienel (Herausgeber): Vakuumbeschichtung 1 - 5, VDI Verlag, Düsseldorf, 1994

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed

T 7.453 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment of this course is a written or (if necessary) oral examination.

Prerequisites
None

Annotation
This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but is not equivalent to another course of this topic.

Workload
135 hours

T 7.454 Course: Supplement Software- and Systemsengineering [T-WIWI-110372]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate
The assessment of this course is a written or (if necessary) oral examination.

Prerequisites
None

Annotation
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot assigned to another course of this topic.

T 7.455 Course: Supply Chain Management with Advanced Planning Systems [T-WIWI-102763]

Responsible: Claus J. Bosch
Dr. Mathias Göbelt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each summer term	1

Events					
ST 2025	2581961	Supply Chain Management with Advanced Planning Systems	2 SWS	Lecture / 🗣	Göbelt, Bosch
Exams					
WT 24/25	7981961	Supply Chain Management with Advanced Planning Systems			Schultmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Supply Chain Management with Advanced Planning Systems
Lecture (V)
On-Site

2581961, SS 2025, 2 SWS, Language: English, Open in study portal

Content

This lecture deals with supply chain management from a practitioner's perspective with a special emphasis Advanced Planning Systems (APS) and the planning domain. The software solution SAP SCM, one of the most widely used Advanced Planning Systems, is used as an example to show functionality and application of an APS in practice.

First, the term supply chain management is defined and its scope is determined. Methods to analyze supply chains as well as indicators to measure supply chains are derived. Second, the structure of an APS (advanced planning system) is discussed in a generic way. Later in the lecture, the software solution SAP SCM is mapped to this generic structure. The individual planning tasks and software modules (demand planning, supply network planning / sales & operations planning, production planning / detailed scheduling, deployment, transportation planning, global available-to-promise) are presented by discussing the relevant business processes, providing academic background, describing typical planning processes and showing the user interface and user-related processes in the software solution. At the end of the lecture, implementation methodologies and project management approaches for SAP SCM are covered.

Contents

1. Introduction to Supply Chain Management

1.1. Supply Chain Management Fundamentals

1.2. Supply Chain Management Analytics

2. Structure of Advanced Planning Systems

3. SAP SCM

3.1. Introduction / SCM Solution Map

3.2. Demand Planning

3.3. Supply Network Planning / Sales & Operations Planning

3.4. Production Planning and Detailed Scheduling

3.5. Deployment

3.6. Transportation Planning / Global Available to Promise

3.7. Cloud-based Supply Chain Planning

4. SAP SCM in Practice

4.1. Project Management and Implementation

4.2. SAP Implementation Methodology

Literature

will be announced in the course

T 7.456 Course: Sustainability in Mobility Systems [T-BGU-111057]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6232906	Sustainability in Mobility Systems	2 SWS	Lecture / 🗣	Kagerbauer, Plötz, Gnann
Exams					
WT 24/25	8245111057	Sustainability in Mobility Systems			Kagerbauer

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, 60 min., computer-based

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 7.457 Course: Sustainable Vehicle Drivetrains [T-MACH-111578]

Responsible: Prof. Dr. Thomas Koch
Dr.-Ing. Olaf Toedter
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101303 - Combustion Engines II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2133132	Sustainable Vehicle Drivetrains	2 SWS	Lecture / 🗣	Toedter
Exams					
WT 24/25	76-T-MACH-105655	Sustainable Vehicle Drivetrains			Toedter

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam (approx. 20 minutes)

Prerequisites
none

Annotation
Starting in winter term 25/26, the course consists of a lecture (2h / week) and a tutorial (1 h / week).

Workload
120 hours

Below you will find excerpts from events related to this course:

V Sustainable Vehicle Drivetrains

2133132, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Sustainability

Environmental balance

Legislation

Alternative fuels

BEV

Fuel cell

Hybrid drives

T 7.458 Course: System Integration in Micro- and Nanotechnology [T-MACH-105555]

Responsible: apl. Prof. Dr. Ulrich Gengenbach
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2025	2106033	System Integration in Micro- and Nanotechnology I	2 SWS	Lecture / 🗣	Gengenbach
Exams					
WT 24/25	76-T-MACH-105555	System Integration in Micro- and Nanotechnology			Gengenbach

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam (Duration: 30 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V System Integration in Micro- and Nanotechnology I
2106033, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Content:

- Introduction to system integration (fundamentals)
- Brief introduction to MEMS processes
- Flexures
- Surfaces and plasma processes for surface treatment
- Adhesive bonding in engineering
- Mounting techniques in electronics
- Molded Interconnect devices (MID)
- Functional Printing
- Low temperature cofired ceramics in system integration

Learning objectives:

The students acquire basic knowledge of challenges and system integration technologies from mechanical engineering, precision engineering and electronics.

Literature

- A. Risse, Fertigungsverfahren der Mechatronik, Feinwerk- und Präzisionsgerätetechnik, Vieweg+Teubner Verlag, Wiesbaden, 2012
- M. Madou, Fundamentals of microfabrication and nanotechnology, CRC Press Boca Raton, 2012
- G. Habenicht, Kleben Grundlagen, Technologien, Anwendungen, Springer-Verlag Berlin Heidelberg, 2009
- J. Franke, Räumliche elektronische Baugruppen (3D-MID), Carl Hanser-Verlag München, 2013

T 7.459 Course: System Integration in Micro- and Nanotechnology 2 [T-MACH-110272]

Responsible: apl. Prof. Dr. Ulrich Gengenbach
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101294 - Nanotechnology

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2105040	System Integration in Micro- and Nanotechnology 2	2 SWS	Lecture / 🗣	Gengenbach
Exams					
WT 24/25	76-T-MACH-110272	System Integration in Micro- and Nanotechnology 2			Gengenbach

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral exam, approx. 15 min.

Prerequisites
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V System Integration in Micro- and Nanotechnology 2

2105040, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Introduction to system integration (novel processes and applications)

Assembly of hybrid microsystems

Packaging processes

Applications:

- Lab-on-chip systems
- Microoptical systems
- Silicon Photonics

Novel integration processes:

- Direct Laser Writing
- Self Assembly

Learning objectives
The students acquire knowledge of novel system integration technologies and their application in microoptic and microfluidic systems.

Literature
N.-T. Nguyen, Fundamentals and Applications of Microfluidics, Artech House

G. T. Reed, Silicon Photonics: An Introduction, Wiley

T 7.460 Course: Systematic Materials Selection [T-MACH-100531]

Responsible: Dr.-Ing. Stefan Dietrich
Prof. Dr.-Ing. Volker Schulze

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	5

Events					
ST 2025	2174576	Systematic Materials Selection	3 SWS	Lecture / 🗣	Dietrich
ST 2025	2174577	Excercises in Systematic Materials Selection	1 SWS	Practice / 🗣	Dietrich
Exams					
WT 24/25	76-T-MACH-100531	Systematic Materials Selection			Dietrich
ST 2025	76-T-MACH-100531	Systematic Materials Selection			Dietrich

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written exam of 2 h.

Prerequisites
None.

Recommendation
It is strongly recommended to pass the two courses "Materials Science I" (T-MACH-102078) and "Materials Science II" (T-MACH-102079).

Workload
120 hours

Below you will find excerpts from events related to this course:

V Systematic Materials Selection

2174576, SS 2025, 3 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content
Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are deeloped. The following topics are covered:

- Information and introduction
- Necessary basics of materials
- Selected methods / approaches of the material selection
- Examples for material indices and materials property charts
- Trade-off and shape factors
- Sandwich materials and composite materials
- High temperature alloys
- Regard of process influences
- Material selection for production lines
- Incorrect material selection and the resulting consequences
- Abstract and possibility to ask questions

learning objectives:
The students are able to select the best material for a given application. They are proficient in selecting materials on base of performance indices and materials selection charts. They can identify conflicting objectives and find sound compromises. They are aware of the potential and the limits of hybrid material concepts (composites, bimaterials, foams) and can determine whether following such a concept yields a useful benefit.
requirements:

WiIng SPO 2007 (B.Sc.)

The course Material Science I [21760] has to be completed beforehand.

WiIng (M.Sc.)

The course Material Science I [21760] has to be completed beforehand.

workload:

The workload for the lecture is 120 h per semester and consists of the presence during the lecture (30 h) as well as preparation and rework time at home (30 h) and preparation time for the oral exam (60 h).

Literature
Vorlesungsskriptum; Übungsblätter; Lehrbuch: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);
Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen
Easy-Reading-Ausgabe, 3. Aufl., Spektrum Akademischer Verlag, 2006
ISBN: 3-8274-1762-7

Lecture notes; Problem sheets; Textbook: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);
Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen
Easy-Reading-Ausgabe, 3. Aufl., Spektrum Akademischer Verlag, 2006
ISBN: 3-8274-1762-7

T 7.461 Course: Tax Law [T-INFO-111437]

Responsible: Detlef Dietrich
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	24646	Tax Law	2 SWS	Lecture / 🗣	Dietrich
Exams					
WT 24/25	7500062	Tax Law			Sattler, Matz
ST 2025	7500120	Tax Law			Sattler

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 7.462 Course: Telecommunications and Internet – Economics and Policy [T-WIWI-113147]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101406 - Network Economics
M-WIWI-101409 - Electronic Markets
M-WIWI-107010 - Economics in a Connected World

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2561232	Telecommunication and Internet - Economics and Policy	2 SWS	Lecture /	Mitusch
WT 24/25	2561233	Excercises to Telecommunication and Internet - Economics and Policy	1 SWS	Practice /	Mitusch, Corbo
Exams					
WT 24/25	7900246	Telecommunications and Internet – Economics and Policy			Mitusch

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
Students' understanding and knowledge will be assessed through either an oral or a written exam. The actual method used will be announced during the course. The course takes place every winter term, and exams are offered two times a year, in March and in September.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-102713 - Telecommunication and Internet Economics must not have been started.

Recommendation
Basic knowledge of microeconomics is a precondition. Further knowledge of industrial economics or networks economics is useful, but not necessary. No prior knowledge of telecommunications or internet technologies is required.

Annotation
Disclaimer:
German wording is sometimes provided in parallel. Some German original literature is used (especially official and legislative texts) where we will try to provide English translations in parallel.

Workload
135 hours

Below you will find excerpts from events related to this course:

V Telecommunication and Internet - Economics and Policy

2561232, WS 24/25, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content

Description:

The course provides students with a comprehensive understanding of the economic principles, dynamics, and policies that govern the telecommunication and internet industries and markets. It focuses on the infrastructure of the internet, both physical and logical.

Course Objectives:

Understand the telecommunication and internet landscape: Students will be introduced to the historical development, evolution, and current state of the telecommunication and internet industries. This includes technology, industrial organization, regulation, and other policies. Students will explore the emergence of modern telecommunication networks, the birth of the internet, and key milestones that have shaped the global communication landscape.

Examine network economics: Students will explore the unique economic characteristics of telecommunications networks, including network effects, economies of scale, the implications for investment decisions and market entry barriers, and regulatory responses.

Analyse market structures and competition policies: Students will dive into the various market structures that exist within the telecommunication and internet industries, including: access to the internet by users, access to the infrastructure by firms, economic interactions between the autonomous systems (i.e. sub-networks) and other players (like internet exchange points) of the internet, implications for quality of services and network neutrality. Emphasis will be placed on competitiveness of markets, resp. market power, on the role of regulation, and how they impact market dynamics.

Investigate infrastructure investment and policy: The course will address the significant role of infrastructure investment in the telecommunication and internet sectors. Students will analyse the economic drivers behind infrastructure construction, government policies, and regulatory frameworks that influence investment decisions.

Address emerging trends: The course will address the latest trends and technologies in telecommunication and the internet, such as 5G, Internet of Things (IoT), and cloud computing, content delivery networks, and their economic implications.

Assess platform economics: The role of digital platforms in the telecommunication and internet industries will be addressed. Students will understand platform business models and the economics of multisided markets. In this context, the "hypergiants" of the internet get into the focus as well as the challenges and opportunities they present.

Teaching Methodology:

The course will adopt a combination of lectures, case studies, and guest lectures from (industry) experts. Real-world examples will be used to illustrate economic principles in action within the telecommunication and internet sectors. A few economic models will be analysed, but most of the issues will be addressed verbally.

T 7.463 Course: Telecommunications Law [T-INFO-101309]

Organisation: KIT Department of Informatics

Part of: M-INFO-106754 - Public Economic and Technology Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2424632	Telekommunikationsrecht	2 SWS	Lecture / 🗣	Döveling
Exams					
WT 24/25	7500049	Telecommunications Law			Zufall
ST 2025	7500085	Telecommunications Law			Zufall

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 7.464 Course: Tendering, Planning and Financing in Public Transport [T-BGU-101005]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation
M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6232807	Competition, Planning and Financing in Public Transport	2 SWS	Lecture / 🗣	Pischon
Exams					
ST 2025	8245101005	Tendering, Planning and Financing in Public Transport			Vortisch

Legend: 🖥 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 20 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 7.465 Course: The Circular Factory [T-MACH-113983]

Responsible: Prof. Dr.-Ing. Gisela Lanza
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-107129 - The Circular Factory

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	2

Events					
ST 2025	2150620	The Circular Factory	4 SWS	Lecture / 🗣	Lanza, Kaiser
Exams					
ST 2025	76-T-MACH-113983	The Circular Factory			Lanza

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
written exam, duration 120 minutes

Prerequisites
none

Workload
270 hours

Below you will find excerpts from events related to this course:

V The Circular Factory

2150620, SS 2025, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Content

New, innovative economic systems are needed to decouple resource consumption from wealth. New, innovative economic systems are needed to decouple resource consumption from prosperity. In this lecture, students learn about the relevance of such systems of circular value creation. The main focus is on implementation by means of a so-called circular factory, which should enable a new life cycle for used products. Ideally, this is done today by upgrading the used product to the product generation currently in production. This shows the complex field of tension in which the topics of this course are embedded. The freedom of product development is restricted by the constraint of product upgrades and new paradigms are needed. The planning and control of products by the circular factory, including the associated logistics concepts, is complicated by the used condition of the returns. This must be measured and evaluated in order to enable a functional statement of the reprocessed product in a new life cycle. Not least, it requires appropriate (robotic) automation concepts for the disassembly of used products and their reprocessing, which must be specifically designed in high-wage countries in order to operate and establish the overall process economically.

The content of the course addresses and deals with the specific problems and solutions that arise in the realization of circular factories. The following topics are addressed in chronological order:

- An overview of the circular economy in general and different strategies to reduce the consumption of natural resources (R-strategies).
- Comprehensive overview of remanufacturing and presentation of challenges and solutions in the planning and control of disassembly and remanufacturing systems.
- Guidelines and constraints in the design, development and validation of sustainable products.
- Fundamentals of metrological assessment and evaluation of returning used products in the circular factory to enable a new life cycle.
- Methods for data-driven learning from human disassembly to enable automated robot-based automation.
- Processing technology solutions for the reprocessing of used products.
- Intralogistics and handling of recyclable products.

The lecture is complemented by practical items. Real-life industrial problems are presented and discussed in order to reinforce students' understanding of the relevance of the theoretical content and to enable a thorough practical orientation.

Learing Outcomes:

The students ...

- can name dimensions of circularity and circular economy methods (e.g., repair, refurbish, recycle) and describe them in detail.
- can describe challenges in planning and control circular factories, including remanufacturing networks and disassembly systems.
- are able to apply guidelines for designing circular products.
- distinguish data acquisition techniques for metrologically assessing returned products and apply uncertainty-driven product modeling in circular production systems.
- have methodical knowledge on learning from human observation and disassembly automatization and apply this knowledge to new problem cases.
- can describe reprocessing methods, including reconditioning and material characterization.
- understand the challenges in intralogistics for circular products.

After completing this course, students are able to understand the challenges of establishing a circular economy. They are also able to evaluate possible solutions and assess them in relation to these challenges. In particular, students are ultimately able to understand circular production in a circular factory holistically and to relate it to existing concepts in industrial practice.

Workload:

regular attendance: 62 hours
self-study: 178 hours

Literature

Medien:

Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).

T 7.466 Course: Tires and Wheel Development for Passenger Cars [T-MACH-102207]

Responsible: Prof. Dr.-Ing. Günter Leister
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2025	2114845	Tires and Wheel Development for Passenger Cars	2 SWS	Lecture / 🗣	Leister
Exams					
WT 24/25	76-T-MACH-102207	Tires and Wheel Development for Passenger Cars			Leister
ST 2025	76-T-MACH-102207	Tires and Wheel Development for Passenger Cars			Leister

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral Examination

Duration: 30 up to 40 minutes

Auxiliary means: none

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Tires and Wheel Development for Passenger Cars

2114845, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Content

1. The role of the tires and wheels in a vehicle
2. Geometrie of Wheel and tire, Package, load capacity and endurance, Book of requirement
3. Mobility strategy, Minispare, runflat systems and repair kit.
4. Project management: Costs, weight, planning, documentation
5. Tire testing and tire properties
6. Wheel technology incuding Design and manifacturing methods, Wheeltesting
7. Tire presssure: Indirect and direct measuring systems
8. Tire testing subjective and objective

Learning Objectives:

The students are informed about the interactions of tires, wheels and chassis. They have an overview of the processes regarding the tire and wheel development. They have knowledge of the physical relationships.

Organizational issues
Voraussichtliche Termine, nähere Informationen und eventuelle Terminänderungen:

siehe Institutshomepage.

Literature
Manuskript zur Vorlesung

Manuscript to the lecture

T 7.467 Course: Topics in Experimental Economics [T-WIWI-102863]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101505 - Experimental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Annotation
The course is offered in summer 2020 for the next time, not in summer 2018.

T 7.468 Course: Topics in Stochastic Optimization [T-WIWI-112109]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-101637 - Analytics and Statistics
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Competence Certificate
Students will be given problem sets on which they work in groups. The problem sets will involve the implementation of the models presented in the course, and exploring features of these models. The groups will present their findings in front of the class. The grading will be based on the presentation.

Recommendation
A solid understanding of Stochastic Optimization and/or Optimization under Uncertainty as well as optimization in general is highly recommended, since we will heavily build upon basics of these areas.

Annotation
Teaching and learning format: Lecture and exercise

Workload
135 hours

T 7.469 Course: Trademark and Unfair Competition Law [T-INFO-101313]

Responsible: Dr. Yvonne Matz
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each term	1

Events					
WT 24/25	2424136	Trademark and Unfair Competition Law	2 SWS	Lecture / 🗣	Matz
ST 2025	24609	Trademark and Unfair Competition Law	2 SWS	Lecture / 🗣	Matz
Exams					
WT 24/25	7500061	Trademark and Unfair Competition Law			Matz
ST 2025	7500051	Trademark and Unfair Competition Law			Matz

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The assessment is carried out as a written examination (§ 4 Abs. 2 No. 1 SPO) lasting 60 minutes.

Prerequisites
None.

T 7.470 Course: Traffic Engineering [T-BGU-101798]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6232703	Road Traffic Engineering	2 SWS	Lecture / Practice (/	Vortisch, Mitarbeiter/innen
Exams					
WT 24/25	8240101798	Traffic Engineering			Vortisch
ST 2025	8240101798	Traffic Engineering			Vortisch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

Below you will find excerpts from events related to this course:

V Road Traffic Engineering

6232703, WS 24/25, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The lecture teaches basic principles and skills necessary to understand the methods and tools of traffic engineering, including theoretical background information as well as application of the relevant manuals and guidelines.

- Applications of traffic engineering: design of infrastructure and traffic control
- Description and analysis of traffic flow: Basic principles (kinematics, measurements of traffic flows, microscopic and macroscopic traffic parameters, Fundamental diagram)
- Methods in traffic engineering: travel demand structure, traffic flow characteristics, Queuing theory, Level-of-Service-concepts
- Capacity analysis for intersections with and without signalisation (entries and weaving sections, roundabouts and signal-controlled intersection),
- Backgrounds and application of the German Highway Capacity Manual
- Design of signal control (Fixed time signal controls, vehicle actuated control, „green waves“, network control, progressive signal systems) including public transport (prioritizing systems) and other transport modes (bicycles, pedestrians)
- Introduction to traffic management (for more detailed information see lecture “Transport Management and Transport Telematics [6232802])

Coordination: Baumann, Marvin

T 7.471 Course: Traffic Flow Simulation [T-BGU-101800]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6232804	Traffic Simulation	2 SWS	Lecture / Practice (/	Vortisch, Mitarbeiter/innen
Exams					
WT 24/25	8240101800	Traffic Flow Simulation			Vortisch
ST 2025	8240101800	Traffic Flow Simulation			Vortisch

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

Below you will find excerpts from events related to this course:

V Traffic Simulation

6232804, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The lecture teaches basic principles and application of traffic flow simulation tools in traffic engineering and transport planning.

This includes application of simulation software as well as the knowledge about models and how to deal with the stochastic nature of simulation results.

The lecture teaches the application of microscopic traffic flow simulation using the simulation software PTV Vissim, combining practical and theoretical aspects. Theoretical aspects include car following models, lane changing behavior and route choice models. Calibration and validation of the models will be explained and demonstrated by practical examples. Furthermore, German and American guidelines for the application of simulation models will be discussed and background information will be given.

In addition to the lectures, students will build a microscopic traffic flow model of an intersection. The aim is to practically apply what has been learned and to deepen the modeling knowledge.

Coordination: Grau, Josephine

T 7.472 Course: Traffic Management and Transport Telematics [T-BGU-101799]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6232802	Traffic Management and Telematics	2 SWS	Lecture / Practice (/ 🗣	Vortisch
Exams					
WT 24/25	8240101799	Traffic Management and Transport Telematics			Vortisch
ST 2025	8240101799	Traffic Management and Transport Telematics			Vortisch

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral Exam, appr. 20. min.

Prerequisites
Exercise Transportation Data Analysis must be passed

Recommendation
None

Annotation
None

Workload
90 hours

T 7.473 Course: Transport Economics [T-WIWI-100007]

Responsible: Prof. Dr. Kay Mitusch
Dr. Eckhard Szimba

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101406 - Network Economics
M-WIWI-101468 - Environmental Economics
M-WIWI-101485 - Transport Infrastructure Policy and Regional Development

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2025	2560230	Transport Economics	2 SWS	Lecture	Mitusch, Szimba
ST 2025	2560231	Übung zu Transportökonomie	1 SWS	Practice	Krenn
Exams					
WT 24/25	7900232	Transport Economics			Mitusch

Competence Certificate
The assessment is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

Below you will find excerpts from events related to this course:

V Transport Economics
2560230, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content
The course shall provide an overview of transport economics. It will be demonstrated, using new microeconomic models, which impacts regulation and pricing in transport have on the economic actions of individuals and logisticans and which benefits and costs apply. The following topics will be discussed:

- demand and supply in transport
- empirical analysis of transport demand
- assessment of transport infrastructure projects
- external effects in transport
- transport policy
- cost structures of transport infrastructure
- Project evaluation from the perspective of the public sector

Literature
Literatur:

Aberle, G: Transportwirtschaft: einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen München; Wien: Oldenbourg, 2003.

Blauwens, G., De Baere, P. and Van der Voorde, E. (2006): Transport Economics.

Frerich, J; Müller, G: Europäische Verkehrspolitik, Landverkehrspolitik München; Wien: Oldenbourg, 2004.

Dasgupta, A, Pearce, D (1972): Cost-Benefit Analysis, MacMillan, London.

Europäische Kommission (2008): Guide to Cost Benefit Analysis of Investment Projects, online unter http://ec.europa.eu/regional_policy/sources/Ben-Akiva, M., Meerseman, H., and Van de Voorde, E. (2008): Recent developments in transport modelling: Lessons for the freight sector.

Ortúzar, J. d. D. and Willumsen, L. (1990): Modelling Transport.

T 7.474 Course: Transportation Data Analysis [T-BGU-100010]

Responsible: PD Dr.-Ing. Martin Kagerbauer
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101065 - Transportation Modelling and Traffic Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	2

Events					
WT 24/25	6232901	Empirical Data in Transportation	2 SWS	Lecture / Practice (/ 🗣	Kagerbauer
Exams					
WT 24/25	8245100010	Transportation Data Analysis			Kagerbauer
ST 2025	8240100010	Transportation Data Analysis			Kagerbauer

Legend: 📱 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
The Exercise Transportation Data Analysis (T-BGU-113671) has to be passed.

Recommendation
None

Annotation
None

Workload
90 hours

T 7.475 Course: Transportation Systems [T-BGU-106610]

Responsible: Prof. Dr.-Ing. Peter Vortisch
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101064 - Fundamentals of Transportation

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	2

Events					
ST 2025	6200406	Transportation Systems	2 SWS	Lecture / 🗣	Vortisch
Exams					
WT 24/25	8230106610	Transportation Systems			Vortisch

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

7.476 Course: Trustworthy Emerging Technologies [T-WIWI-113026]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-109251 - Selected Issues in Critical Information Infrastructures must not have been started.

Workload
135 hours

T 7.477 Course: Tunnel Construction and Blasting Engineering [T-BGU-101846]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101110 - Process Engineering in Construction

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6241903	Tunnel Construction and Blasting Engineering	2 SWS	Lecture / 🗣	Haghsheno, Scheuble
Exams					
WT 24/25	8240101846	Tunnel Construction and Blasting Engineering			Haghsheno, Schneider

Legend: 🖥 Online, ✲ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Workload
90 hours

T 7.478 Course: Turnkey Construction [T-BGU-111921]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-101884 - Lean Management in Construction
M-BGU-101888 - Project Management in Construction
M-BGU-105592 - Digitalization in Facility Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
ST 2025	6241808	Turnkey Construction	2 SWS	Lecture / Practice (/	Teizer
Exams					
WT 24/25	8240111921	Turnkey Construction			Haghsheno

Legend: Online, Blended (On-Site/Online), On-Site, × Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 7.479 Course: Tutoring: Training and Practice [T-WIWI-112967]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	2	pass/fail	Each term	1

Competence Certificate

- Successful participation in the KIT-PEBA tutor training course "Start in die Lehre": 2 credit points.
- Successful participation in the tutor training course "Start in die Lehre" and supplementary tutoring activity over at least two semesters: 3 credit points.

Annotation

The successful participation in the tutor training "Start in die Lehre" of KIT-PEBA can be credited in the seminar module WiIng/TVWL M.Sc. as interdisciplinary qualification with two or three credit points.

The online application with further information can be found at https://portal.wiwi.kit.edu/forms/form/AnerkennungTutorent%C3%A4tigkeit.

T 7.480 Course: Upgrading of Existing Buildings [T-BGU-111218]

Responsible: Prof. Dr.-Ing. Kunibert Lennerts
Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences
Part of: M-BGU-106453 - Facility Management in Hospitals for Industrial Engineering

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6240901	Bauen im Bestand	3 SWS	Lecture / Practice (/ 🗣	Lennerts, Schneider
Exams					
WT 24/25	8240111218	Upgrading of Existing Buildings			Lennerts, Schneider

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
90 hours

T 7.481 Course: Urban Water Technologies [T-BGU-112365]

Responsible: Dr.-Ing. Mohammad Ebrahim Azari Najaf Abad
PD Dr.-Ing. Stephan Fuchs

Organisation: KIT Department of Civil Engineering, Geo and Environmental Sciences

Part of: M-BGU-104448 - Urban Water Technologies

Type	Credits	Grading scale	Recurrence	Expansion	Version
Oral examination	9	Grade to a third	Each term	1 terms	1

Events					
WT 24/25	6223701	Urban Water Infrastructure and Management	4 SWS	Lecture / Practice (/ 🗣	Fuchs
WT 24/25	6223801	Wastewater Treatment Technologies	4 SWS	Lecture / Practice (/ 🗣	Fuchs, Azari Najaf Abad

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
oral exam, appr. 30 min.

Prerequisites
none

Recommendation
none

Annotation
none

Workload
270 hours

T 7.482 Course: Valuation [T-WIWI-102621]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101482 - Finance 1
M-WIWI-101483 - Finance 2
M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 24/25	2530212	Valuation	2 SWS	Lecture / 🗣	Ruckes
WT 24/25	2530213	Übungen zu Valuation	1 SWS	Practice / 🗣	Ruckes, Luedecke
Exams					
WT 24/25	7900057	Valuation			Ruckes
ST 2025	7900072	Valuation			Ruckes

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

Below you will find excerpts from events related to this course:

V Valuation
2530212, WS 24/25, 2 SWS, Language: English, Open in study portal

Lecture (V)
On-Site

Literature
Weiterführende Literatur

Titman/Martin (2013): *Valuation - The Art and Science of Corporate Investment Decisions*, 2nd. ed. Pearson International.

T 7.483 Course: Vehicle Systems for Urban Mobility [T-MACH-113069]

Responsible: Prof. Dr.-Ing. Martin Cichon
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-106496 - Modern Mobility on Rails and Roads

Type	Credits	Grading scale	Version
Oral examination	4,5	Grade to a third	3

Events					
WT 24/25	2115922	Vehicle Systems for Urban Mobility	2 SWS	Lecture / 🗣	Cichon, Ziesel
ST 2025	2115922	Vehicle Systems for Urban Mobility	2 SWS	Lecture / 🗣	Ziesel, Cichon
Exams					
WT 24/25	76-T-MACH-106428	Vehicle Systems for Urban Mobility			Ziesel, Cichon
ST 2025	76-T-MACH-106428	Vehicle Systems for Urban Mobility			Ziesel, Cichon

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral examination
Duration: approx. 20 minutes
No tools or reference material may be used during the exam.

Workload
135 hours

T 7.484 Course: Virtual Engineering II [T-MACH-102124]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	3

Events					
ST 2025	2122378	Virtual Engineering II		Lecture / Practice (/ 🗣	Häfner, Ovtcharova
Exams					
WT 24/25	76-T-MACH-102124	Virtual Engineering II			Ovtcharova, Häfner
ST 2025	76-T-MACH-102124	Virtual Engineering II			Ovtcharova, Häfner

Legend: 🖥 Online, ❃ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Writen examination 90 min.

Prerequisites
None

Workload
120 hours

Below you will find excerpts from events related to this course:

V Virtual Engineering II

2122378, SS 2025, SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)
On-Site

Content
The course includes:

- Fundamentals (Computer Graphics, VR, AR, MR)
- Hardware and Software Solutions
- Virtual Twin, Validation and application

After successful attendance of the course, students can:

- describe Virtual Reality concepts, as well as explaining and comparing the underlying technologies
- discuss the modeling and computer-internal picture of a VR scene and explain the operation of the pipeline to visualize the scene
- designate different systems to interact with a VR scene and assess the pros and cons of manipulation and tracking devices
- differentiate between static, dynamic and functional Virtual Twins
- describe applications and validation studies with Virtual Twins in the area of building and production

Organizational issues
Zusätzliche Übungszeiten (1 SWS) werden zu Vorlesungsbegin bekannt gegeben / Additional practice times (1 SWS) will be announced at the beginning of the lecture.

Literature
Vorlesungsfolien / Lecture slides

T 7.485 Course: Virtual Engineering Lab [T-MACH-106740]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101281 - Virtual Engineering B

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4	Grade to a third	Each term	1

Events					
WT 24/25	2123350	Virtual Engineering Lab	3 SWS	Project (P / 🗣	Ovtcharova, Häfner
ST 2025	2123350	Virtual Engineering Lab	3 SWS	Project (P / 🗣	Häfner, Ovtcharova
Exams					
WT 24/25	76-T-MACH-106740	Virtual Engineering Lab			Ovtcharova, Häfner

Legend: 📱 Online, ❂ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Assessment of another type (graded), Group project to create a VR application (project task, implementation and presentation of the project work)

Below you will find excerpts from events related to this course:

V Virtual Engineering Lab
2123350, WS 24/25, 3 SWS, Language: German/English, Open in study portal

Project (PRO)
On-Site

Content

- Introduction in Virtual Reality (hardware, software, applications)
- Exercises in the task specific software systems
- Autonomous project work in the area of Virtual Reality in small groups

Literature
Keine / None

V Virtual Engineering Lab
2123350, SS 2025, 3 SWS, Language: German/English, Open in study portal

Project (PRO)
On-Site

Content

- Introduction in Virtual Reality (hardware, software, applications)
- Exercises in the task specific software systems
- Autonomous project work in the area of Virtual Reality in small groups

Organizational issues
Siehe Webseite zur Lehrveranstaltung / see web page of the lecture

Literature
Keine / None

T 7.486 Course: Warehousing and Distribution Systems [T-MACH-105174]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems
M-MACH-104888 - Advanced Module Logistics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	3

Events					
ST 2025	2118097	Warehousing and distribution systems	2 SWS	Lecture / 🗣	Furmans
Exams					
ST 2025	76-T-MACH-105174	Warehousing and Distribution Systems			Furmans

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The success control takes place in form of a written examination (60 min) during the semester break (according to §4(2), 1 SPO). If the number of participants is low, an oral examination (according to §4 (2), 2 SPO) may also be offered.

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V Warehousing and distribution systems
2118097, SS 2025, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Organizational issues
Vorlesung:

Die Vorlesung wird in diesem Semester als **Blockveranstaltung** angeboten. Die Veranstaltungstermine sind:

- Mi., 14. Mai
- Do., 15. Mai
- Fr., 16 Mai

Die Vorlesung startet jeweils um 08:00 Uhr und findet im **Selmayr-HS (Geb. 50.38)** statt. Bitte beachten Sie für mögliche kurzfristige Raumänderungen die Informationen im ILIAS-Kurs.

Klausur:

- Informationen zur Klausur werden zeitnah über den Ilias-Kurs bekanntgegeben.

Vorlesungsbegleitende Unterlagen:

- Die vorlesungsbegleitenden Unterlagen finden Sie ebenfalls im Ilias-Kurs.

Ansprechpartner:

Keno Büscher

Literature

ARNOLD, Dieter, FURMANS, Kai (2005)
Materialfluss in Logistiksystemen, 5. Auflage, Berlin: Springer-Verlag

ARNOLD, Dieter (Hrsg.) et al. (2008)
Handbuch Logistik, 3. Auflage, Berlin: Springer-Verlag

BARTHOLDI III, John J., HACKMAN, Steven T. (2008)
Warehouse Science

GUDEHUS, Timm (2005)
Logistik, 3. Auflage, Berlin: Springer-Verlag

FRAZELLE, Edward (2002)
World-class warehousing and material handling, McGraw-Hill

MARTIN, Heinrich (1999)
Praxiswissen Materialflußplanung: Transport, Hanshaben, Lagern, Kommissionieren, Braunschweig, Wiesbaden: Vieweg

WISSER, Jens (2009)
Der Prozess Lagern und Kommissionieren im Rahmen des Distribution Center Reference Model (DCRM); Karlsruhe : Universitätsverlag

Eine ausführliche Übersicht wissenschaftlicher Paper findet sich bei:

ROODBERGEN, Kees Jan (2007)
Warehouse Literature

T 7.487 Course: Water Quality Assessment [T-CIWVT-108841]

Responsible: Dr. Gudrun Abbt-Braun
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101122 - Water Chemistry and Water Technology II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Exams			
WT 24/25	7232603	Water Quality Assessment	Abbt-Braun, Horn

Competence Certificate
The examination is an oral examination with a duration of about 30 minutes (section 4 subsection 2 number 2 SPO).

Prerequisites
None

T 7.488 Course: Water Technology [T-CIWVT-106802]

Responsible: Prof. Dr. Harald Horn
Organisation: KIT Department of Chemical and Process Engineering
Part of: M-CIWVT-101121 - Water Chemistry and Water Technology I

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Each winter term	1

Events					
WT 24/25	2233030	Water Technology	2 SWS	Lecture / 🗣	Horn
WT 24/25	2233031	Exercises to Water Technology	1 SWS	Practice / 🗣	Horn, und Mitarbeitende
Exams					
WT 24/25	7232621	Water Technology			Horn
ST 2025	7232621	Water Technology			Horn

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

T 7.489 Course: Web App Programming for Finance [T-WIWI-110933]

Responsible: TT-Prof. Dr. Julian Thimme
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Once	1

Competence Certificate
Non exam assessment according to § 4 paragraph 3 of the examination regulation. (Anmerkung: gilt nur für SPO 2015). The grade is made up as follows: 50% result of the project (R-code), 50% presentation of the project.

Prerequisites
None

Recommendation
The content of the bachelor course Investments is assumed to be known and necessary to follow the course.

Workload
135 hours

T 7.490 Course: Welding Technology [T-MACH-105170]

Responsible: Dr.-Ing. Majid Farajian
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 24/25	2173571	Welding Technology	2 SWS	Block / 🗣	Farajian
Exams					
WT 24/25	76-T-MACH-105170	Welding Technology			Farajian

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
Oral exam, about 20 minutes

Prerequisites
none

Recommendation
Basics of material science (iron- and non-iron alloys), materials, processes and production, design.

All the relevant books of the German Welding Institute (DVS: Deutscher Verband für Schweißen und verwandte Verfahren) in the field of welding and joining is recommended.

Workload
120 hours

Below you will find excerpts from events related to this course:

V Welding Technology
2173571, WS 24/25, 2 SWS, Language: German, Open in study portal

Block (B)
On-Site

Content

definition, application and differentiation: welding,

welding processes, alternative connecting technologies.

history of welding technology

sources of energy for welding processes

Survey: Fusion welding,

pressure welding.

weld seam preparation/design

welding positions

weldability

gas welding, thermal cutting, manual metal-arc welding

submerged arc welding

gas-shielded metal-arc welding, friction stir welding, laser beam and electron beam welding, other fusion and pressure welding processes

static and cyclic behavior of welded joints,

fatigue life improvement techniques

learning objectives:

The students have knowledge and understanding of the most important welding processes and its industrial application.

They are able to recognize, understand and handle problems occurring during the application of different welding processes relating to design, material and production.

They know the classification and the importance of welding technology within the scope of connecting processes (advantages/ disadvantages, alternatives).

The students will understand the influence of weld quality on the performance and behavior of welded joints under static and cyclic load.

How the fatigue life of welded joints could be increased, will be part of the course.

requirements:

basics of material science (iron- and non-iron alloys), of electrical engineering, of production processes.

workload:

The workload for the lecture Welding Technology is 120 h per semester and consists of the presence during the lecture (18 h) as well as preparation and rework time at home (102 h).

exam:

oral, ca. 20 minutes, no auxiliary material

Organizational issues

Die Blockveranstaltung findet am 23.01.25, 24.01.2025, 30.01.2025, 31.10.2025 jeweils von 09:00 bis 15:00 Uhr in Gebäude 10.91 Raum 380 statt. Anmeldungen erfolgen über den Beitritt zum ILIAS-Kurs. Bei Fragen wenden Sie sich gerne an majid.farajian@kit.edu

Literature

Für ergänzende, vertiefende Studien gibt das

Handbuch der Schweißtechnik von J. Ruge, Springer Verlag Berlin, mit seinen vier Bänden

Band I: Werkstoffe

Band II: Verfahren und Fertigung

Band III: Konstruktive Gestaltung der Bauteile

Band IV: Berechnung der Verbindungen

einen umfassenden Überblick. Der Stoff der Vorlesung Schweißtechnik findet sich in den Bänden I und II. Einen kompakten Einblick in die Lichtbogenschweißverfahren bietet das Bändchen

Nies: Lichtbogenschweißtechnik, Bibliothek der Technik Band 57, Verlag moderne Industrie AG und Co., Landsberg / Lech

Im Übrigen sei auf die zahlreichen Fachbücher des DVS Verlages, Düsseldorf, zu allen Einzelgebieten der Fügetechnik verwiesen.

T 7.491 Course: Workshop Business Wargaming – Analyzing Strategic Interactions [T-WIWI-106189]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
WT 24/25	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar / 🗣	Lindstädt
ST 2025	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar / 🗣	Lindstädt
Exams					
WT 24/25	7900172	Workshop Business Wargaming – Analyzing Strategic Interactions			Lindstädt

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization" is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the summer term 2018.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)
2577922, WS 24/25, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content

This course enables the simulation of strategic conflicts in which the participants assume the roles of selected actors. With the help of specially programmed wargaming software, strategic conflicts are simulated interactively and then reflected upon and discussed.

The course focuses on the simulation and analysis of real conflict situations with strategic interaction. Students gain a better understanding of the structural characteristics of strategic conflicts in the fields of economics and politics as well as the ability to derive their own strategies for action.

Through a combination of group work, simulation, and reflection, the seminar provides a learning experience that both strengthens team skills and develops analytical skills in strategic conflict. Join this seminar to gain sound insights into conflict dynamics and develop effective action strategies for complex situations.

Learning Objectives

Upon completion of the course, students will be able to,

- learn the basic methodologies, features and benefits of business wargaming
- improve their understanding of conflict dynamics by reflecting on strategic conflicts
- Strengthen analytical skills by processing a variety of courses of action and deriving strategies for action

Recommendations:

Prior attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

- Total workload: approx. 90 hours
- Attendance time: 15 hours
- Preparation and follow-up: 75 hours
- Examination and preparation: not applicable

Evidence:

In this course, real conflict situations are simulated and analyzed with the help of various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

Organizational issues

IBU-Seminarraum, Geb. 05.20, Raum 2A-12.1

V **Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)**
2577922, SS 2025, 2 SWS, Language: German, Open in study portal
Seminar (S)
On-Site

Content

This course enables the simulation of strategic conflicts in which the participants assume the roles of selected actors. With the help of specially programmed wargaming software, strategic conflicts are simulated interactively and then reflected upon and discussed.

The course focuses on the simulation and analysis of real conflict situations with strategic interaction. Students gain a better understanding of the structural characteristics of strategic conflicts in the fields of economics and politics as well as the ability to derive their own strategies for action.

Through a combination of group work, simulation, and reflection, the seminar provides a learning experience that both strengthens team skills and develops analytical skills in strategic conflict. Join this seminar to gain sound insights into conflict dynamics and develop effective action strategies for complex situations.

Learning Objectives

Upon completion of the course, students will be able to,

- learn the basic methodologies, features and benefits of business wargaming
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- Strengthen analytical skills by processing a variety of courses of action and deriving strategies for action

Recommendations:

Prior attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

- Total workload: approx. 90 hours
- Attendance time: 15 hours
- Preparation and follow-up: 75 hours
- Examination and preparation: not applicable

Evidence:

In this course, real conflict situations are simulated and analyzed with the help of various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Annotation:

The course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics" [M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester, so the entire module can be completed in two semesters.

Organizational issues

IBU-Seminarraum, Geb. 05.20, Raum 2A-12.1

T 7.492 Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2025	2577923	Workshop aktuelle Themen Strategie und Management (Master)	2 SWS	Seminar / 🗣	Lindstädt

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✕ Cancelled

Competence Certificate
The evaluation of the performance takes place through the active participation in the discussion rounds; an appropriate preparation is expressed here and a clear understanding of the topic and framework becomes recognizable. Further details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

Workload
90 hours

Below you will find excerpts from events related to this course:

V Workshop aktuelle Themen Strategie und Management (Master)
2577923, SS 2025, 2 SWS, Language: German, Open in study portal

Seminar (S)
On-Site

Content

Aspects of strategic management can be found in a variety of daily events. In this course, current strategic and industrial policy issues are discussed and the exchange of ideas on current management topics is promoted.

For this purpose, practice-relevant case studies and dedicated questions are communicated to the students in advance so that they can prepare themselves individually for the discussion. The chair team actively moderates the discussion and creates typical discussion situations such as pro/con discussions and conflicting interests of different groups in order to bring opposing opinions into an exchange and to promote the power of argumentation. In this way, the discussion not only imparts knowledge about the content, but also strengthens the participants' skills by simulating real discussion situations in a management team.

In addition, company representatives and managers participate in individual case studies to strengthen the context of the content and experience the daily dynamics of discussion in strategic business areas.

Learning Objectives:

Students will

- are able to evaluate strategic decisions using appropriate models of strategic business management,
- are able to present and critically evaluate theoretical approaches and models in the field of strategic business management and illustrate them using practical examples, and
- have the ability to present their position convincingly through a reasoned argumentation in structured discussions.

Recommendations:

Previous attendance of the Bachelor's module "Strategy and Organization" or another module with comparable content at another university is recommended.

Workload:

Total effort approx. 90 hours

Attendance time: 15 hours

Preparation and follow-up: 75 hours

Examination and preparation: not applicable

Evidence:

Performance will be assessed through active discussion participation in the discussion rounds; here, adequate preparation will be expressed and a clear understanding of the topic and framework will be evident. Further details on the design of the performance assessment will be announced during the lecture.

Annotation:

This course is admission restricted. In case of prior admission to another course in the module "Strategy and Management: Advanced Topics"[M-WIWI-103119], participation in this course is guaranteed. For more information on the application process, see the IBU website.

Exams are offered at least every other semester so that the entire module can be completed in two semesters.

T 7.493 Course: X-ray Optics [T-MACH-109122]

Responsible: Dr. Arndt Last
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication
M-MACH-101292 - Microoptics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each term	1

Events					
WT 24/25	2141007	X-ray Optics	2 SWS	Lecture / 🗣	Last
ST 2025	2141007	X-ray optics	2 SWS	Lecture / 🗣	Last
Exams					
WT 24/25	76-T-MACH-109122	X-ray Optics			Last

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, x Cancelled

Competence Certificate
oral exam (about 20 min)

Prerequisites
none

Workload
120 hours

Below you will find excerpts from events related to this course:

V X-ray Optics
2141007, WS 24/25, 2 SWS, Language: English, Open in study portal
Lecture (V)
On-Site

Organizational issues
Termin und Ort nach Absprache mit den Angemeldeten

Literature
M. Born und E. Wolf
Principles of Optics, 7th (expanded) edition
Cambridge University Press, 2010

A. Erko, M. Idir, T. Krist und A. G. Michette
Modern Developments in X-Ray and Neutron Optics
Springer Series in Optical Sciences, Vol. 137
Springer-Verlag Berlin Heidelberg, 2008

D. Attwood
Soft X-Rays and Extreme Ultraviolet Radiation: Principles and Applications
Cambridge University Press, 1999

V X-ray optics
2141007, SS 2025, 2 SWS, Language: English, Open in study portal
Lecture (V)
On-Site

Content
see Institute homepage

If you are interested, please contact arndt.last@kit.edu by 30.5.2023 to make an appointment.

Organizational issues
Viertägiger Blockkurs im Juni oder Juli 2024. Interessenten melden sich bitte zur Terminabsprache bis zum 30.5.2024 bei arndt.last@kit.edu

8 Appendix

8.1 Definition - About this MHB

Basically, the program is divided into **subjects** (for example business administration, informatics or operations research). Each subject is in turn divided into **modules**. Each module consists of one or more interrelated **partial achievements**, which are completed by a **performance assessment**. The scope of each module is characterized by credit points, which are credited after successful completion of the module. Some modules are **compulsory**. Numerous modules offer numerous individual **elective and specialization options**. This gives students the opportunity to tailor the interdisciplinary degree program to their personal needs, interests and career prospects, both in terms of content and time. The module handbook describes the modules belonging to the degree program. It deals with

- the composition of the modules,
- the size of the modules (in CP),
- the interdependencies between the modules
- the qualification objectives of the modules,
- the type of assessment and
- how the grade of a module is calculated.

The module handbook thus provides the necessary orientation during your studies and is a helpful companion. However, the module handbook does not replace the **course catalog** which provides up-to-date information on the variable course dates (e.g. time and location of the course) for each semester.