Module Handbook
Industrial Engineering and Management M.Sc.
SPO 2015
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1 General information

Welcome to the new module handbook of your study program! We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester! In the following we would like to give you a short introduction to the most important terms and rules that are important in connection with the choice of modules, courses and examinations.

1.1 Structural elements

The program exists of several subjects (e.g. business administration, economics, operations research). Every subject is split into modules and every module itself consists of one or more interrelated module component exams. The extent of every module is indicated by credit points (CP), which will be credited after the successful completion of the module. Some of the modules are obligatory. According to the interdisciplinary character of the program, a great variety of individual specialization and deepening possibilities exists for a large number of modules. This enables the student to customize content and time schedule of the program according to personal needs, interest and job perspective. The module handbook describes the modules belonging to the program. It describes particularly:

- the structure of the modules
- the extent (in CP),
- the dependencies of the modules,
- the learning outcomes,
- the assessment and examinations.

The module handbook serves as a necessary orientation and as a helpful guide throughout the studies. The module handbook does not replace the course catalog, which provides important information concerning each semester and variable course details (e.g. time and location of the course).

1.2 Begin and completion of a module

Each module and each examination can only be selected once. The decision on the assignment of an examination to a module (if, for example, an examination in several modules is selectable) is made by the student at the moment when he / she is registered for the appropriate examination. A module is completed or passed when the module examination is passed (grade 4.0 or better). For modules in which the module examination is carried out over several partial examinations, the following applies: The module is completed when all necessary module partial examinations have been passed. In the case of modules which offer alternative partial examinations, the module examination is concluded with the examination with which the required total credit points are reached or exceeded. The module grade, however, is combined with the weight of the predefined credit points for the module in the overall grade calculation.

1.3 Module versions

It is not uncommon for modules to be revised due to, for example, new courses or cancelled examinations. As a rule, a new module version is created, which applies to all students who are new to the module. On the other hand, students who have already started the module enjoy confidence and remain in the old module version. These students can complete the module on the same conditions as at the beginning of the module (exceptions are regulated by the examination committee). The date of the student’s "binding declaration" on the choice of the module in the sense of §5(2) of the Study and Examination Regulation is decisive. This binding declaration is made by registering for the first examination in this module.

In the module handbook, all modules are presented in their current version. The version number is given in the module description. Older module versions can be accessed via the previous module handbooks in the archive at http://www.wiwi.kit.edu/Archiv_MHB.php.

1.4 General and partial examinations

Module examinations can be either taken in a general examination or in partial examinations. If the module examination is offered as a general examination, the entire learning content of the module will be examined in a single examination. If the module examination is subdivided into partial examinations, the content of each course will be examined in corresponding partial examinations. Registration for examinations can be done online at the campus management portal. The following functions can be accessed on https://campus.studium.kit.edu/:

- Register/unregister for examinations
- Check for examination results
- Create transcript of records

For further and more detailed information, https://studium.kit.edu/Seiten/FAQ.aspx.

1.5 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.
Caution: exam type dependent on further pandemic developments

Due to the current situation, online formats are also available for examinations that are typically offered as presence examinations, depending on the circumstances. All assessments that are announced in the modules as a written exam (written exam/sP according to SPO § 4 Abs. 2, Pkt. 1) can therefore also be offered as an alternative exam assessment/PLaA (according to SPO § 4 Abs. 2, Pkt. 3) depending on further pandemic developments. And vice versa. As alternative examination formats, a) online examinations with video supervision (sP) and optionally a face-to-face examination in the same examination period are offered. Or b) the Online Open Book exam (PLaA) format.

This option applies to all modules and assessments listed in the module handbook, regardless of whether or not corresponding references are already made to them there. It is also at the discretion of the responsible examiners whether they allow a 'free shot' for their examination when determining the type of examination.

1.6 Repeating exams

Principal a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after losing the examination claim. A counseling interview is mandatory.

For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

1.7 Examiners

The examination committee has appointed the KIT examiners and lecturers listed in the module handbook for the modules and their courses as examiners for the courses they offer.

1.8 Additional accomplishments

Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Additional accomplishments with at most 30 CP may appear additionally in the certificate.

1.9 Further information

For current information about studying at the KIT Department of Economics and Management, please visit our website www.wiwi.kit.edu as well as Instagram, LinkedIn, and YouTube. Please also see current notices and announcements for students at: https://www.wiwi.kit.edu/studium.php.

Information around the legal and official framework of the study program can be found in the respective study and examination regulations of your study program. These are available under the Official Announcements of KIT (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

More detailed information about the legal and general conditions of the program can be found in the examination regulation of the program (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

1.10 Contact

If you have any questions about modules or exams, please contact the examination office of the KIT Department of Economics and Management:

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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.

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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 Qualification objectives of the Master's program in Industrial Engineering and Management

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).
4 Key Skills

The master program Industrial Engineering and Management (M.Sc.) at the KIT Department of Economics and Management distinguishes itself by an exceptionally high level of interdisciplinarity. With the combination of business science, economics, informatics, operations research, mathematics as well as engineering and natural science, the integration of knowledge of different disciplines is an inherent element of the programme. As a result, interdisciplinary and connected thinking is encouraged in a natural way. Furthermore, the seminar courses in the master degree programme contribute significantly to the development of key skills by practicing to elaborate and write scientifically sound papers and presentations about special topics. The integrative taught key skills, which are acquired throughout the entire programme, can be classified into the following fields:

**Soft skills**
- Team work, social communication and creativity techniques
- Presentations and presentation techniques
- Logical and systematical arguing and writing
- Structured problem solving and communication

**Enabling skills**
- Decision making in business context
- Project management competences
- Fundamentals of business science
- English as a foreign language

**Orientational knowledge**
- Acquisition of interdisciplinary knowledge
- Institutional knowledge about economic and legal systems
- Knowledge about international organisations
- Media, technology and innovation

The integrative acquisition of key skills especially takes place in several obligatory courses during the master programme, namely

- Seminar module
- Mentoring of the Master’s thesis
- Business science, economics and informatics modules

Besides the integrated key skills, the additive acquisition of key skills, which are totalling at least three credits within the seminar module, is scheduled. Students may choose freely among the offered courses of HoC, ZAK and Sprachenzentrum.
5 Field of study structure

<table>
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<tr>
<th>Mandatory</th>
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<td>Compulsory Elective Modules</td>
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### 5.1 Master's Thesis

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## 5.2 Business Administration

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<td>Data Science: Data-Driven Information Systems</td>
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<td>Data Science: Evidence-based Marketing</td>
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<td>Data Science: Intelligent, Adaptive, and Learning Information Services</td>
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<td>Designing Interactive Information Systems</td>
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### 5.3 Economics

**Economics (Election: 1 item)**

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<td>Microeconomic Theory</td>
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<td>Network Economics</td>
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### 5.4 Informatics

**Informatics (Election: 1 item)**

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### 5.5 Operations Research

**Operations Research (Election: 1 item)**

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<td>M-BGU-100998</td>
<td>Design, Construction, Operation and Maintenance of Highways</td>
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5.7 Compulsory Elective Modules

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

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### Business Administration (Election: at most 18 credits)

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<td>M-WIWI-101506</td>
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<td>Transport Infrastructure Policy and Regional Development</td>
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<td>M-WIWI-101496</td>
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**Informatics (Election: at most 18 credits)**

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**Operations Research (Election: at most 18 credits)**

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**Engineering Sciences (Election: at most 18 credits)**

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<td>Energy and Process Technology I</td>
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<td>M-BGU-100998</td>
<td>Design, Construction, Operation and Maintenance of Highways</td>
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<td>Generation and Transmission of Renewable Power</td>
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<td>Handling Characteristics of Motor Vehicles</td>
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<td>Principles of Food Process Engineering</td>
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Statistics (Election: at most 18 credits)

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Law or Sociology (Election: at most 9 credits)

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<td>M-INFO-101215</td>
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<td>M-INFO-101216</td>
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<td>M-GEISTSOZ-101169</td>
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<td>M-INFO-101191</td>
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6 Modules

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

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<tr>
<th>Responsible</th>
<th>Prof. Dr. Maxim Ulrich</th>
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<tr>
<td>Organisation</td>
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<td>T-WIWI-111305</td>
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<td>Advanced Machine Learning and Data Science</td>
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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
see T-WIWI-106193 "Advanced Machine Learning and Data Science".

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
### 6.2 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)**

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**Specialization module logistics (Elective: )**

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<td>T-MACH-105230</td>
<td>Decently Controlled Intralogistic Systems</td>
<td>4 CR</td>
<td>Furmans, Hochstein</td>
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<tr>
<td>T-MACH-112113</td>
<td>Dynamic Systems of Technical Logistics</td>
<td>6 CR</td>
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<td>T-MACH-112114</td>
<td>Dynamic Systems of Technical Logistics - Project</td>
<td>4 CR</td>
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<td>T-MACH-105151</td>
<td>Energy Efficient Intralogistic Systems</td>
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<td>T-MACH-111003</td>
<td>Global Logistics</td>
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<td>Furmans</td>
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<td>T-MACH-102128</td>
<td>Information Systems and Supply Chain Management</td>
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<td>T-MACH-105187</td>
<td>IT-Fundamentals of Logistics</td>
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<td>T-MACH-105174</td>
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<td>T-MACH-105175</td>
<td>Airport Logistics</td>
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<td>T-MACH-106693</td>
<td>Plug-and-Play Material Handling</td>
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<td>T-MACH-105171</td>
<td>Safety Engineering</td>
<td>4 CR</td>
<td>Kany</td>
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<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
<td>4,5 CR</td>
<td>Spieckermann</td>
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<td>T-MACH-112213</td>
<td>Applied material flow simulation</td>
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**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-101279, M-MACH-101277, M-MACH-101280 or M-MACH-105298 must be completed.

**Competence Goal**

The student acquires

- 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.
6.3 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)

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<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each term</td>
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### Electives (Election: between 1 and 2 items)

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<tr>
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<th>Duration</th>
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<tbody>
<tr>
<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4.5 CR</td>
<td>Gutekunst, Wigger</td>
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### Supplementary Courses (Election: between 0 and 1 items)

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<td>Fundamentals of National and International Group Taxation</td>
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<td>Public Revenues</td>
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### 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

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

### Recommendation

Basic knowledge in the area of public finance and public management is required.
6.4 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)

<table>
<thead>
<tr>
<th>Credits</th>
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**Compulsory Elective Courses (Electing: 9 credits)**

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<tbody>
<tr>
<td>T-WIWI-106188</td>
<td>Workshop Current Topics in Strategy and Management</td>
<td>3</td>
<td>Lindstädt</td>
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<tr>
<td>T-WIWI-106189</td>
<td>Workshop Business Wargaming – Analyzing Strategic Interactions</td>
<td>3</td>
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<tr>
<td>T-WIWI-106190</td>
<td>Strategy and Management Theory: Developments and “Classics”</td>
<td>3</td>
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</table>

**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**

- Students are able to analyze business strategies and derive recommendations using appropriate frameworks
- Learn to express their position through compelling reasoning in structured discussions
- Are qualified to critically examine recent research topics in the field of strategic management
- Can derive own conclusions from less structured information by using interdisciplinary knowledge

**Content**

The module is divided into three main topics:

- The students analyze and discuss a wide range of business strategies on the basis of collectively selected case studies.
- Participate in a business wargaming workshop and analyze strategic interactions.
- Write a paper about current topics in the field of strategic management theory.

**Annotation**

This course is admission restricted. After being admitted to one course of this module, the participation at the other courses will be guaranteed.

Every course of this module will be at least offered every second term. Thus, it will be possible to complete the module within two terms.

**Recommendation**

None
M 6 Module: Agglomeration and Innovation [M-WIWI-101497]

**Responsibility:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:**
- Economics
- Compulsory Elective Modules (Economics)

<table>
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<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
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**Compulsory Elective Courses (Election: 9 credits)**

<table>
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<th>Credits</th>
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<td>Advanced Topics in Economic Theory</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-109194</td>
<td>Dynamic Macroeconomics</td>
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<td>Brumm</td>
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<td>T-WIWI-102840</td>
<td>Innovation Theory and Policy</td>
<td>4,5 CR</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4,5 CR</td>
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</table>

**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 add up to at least 9.

The overall grade for the module is the average of the grades for each course weighted by the credits.

**Prerequisites**

None

**Competence Goal**

The student:

- applies quantitative methods in the context of economic models
- learns advanced micro- and macroeconomic theories
- is able to derive policy recommendations based on theory
- can identify the importance of alternative incentive mechanisms for the development and spread of innovations
- begins to understand the connections between market form and the development of innovations
- analyzes the determinants of the spatial distribution of economic activity
- understands how processes of concentration result from the interplay of agglomeration and dispersion forces

**Content**

The module comprises theories of incentives for the development of innovations as well as theories of wage-based labor mobility, which leads to spatial concentration processes. The microfounded optimality decisions of the actors are in each case transformed into macroeconomic results. In the context of the theory of innovations the diffusion of technological knowledge and the resulting effect on growth due to technological progress is discussed and economic-policy implications are derived. Spatial economics adds to the picture of economic activity by introducing a spatial point of view.

**Workload**

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

**Recommendation**

Successful completion of the courses *Economics I: Microeconomics* and *Economics II: Macroeconomics* is required.
6.6 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)

<table>
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<tr>
<th>Credits</th>
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<th>Language</th>
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**Mandatory**

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<tr>
<td>T-WIWI-103123</td>
<td>Advanced Statistics</td>
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**Supplementary Courses (Election: between 4.5 and 5 credits)**

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<tr>
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<th>Course Name</th>
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<tr>
<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-111247</td>
<td>Mathematics for High Dimensional Statistics</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-112109</td>
<td>Topics in Stochastic Optimization</td>
<td>4,5 CR</td>
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**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 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 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.
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)

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<tr>
<th>Credits</th>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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</table>

**Mandatory**

- **T-WIWI-102861** Advanced Game Theory 4,5 CR Ehrhart, Puppe, Reiß

**Supplementary Courses (Election: between 4,5 and 5 credits)**

- **T-WIWI-102613** Auction Theory 4,5 CR Ehrhart
- **T-WIWI-102614** Experimental Economics 4,5 CR Weinhardt
- **T-WIWI-102622** Corporate Financial Policy 4,5 CR Ruckes
- **T-WIWI-102623** Financial Intermediation 4,5 CR Ruckes
- **T-WIWI-102640** Market Engineering: Information in Institutions 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.
6.8 Module: Artificial Intelligence in Production [M-MACH-105968]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences

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<th>Credits</th>
<th>Grading scale</th>
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<th>Instructor</th>
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<tbody>
<tr>
<td>T-MACH-112115</td>
<td>Artificial Intelligence in Production</td>
<td>5 CR</td>
<td>Fleischer</td>
</tr>
<tr>
<td>T-MACH-112121</td>
<td>Seminar Application of Artificial Intelligence in Production</td>
<td>4 CR</td>
<td>Fleischer</td>
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</tbody>
</table>

**Competence Certificate**

T-MACH-112115 - Written Exam (90 min)
T-MACH-112121 - Alternative test achievement (graded)

**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.

**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
6.9 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 9
Grading scale Grade to a tenth
Recurrence Each summer term
Duration 1 term
Language German
Level 4
Version 1

<table>
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<tbody>
<tr>
<td>T-MACH-102162 Automated Manufacturing Systems</td>
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</tbody>
</table>

Competence Certificate
written exam (120 minutes)

Prerequisites
none

Competence Goal
The students
- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.
- are capable with respect to a given task to plan the configuration of an automated manufacturing system and to determine the necessary components to its realization.
- are able to design and select components for a given use case of the categories: "Handling Technology", "Industrial Robotics", "Sensory" and "Controls".
- are capable to compare different concepts for multi-machine systems and select a suitable concept for a given use case.

Content
The lecture provides an overview of the structure and functioning of automated manufacturing systems. In the introduction chapter the basic elements for the realization of automated manufacturing systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- Quality assurance in automated manufacturing
- automatic machines, cells, centers and systems for manufacturing and assembly
- structures of multi-machine systems
- planning of automated manufacturing systems

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components (chassis and drive technology). The analysis of automated manufacturing systems for manufacturing of defined components is also included. In the field of vehicle power train both, the automated manufacturing process for the production of the conventional internal-combustion engine and the automated manufacturing process for the production of the prospective electric power train (electric motor and battery) are considered. In the field of car body, the focus is on the analysis of the process chain for the automated manufacturing of conventional sheet metal body parts, as well as for automated manufacturing of body components made out of fiber-reinforced plastics. Within tutorials, the contents from the lecture are advanced and applied to specific problems and tasks.

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

Learning type
Lectures, exercise, excursion
6.10 Module: Automotive Engineering [M-MACH-101266]

**Responsible:** Prof. Dr. Frank Gauterin
**Organisation:** KIT Department of Mechanical Engineering

### Credits
- **9**

### Grading scale
- Grade to a tenth

### Recurrence
- Each term

### Duration
- 1 term

### Language
- German/English

### Level
- 4

### Version
- 5

<table>
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<td>T-MACH-110796</td>
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### 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.
6.11 Module: BioMEMS [M-MACH-101290]

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

### Complement Elective Modules (Engineering Sciences)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
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<th>Duration</th>
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<td>Each term</td>
<td>1 term</td>
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**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

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

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

<table>
<thead>
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<th>Credits</th>
<th>Grading scale</th>
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<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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</table>

**Compulsory Elective Courses (Election: 9 credits)**
- **T-WIWI-102848** Personalization and Services 4,5 CR Sonnenbichler
- **T-WIWI-110887** Practical Seminar: Service Innovation 4,5 CR Satzger
- **T-WIWI-102847** Recommender Systems 4,5 CR Geyer-Schulz
- **T-WIWI-102641** Service Innovation 4,5 CR Satzger
- **T-WIWI-109940** 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 approximately 270 hours. For further information see German version.

**Recommendation**
None
6.13 Module: Collective Decision Making [M-WIWI-101504]

**Responsible:** Prof. Dr. Clemens Puppe

**Organisation:** KIT Department of Economics and Management

**Part of:** Economics

<table>
<thead>
<tr>
<th>Compulsory Elective Courses (Election:)</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tr>
<td>T-WIWI-102740 Public Management</td>
<td>4,5 CR</td>
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<td>T-WIWI-102859 Social Choice Theory</td>
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</table>

**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 separately.

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 problems of the public sector and to analyze them with respect to positive and normative questions,
- 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 of public decisions making, including voting and the aggregation of preferences and judgements.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
6.14 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)

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**Wahlpflicht (Election: between 1 and 2 items)**

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<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-MACH-111550</td>
<td>CO2-Neutral Combustion Engines and their Fuels I</td>
<td>5 CR</td>
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<tr>
<td>T-MACH-111585</td>
<td>Hydrogen and reFuels - Energy Conversion in Combustion Engines</td>
<td>4 CR</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The module examination contains 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 principle 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 of ICE
- Characteristic Parameters
- Characteristic parameters
- Engine parts
- Crank drive
- Fuels
- Gasoline engine operation modes
- Diesel engine operation modes
- Emissions
- Fundamentals of ICE combustion
- Thermodynamics of ICE
- Flow field
- Wall heat losses
- Combustion in Gasoline and Diesel engines
- Heat release calculation
- Waste heat recovery
- CO2-free engine technology

**Workload**
- regular attendance: 62 hours
- self-study: 208 hours
6.15 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)

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**Mandatory**

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<th>Title</th>
<th>Credits</th>
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<tr>
<td>T-MACH-111560</td>
<td>CO2-Neutral Combustion Engines and their Fuels II</td>
<td>5 CR</td>
<td>Koch</td>
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<tr>
<td>T-MACH-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>4 CR</td>
<td>Gohl</td>
<td></td>
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<tr>
<td>T-MACH-105649</td>
<td>Boosting of Combustion Engines</td>
<td>4 CR</td>
<td>Kech, Kubach</td>
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<tr>
<td>T-MACH-105184</td>
<td>Fuels and Lubricants for Combustion Engines</td>
<td>4 CR</td>
<td>Kehrwald, Kubach</td>
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<td>T-MACH-110817</td>
<td>Development of hybrid drivetrains</td>
<td>4 CR</td>
<td>Koch</td>
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<tr>
<td>T-MACH-110816</td>
<td>Großdiesel- und -gasmotoren für Schiffsantriebe</td>
<td>4 CR</td>
<td>Kubach</td>
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<tr>
<td>T-MACH-105044</td>
<td>Fundamentals of Catalytic Exhaust Gas Aftertreatment</td>
<td>4 CR</td>
<td>Deutschmann, Grunwaldt, Kubach, Lox</td>
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<tr>
<td>T-MACH-105167</td>
<td>Analysis Tools for Combustion Diagnostics</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-105169</td>
<td>Engine Measurement Techniques</td>
<td>4 CR</td>
<td>Bernhardt</td>
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<tr>
<td>T-MACH-111578</td>
<td>Sustainable Vehicle Drivetrains</td>
<td>4 CR</td>
<td>Koch, Toedter</td>
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<tr>
<td>T-MACH-105985</td>
<td>Ignition Systems</td>
<td>4 CR</td>
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**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 maps
Emissions and Exhaust gas aftertreatment
Transient engine operation
ECU 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
### Module: Commercial Law [M-INFO-101191]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
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<th>Credits</th>
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<th>Language</th>
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</table>

**Mandatory**

| T-INFO-102013 | Exercises in Civil Law | 9 CR | Dreier, Matz |
6.17 Module: Consumer Research [M-WIWI-105714]

**Responsible:** Prof. Dr. Benjamin Scheibehenne

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

<table>
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**Compulsory Elective Courses (Election: )**

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<tr>
<td>T-WIWI-111393</td>
<td>Behavioral Experiments in Action</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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<tr>
<td>T-WIWI-111806</td>
<td>Behavioral Lab Exercise</td>
<td>4,5 CR</td>
<td>Nieken, Scheibehenne</td>
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<tr>
<td>T-WIWI-111392</td>
<td>Cognitive Modeling</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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<tr>
<td>T-WIWI-111100</td>
<td>Current Directions in Consumer Psychology</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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<tr>
<td>T-WIWI-111099</td>
<td>Judgement and Decision Making</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-111109</td>
<td>KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-107720</td>
<td>Market Research</td>
<td>4,5 CR</td>
<td>Klarmann</td>
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</table>

**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 influence 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 prerequisite 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.
6.18 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)

**Mandatory**

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<td>T-ETIT-100666</td>
<td>Control of Linear Multivariable Systems</td>
<td>6 CR</td>
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<tr>
<td>T-ETIT-100980</td>
<td>Nonlinear Control Systems</td>
<td>3 CR</td>
<td>Kluwe</td>
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</table>

**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.
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)**

<table>
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<td>Advanced Management Accounting</td>
<td>4.5</td>
<td>CR</td>
<td>Each term</td>
<td>German/English</td>
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<td>Wouters</td>
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<td>T-WIWI-105777</td>
<td>Business Intelligence Systems</td>
<td>4.5</td>
<td>CR</td>
<td>Each term</td>
<td>German/English</td>
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<td>Mädche, Nadj, Toreini</td>
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<td>T-WIWI-105781</td>
<td>Incentives in Organizations</td>
<td>4.5</td>
<td>CR</td>
<td>Each term</td>
<td>German/English</td>
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<td>T-WIWI-102835</td>
<td>Marketing Strategy Business Game</td>
<td>1.5</td>
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<td>T-WIWI-107720</td>
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<td>CR</td>
<td>Each term</td>
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<td>Online Concepts for Karlsruhe City Retailers</td>
<td>1.5</td>
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<td>T-WIWI-108651</td>
<td>Extraordinary additional course in the module Cross-Functional Management Accounting</td>
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<td>CR</td>
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<td>German/English</td>
<td>4</td>
<td>Wouters</td>
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**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 and 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**
The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**
None
6.20 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

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

Organisation: KIT Department of Economics and Management
Part of: Business Administration
Compulsory Elective Modules (Business Administration)

<table>
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<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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</table>

Compulsory Elective Courses (Selection:)

- **T-WIWI-108715** Artificial Intelligence in Service Systems
  - Credits: 4.5 CR
  - Lecturer: Satzger

- **T-WIWI-111219** Artificial Intelligence in Service Systems - Applications in Computer Vision
  - Credits: 4.5 CR
  - Lecturer: Satzger

- **T-WIWI-109863** Business Data Analytics: Application and Tools
  - Credits: 4.5 CR
  - Lecturer: Weinhardt

- **T-WIWI-106187** Business Data Strategy
  - Credits: 4.5 CR
  - Lecturer: Weinhardt

- **T-WIWI-105777** Business Intelligence Systems
  - Credits: 4.5 CR
  - Lecturers: Mädche, Nadj, Toreini

- **T-WIWI-110918** Introduction to Bayesian Statistics for Analyzing Data
  - Credits: 4.5 CR
  - Lecturer: Scheibehenne

- **T-WIWI-111385** Responsible Artificial Intelligence
  - Credits: 4.5 CR
  - Lecturer: Weinhardt

- **T-WIWI-106207** Practical Seminar: Data-Driven Information Systems
  - Credits: 4.5 CR
  - Lecturers: Mädche, Satzger, Setzer, 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 available 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 tremendous 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 understand 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 heterogeneous, high-dimensional data available 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.

**Annotation**

The course „Business Data Strategy“ can be chosen from winter term 2016 on.

**Recommendation**

Basic knowledge of Information Management, Operations Research, Descriptive Statistics, and Inferential Statistics is assumed.
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: 9
Grading scale: Grade to a tenth
Recurrence: Each term
Duration: 1 term
Language: German/English
Level: 4
Version: 6

Compulsory Elective Courses (Election: at least 9 credits)

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<tr>
<td>T-WIWI-109863</td>
<td>Business Data Analytics: Application and Tools</td>
<td>4,5 CR</td>
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<td>T-WIWI-102614</td>
<td>Experimental Economics</td>
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<td>T-WIWI-111109</td>
<td>KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics</td>
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<td>T-WIWI-102899</td>
<td>Responsible Artificial Intelligence</td>
<td>4,5 CR</td>
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<td>Practical Seminar: Advanced Analytics</td>
<td>4,5 CR</td>
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</table>

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.
6.22 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)**

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**Compulsory Elective Courses (Election: 9 credits)**

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<td>T-WIWI-107720</td>
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**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
6.23 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)

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**Compulsory Elective Courses (Election: 9 credits)**

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<tr>
<td>T-WIWI-109921</td>
<td>Advanced Machine Learning</td>
<td>4,5 CR</td>
<td>Geyer-Schulz, Nazemi</td>
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<tr>
<td>T-WIWI-111219</td>
<td>Artificial Intelligence in Service Systems - Applications in Computer Vision</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102762</td>
<td>Business Dynamics</td>
<td>4,5 CR</td>
<td>Geyer-Schulz, Glenn</td>
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<tr>
<td>T-WIWI-111267</td>
<td>Intelligent Agent Architectures</td>
<td>4,5 CR</td>
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<td>T-WIWI-110915</td>
<td>Intelligent Agents and Decision Theory</td>
<td>4,5 CR</td>
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<td>T-WIWI-102848</td>
<td>Personalization and Services</td>
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<td>T-WIWI-102847</td>
<td>Recommender Systems</td>
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**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 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

- 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 approximately 270 hours. For further information see German version.

**Recommendation**

None

**Responsible:** Prof. Dr.-Ing. Ralf Roos

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** Engineering Sciences

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
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<td>Each summer term</td>
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**Mandatory**

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<th>Module Code</th>
<th>Module Name</th>
<th>CR</th>
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<tr>
<td>T-BGU-106613</td>
<td>Design Basics in Highway Engineering</td>
<td>3 CR</td>
<td>Roos</td>
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<tr>
<td>T-BGU-106300</td>
<td>Infrastructure Management</td>
<td>6 CR</td>
<td>Roos</td>
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**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
6.25 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)

<table>
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<th>Credits</th>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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Compulsory Elective Courses (Election: at least 1 item)

- T-WIWI-110851 Designing Interactive Systems
- T-WIWI-110877 Engineering Interactive Systems

Supplementary Courses (Election: at most 1 item)

- T-WIWI-111109 KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics
- T-WIWI-108437 Practical Seminar: Information Systems and Service Design

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 "Engineering 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

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

### Compulsory Elective Courses (Election: 9 credits)

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<th>Level</th>
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<td>T-WIWI-102872</td>
<td>Challenges in Supply Chain Management</td>
<td>4,5 CR</td>
<td>Mohr</td>
<td>Each term</td>
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<td>T-WIWI-107043</td>
<td>Liberalised Power Markets</td>
<td>3 CR</td>
<td>Fichtner</td>
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<td>T-WIWI-106200</td>
<td>Modeling and OR-Software: Advanced Topics</td>
<td>4,5 CR</td>
<td>Nickel</td>
<td>Each term</td>
<td>2 terms</td>
<td>German</td>
<td>4</td>
<td>7</td>
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<tr>
<td>T-WIWI-106563</td>
<td>Practical Seminar Digital Service Systems</td>
<td>4,5 CR</td>
<td>Mädche, Satzger</td>
<td>Each term</td>
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<td>T-WIWI-102641</td>
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<td>4,5 CR</td>
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<td>Each term</td>
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### 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](http://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

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

### Recommendation

None
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: 9
Grading scale: Grade to a tenth
Recurrence: Each winter term
Duration: 2 terms
Language: German
Level: 4
Version: 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
As from summer term 2022 the new selectable course Turnkey Construction replaces the selectable course Turnkey Construction II. With queries about the completion of the old module version please contact Dr. Schneider.
**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
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)

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<th>Language</th>
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**Mandatory**

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**Supplementary Courses (Elective: between 4.5 and 5 credits)**

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<th>Grading</th>
<th>Recurrence</th>
<th>Language</th>
<th>Level</th>
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<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics</td>
<td>4.5 CR</td>
<td>Schienle</td>
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<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics</td>
<td>4.5 CR</td>
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<td>T-WIWI-103127</td>
<td>Panel Data</td>
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<tr>
<td>T-WIWI-110868</td>
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<td>4.5 CR</td>
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<td>T-WIWI-111387</td>
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<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-110939</td>
<td>Financial Econometrics II</td>
<td>4.5 CR</td>
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**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 examined.

**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.
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)

<table>
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<tr>
<th>Credits</th>
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**Compulsory Elective Courses (Electation: between 9 and 10 credits)**

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<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4,5 CR</td>
<td>Grothe</td>
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<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics</td>
<td>4,5 CR</td>
<td>Schienle</td>
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<td>T-WIWI-103127</td>
<td>Panel Data</td>
<td>4,5 CR</td>
<td>Heller</td>
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<tr>
<td>T-WIWI-103128</td>
<td>Portfolio and Asset Liability Management</td>
<td>4,5 CR</td>
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<td>T-WIWI-110868</td>
<td>Predictive Modeling</td>
<td>4,5 CR</td>
<td>Krüger</td>
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<td>T-WIWI-111387</td>
<td>Probabilistic Time Series Forecasting Challenge</td>
<td>4,5 CR</td>
<td>Krüger</td>
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<tr>
<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4,5 CR</td>
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<td>T-WIWI-103129</td>
<td>Stochastic Calculus and Finance</td>
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<td>T-WIWI-110939</td>
<td>Financial Econometrics II</td>
<td>4,5 CR</td>
<td>Schienle</td>
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**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.

**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 module 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**

The total workload for this module is approximately 270 hours.
**Compulsory Elective Courses (Electing: 1 item)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Course</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Duration</th>
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<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4.5 CR</td>
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<td>T-WIWI-102861</td>
<td>Advanced Game Theory</td>
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**Supplementary Courses (Electing: 1 item)**

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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
<td>4.5 CR</td>
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<td>T-WIWI-109050</td>
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<td>T-WIWI-102623</td>
<td>Financial Intermediation</td>
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**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 compulsory.

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

<table>
<thead>
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<th>Credits</th>
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### Compulsory Elective Courses (Election: at least 9 credits)

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<tr>
<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
<td>4,5</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-107503</td>
<td>Energy Networks and Regulation</td>
<td>4,5</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-107504</td>
<td>Smart Grid Applications</td>
<td>4,5</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4,5</td>
<td>Weinhardt</td>
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</table>

### 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 approaches,
- 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 approximately 270 hours. For further information see German version.
### Module: Electives in Informatics [M-WIWI-101630]

**Responsible:**
- Dr.-Ing. Michael Färber
- 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)

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#### Compulsory Elective Area (Election: )

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<tr>
<td>T-WIWI-102680</td>
<td>Computational Economics</td>
<td>Shukla</td>
</tr>
<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
<td>Sunyaev</td>
</tr>
<tr>
<td>T-WIWI-109246</td>
<td>Digital Health</td>
<td>Sunyaev</td>
</tr>
<tr>
<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
<td>Oberweis</td>
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<tr>
<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<tr>
<td>T-WIWI-110372</td>
<td>Supplement Software- and Systemsengineering</td>
<td>Oberweis</td>
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<td>T-WIWI-106423</td>
<td>Information Service Engineering</td>
<td>Sack</td>
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<td>T-WIWI-102666</td>
<td>Knowledge Discovery</td>
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<td>Management of IT-Projects</td>
<td>Schätzle</td>
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<td>T-WIWI-106340</td>
<td>Machine Learning 1 - Basic Methods</td>
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<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods</td>
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<td>Business Process Modelling</td>
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<td>T-WIWI-102679</td>
<td>Nature-Inspired Optimization Methods</td>
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<td>T-WIWI-109799</td>
<td>Process Mining</td>
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<tr>
<td>T-WIWI-110848</td>
<td>Semantic Web Technologies</td>
<td>Käfer</td>
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<tr>
<td>T-WIWI-102895</td>
<td>Software Quality Management</td>
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#### Seminars and Advanced Labs (Election: )

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<td>T-WIWI-110144</td>
<td>Emerging Trends in Digital Health</td>
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<tr>
<td>T-WIWI-110143</td>
<td>Emerging Trends in Internet Technologies</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109249</td>
<td>Sociotechnical Information Systems Development</td>
<td>Sunyaev</td>
</tr>
<tr>
<td>T-WIWI-111126</td>
<td>Advanced Lab Blockchain Hackathon (Master)</td>
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<tr>
<td>T-WIWI-111125</td>
<td>Advanced Lab Sociotechnical Information Systems Development (Master)</td>
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<tr>
<td>T-WIWI-110548</td>
<td>Advanced Lab Informatics (Master)</td>
<td>Professorenschaft des Instituts AIFB</td>
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<td>T-WIWI-108439</td>
<td>Advanced Lab Security, Usability and Society</td>
<td>Volkamer</td>
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<td>Advanced Lab Security</td>
<td>Volkamer</td>
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<td>T-WIWI-109985</td>
<td>Project Lab Cognitive Automobiles and Robots</td>
<td>Zöllner</td>
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<td>T-WIWI-109983</td>
<td>Project Lab Machine Learning</td>
<td>Zöllner</td>
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<tr>
<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
<td>Sunyaev</td>
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</table>
**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 single 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 single 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.
6.33 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)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<td>Each term</td>
<td>2 terms</td>
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**Compulsory Elective Courses (Election: at least 9 credits)**

- **T-WIWI-108880** Blockchains & Cryptofinance 4.5 CR Schuster, Uhrig-Homburg
- **T-WIWI-102762** Business Dynamics 4.5 CR Geyer-Schulz, Glenn
- **T-WIWI-102640** Market Engineering: Information in Institutions 4.5 CR Weinhardt
- **T-WIWI-105946** Price Management 4.5 CR Geyer-Schulz, Glenn
- **T-WIWI-102713** Telecommunication and Internet Economics 4.5 CR Mitsch

**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**

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 modeled. 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 approximately 270 hours. For further information see German version.
Recommendation
None
### Module: Emphasis in Informatics [M-WIWI-101628]

**Responsible:**
- Dr.-Ing. Michael Färber
- 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:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Level:** 4

**Version:** 16

### Compulsory Elective Area (Election: between 1 and 3 items)

<table>
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<th>Grade</th>
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<tbody>
<tr>
<td>T-WIWI-102680</td>
<td>Computational Economics</td>
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<td>T-WIWI-109248</td>
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<td>Digital Health</td>
<td>4,5 CR</td>
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<td>Human Factors in Security and Privacy</td>
<td>4,5 CR</td>
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<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<td>T-WIWI-110372</td>
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<td>T-WIWI-102666</td>
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<td>4,5 CR</td>
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<td>T-WIWI-102667</td>
<td>Management of IT-Projects</td>
<td>4,5 CR</td>
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<td>Machine Learning 1 - Basic Methods</td>
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<tr>
<td>T-WIWI-102697</td>
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<td>4,5 CR</td>
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<td>T-WIWI-110848</td>
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### Seminars and Advanced Labs (Election: )

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<tr>
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<td>Emerging Trends in Digital Health</td>
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<td>T-WIWI-110143</td>
<td>Emerging Trends in Internet Technologies</td>
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<td>T-WIWI-109249</td>
<td>Sociotechnical Information Systems Development</td>
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<td>T-WIWI-111126</td>
<td>Advanced Lab Blockchain Hackathon (Master)</td>
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<td>T-WIWI-111125</td>
<td>Advanced Lab Sociotechnical Information Systems Development (Master)</td>
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<td>T-WIWI-110548</td>
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<td>Project Lab Machine Learning</td>
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<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
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</table>
**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.
6.35 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)

<table>
<thead>
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<th>Grading scale</th>
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<th>Duration</th>
<th>Level</th>
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<th>T-MACH-102211</th>
<th>Energy and Process Technology I</th>
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<tr>
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<td>Bauer, Maas, Schwitzke, Velji</td>
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**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 module 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 held in German only.
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)**

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Mandatory

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**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 module 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.

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

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

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<th>Credits</th>
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<td>German/English</td>
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**Mandatory**

| T-WIWI-107043 | Liberalised Power Markets | 3 CR | Fichtner |

**Supplementary Courses (Election: at least 6 credits)**

| T-WIWI-107501 | Energy Market Engineering | 4,5 CR | Weinhardt |
| T-WIWI-112151 | Energy Trading and Risk Management | 3 CR | N.N. |
| T-WIWI-108016 | Simulation Game in Energy Economics | 3 CR | Genoese |
| T-WIWI-107446 | Quantitative Methods in Energy Economics | 3 CR | Plötz |
| T-WIWI-102712 | Regulation Theory and Practice | 4,5 CR | Mitusch |

**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 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 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 approximately 270 hours.

**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.

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

<table>
<thead>
<tr>
<th>Compulsory Elective Courses (Election: at least 9 credits)</th>
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<tbody>
<tr>
<td>T-WIWI-102793 Efficient Energy Systems and Electric Mobility</td>
</tr>
<tr>
<td>T-WIWI-102650 Energy and Environment</td>
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<tr>
<td>T-WIWI-102830 Energy Systems Analysis</td>
</tr>
<tr>
<td>T-WIWI-107464 Smart Energy Infrastructure</td>
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<tr>
<td>T-WIWI-102695 Heat Economy</td>
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**Compulsory Elective Courses (Election: at least 9 credits)**

- **T-WIWI-102793 Efficient Energy Systems and Electric Mobility**
- **T-WIWI-102650 Energy and Environment**
- **T-WIWI-102830 Energy Systems Analysis**
- **T-WIWI-107464 Smart Energy Infrastructure**
- **T-WIWI-102695 Heat Economy**

**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 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 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 approximately 270 hours. For further information see German version.
Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

**Responsible:** Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

### Mandatory part (Selection: 1 item)
- T-WIWI-102864 Entrepreneurship

### Compulsory Elective Courses (Selection: between 1 and 2 items)
- T-WIWI-102866 Design Thinking
- T-WIWI-102833 Entrepreneurial Leadership & Innovation Management
- T-WIWI-102865 Business Planning
- T-WIWI-110374 Firm creation in IT security
- T-WIWI-110985 International Business Development and Sales
- T-WIWI-109064 Joint Entrepreneurship Summer School
- T-WIWI-111561 Startup Experience

### Supplementary Courses (Selection: between 0 and 1 items)
- T-WIWI-102894 Entrepreneurship Research
- T-WIWI-102852 Case Studies Seminar: Innovation Management
- T-WIWI-102893 Innovation Management: Concepts, Strategies and Methods
- T-WIWI-102612 Managing New Technologies
- T-WIWI-102853 Roadmapping

### Competence Certificate
See German version.

### 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.

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

### Recommendation
None
6.40 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)

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**Compulsory Elective Courses (Election: at least 9 credits)**

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<td>Energy and Environment</td>
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<td>Karl</td>
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<td>T-WIWI-100007</td>
<td>Transport Economics</td>
<td>4.5 CR</td>
<td>Mitusch, Szimba</td>
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<td>T-WIWI-102615</td>
<td>Environmental Economics and Sustainability</td>
<td>3 CR</td>
<td>Walz</td>
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<td>T-WIWI-102616</td>
<td>Environmental and Resource Policy</td>
<td>4 CR</td>
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<tr>
<td>T-BGU-111102</td>
<td>Environmental Law</td>
<td>3 CR</td>
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**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 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**
The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**
Knowledge in the area of microeconomics and of the content of the course Economics I: Microeconomics[2600012], respectively, is required.
6.41 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)**

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**Compulsory Elective Courses (Election: 2 Items)**

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<td>Incentives in Organizations</td>
<td>4,5 CR</td>
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<td>Topics in Experimental Economics</td>
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**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**

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

**Recommendation**

Basic knowledge in mathematics, statistics, and game theory is assumed.
6.42 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)

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**Compulsory Elective Courses (Election: between 9 and 12 credits)**

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**Competence Certificate**

The assessment of the module is determined by the respective module coordinator. 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 intended composition of courses, the module designation and the details of the examination for an Extracurricular Module in Engineering must be confirmed by a module coordinator (professor) of the responsible engineering department. The module coordinator makes sure that the individual courses of the module complement each other in a meaningful way and that no random sequence of various individual examinations is combined.

The responsible module coordinator certifies that the examination can be taken as described and that the details of the courses in the application are correct.

The informal application (not handwritten!) will then be submitted to the Examination Office of the KIT Department of Economics and Management.

The examination board of the KIT Department of Economics and Management decides on the basis of the rules and regulations that have been adopted, in particular with regard to the content (see also https://www.wiwi.kit.edu/ Genehmigung_Ingenieurmodul.php_Ingenieurmodul.php) as well as the application form completed by the student and signed by the respective module coordinator.

A maximum of one Extracurricular Module in Engineering can be taken.

**Competence Goal**

See German version.

**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.
Module: Facility Management in Hospitals [M-BGU-105597]

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)

<table>
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<th>Duration</th>
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Mandatory

T-BGU-108004 Facility Management in Hospitals 4,5 CR Lennerts

Compulsory Elective (Election: at most 3 items as well as at least 4,5 credits)

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- 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
- '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
none
Workload
contact hours (1 HpW = 1 h x 15 weeks):
- Facility Management in Hospitals lecture/exercise: 45 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: 30 h
- preparation of term paper Facility Management in Hospitals (partial exam): 60 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
Module: Finance 1 [M-WIWI-101482]

Responsibility: 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)

<table>
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<th>Duration</th>
<th>Language</th>
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Compulsory Elective Courses (Elective: 9 credits)

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<th>Course Name</th>
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<th>Lecturer</th>
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<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-102621</td>
<td>Valuation</td>
<td>4.5 CR</td>
<td>Ruckes</td>
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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4.5 CR</td>
<td>Ruckes, Uhrig-Homburg</td>
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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 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 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 approximately 270 hours. For further information see German version.
**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)

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**Compulsory Elective Courses (Electation: at least 9 credits)**

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<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
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<td>Ruckes, Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4.5</td>
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<td>Schuster, Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-110995</td>
<td>Bond Markets</td>
<td>4.5</td>
<td>CR</td>
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<td>T-WIWI-110997</td>
<td>Bond Markets - Models &amp; Derivatives</td>
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<td>T-WIWI-110996</td>
<td>Bond Markets - Tools &amp; Applications</td>
<td>1.5</td>
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<td>T-WIWI-102622</td>
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<td>4.5</td>
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<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
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<td>CR</td>
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<td>Web App Programming for Finance</td>
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**Compence 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 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**

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.

**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.
6.46 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)

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<td>Schuster, Uhrig-Homburg</td>
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**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 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**

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.

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

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<th>Duration</th>
<th>Language</th>
<th>Level</th>
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#### Mandatory


**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 module 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](http://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.
6.48 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)**

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**Compulsory Examination (Election: between 1 and 2 items as well as between 3 and 6 credits)**

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<td>T-BGU-106609</td>
<td>Characteristics of Transportation Systems</td>
<td>3 CR</td>
<td>Vortisch</td>
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<td>T-BGU-106610</td>
<td>Transportation Systems</td>
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<td>Vortisch</td>
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**Electives (Election: between 1 and 2 items as well as between 3 and 6 credits)**

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<td>3 CR</td>
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<td>T-BGU-106301</td>
<td>Long-Distance and Air Traffic</td>
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<td>T-BGU-101005</td>
<td>Tendering, Planning and Financing in Public Transport</td>
<td>3 CR</td>
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<td>T-BGU-100014</td>
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<td>T-BGU-112552</td>
<td>Seminar on Modeling and Simulation in Transportation</td>
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<tr>
<td>T-BGU-103425</td>
<td>Mobility Services and New Forms of Mobility</td>
<td>3 CR</td>
<td>Kagerbauer</td>
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<td>T-BGU-103426</td>
<td>Strategic Transport Planning</td>
<td>3 CR</td>
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<td>T-BGU-106608</td>
<td>Information Management for Public Mobility Services</td>
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<td>Vortisch</td>
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<tr>
<td>T-BGU-111057</td>
<td>Sustainability in Mobility Systems</td>
<td>3 CR</td>
<td>Kagerbauer</td>
</tr>
</tbody>
</table>

**Prerequisites**

None

**Competence Goal**

See German version.

**Recommendation**

None
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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
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Compulsory optional subject (Elective: at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
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<th>Tutor</th>
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</thead>
<tbody>
<tr>
<td>T-ETIT-101941</td>
<td>Power Transmission and Power Network Control</td>
<td>5 CR</td>
<td>Leibfried</td>
</tr>
<tr>
<td>T-ETIT-101915</td>
<td>High-Voltage Test Technique</td>
<td>4 CR</td>
<td>Badent</td>
</tr>
</tbody>
</table>

Prerequisites
The module is passed only after the final partial exam of the module 101163 Hochspannungstechnik [WI4INGETIT6] is additionally passed.

Wirtschaftsingenieurwesen Bachelor 2015
The module is passed only after the final partial exam of the module 101163 Hochspannungstechnik [WI4INGETIT6] is additionally passed.

Technische Volkswirtschaftslehre Bachelor 2015
The module is passed only after the final partial exam of the module 101163 Hochspannungstechnik [WI4INGETIT6] 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.
6.50 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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
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<th>Duration</th>
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**Mandatory**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-MACH-110991</td>
<td>Global Production</td>
<td>4 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-111003</td>
<td>Global Logistics</td>
<td>4 CR</td>
<td>Furmans</td>
</tr>
<tr>
<td>T-MACH-110981</td>
<td>Tutorial Global Production</td>
<td>1 CR</td>
<td>Lanza</td>
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</tbody>
</table>

**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
6.51 Module: Growth and Agglomeration [M-WIWI-101496]

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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grade to a tenth</th>
<th>Recurrence</th>
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<th>Language</th>
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**Compulsory Elective Courses (Election: 9 credits)**

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<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Recurrence</th>
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<th>Level</th>
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</tr>
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<tbody>
<tr>
<td>T-WIWI-109194</td>
<td>Dynamic Macroeconomics</td>
<td>4,5 CR</td>
<td>Brumm</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4,5 CR</td>
<td>Ott</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-111318</td>
<td>Growth and Development</td>
<td>4,5 CR</td>
<td>Ott</td>
<td>Each term</td>
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</table>

**Competence Certificate**
The assessment is carried out as partial written exams (see the lectures descriptions).
The overall grade for the module is the average of the grades for each course weighted by the credits.

**Prerequisites**
None

**Competence Goal**
The student
- gains deepened knowledge of micro-based general equilibrium models
- understands how based on individual optimizing decisions aggregate phenomena like economic growth or agglomeration (cities / metropolises) result
- is able to understand and evaluate the contribution of these phenomena to the development of economic trends
- can derive policy recommendations based on theory

**Content**
The module includes the contents of the lectures *Endogenous Growth Theory, Spatial Economics* and *Dynamic Macroeconomics*. While the first lecture focuses on dynamic programming in modern macroeconomics, the other two lectures are more formal and analytical.
The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

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

**Recommendation**
Attendance of the course *Introduction Economic Policy* [2560280] is recommended.
Successful completion of the courses *Economics I: Microeconomics* and *Economics II: Macroeconomics* is required.
6.52 Module: Handling Characteristics of Motor Vehicles [M-MACH-101264]

Responsible: Prof. Dr. Frank Gauterin
Organisation: KIT Department of Mechanical Engineering

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

<table>
<thead>
<tr>
<th>Credits</th>
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Vehicle Properties (Elective: at least 9 credits)

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<tbody>
<tr>
<td>T-MACH-105152</td>
<td>Handling Characteristics of Motor Vehicles I</td>
<td>3 CR</td>
<td>Unrau</td>
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<tr>
<td>T-MACH-105153</td>
<td>Handling Characteristics of Motor Vehicles II</td>
<td>3 CR</td>
<td>Unrau</td>
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<tr>
<td>T-MACH-105154</td>
<td>Vehicle Comfort and Acoustics I</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-105155</td>
<td>Vehicle Comfort and Acoustics II</td>
<td>3 CR</td>
<td>Gauterin</td>
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<tr>
<td>T-MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4.5 CR</td>
<td>Frey, Gauterin, Gießler</td>
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</table>

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
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
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)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
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**Mandatory**

<table>
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<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Level</th>
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<tbody>
<tr>
<td>T-ETIT-110266</td>
<td>High-Voltage Technology</td>
<td>6 CR</td>
<td>Badent</td>
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<tr>
<td>T-ETIT-100723</td>
<td>Electronics and EMC</td>
<td>3 CR</td>
<td>Sack</td>
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</tr>
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</table>

**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.
### 6.54 Module: Highway Engineering [M-BGU-100999]

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
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</tr>
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<tbody>
<tr>
<td></td>
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<td>Each summer term</td>
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<td>9</td>
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</table>

#### Responsible:
Prof. Dr.-Ing. Ralf Roos

#### Organisation:
KIT Department of Civil Engineering, Geo and Environmental Sciences

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

#### 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

<table>
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<tbody>
<tr>
<td>T-BGU-106300</td>
<td>Infrastructure Management</td>
</tr>
<tr>
<td>T-BGU-101860</td>
<td>Special Topics in Highway Engineering and Environmental Impact Assessment</td>
</tr>
</tbody>
</table>
# Module: Incentives, Interactivity & Decisions in Organizations

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration  
**Compulsory Elective Modules (Business Administration)**  
**Credits:** 9  
**Grading scale:** Grade to a tenth  
**Recurrence:** Each term  
**Duration:** 2 terms  
**Language:** German/English  
**Level:** 4  
**Version:** 1

<table>
<thead>
<tr>
<th>Elective Offer (Election:)</th>
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<tbody>
<tr>
<td>T-WIWI-105781 Incentives in Organizations</td>
<td>4,5 CR Nieken</td>
</tr>
<tr>
<td>T-WIWI-111912 Advanced Topics in Digital Management</td>
<td>3 CR Nieken</td>
</tr>
<tr>
<td>T-WIWI-111913 Advanced Topics in Human Resource Management</td>
<td>3 CR Nieken</td>
</tr>
<tr>
<td>T-WIWI-111806 Behavioral Lab Exercise</td>
<td>4,5 CR Nieken, Scheibehenne</td>
</tr>
<tr>
<td>T-WIWI-110851 Designing Interactive Systems</td>
<td>4,5 CR Mädche</td>
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<tr>
<td>T-WIWI-111099 Judgement and Decision Making</td>
<td>4,5 CR Scheibehenne</td>
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<tr>
<td>T-WIWI-111385 Responsible Artificial Intelligence</td>
<td>4,5 CR Weinhardt</td>
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<tr>
<td>T-WIWI-102614 Experimental Economics</td>
<td>4,5 CR Weinhardt</td>
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<tr>
<td>T-WIWI-111109 KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics</td>
<td>4,5 CR Weinhardt</td>
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</table>

**Competition 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.

**Competition 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.
Module: Industrial Production II [M-WIWI-101471]

**Responsible:** Prof. Dr. Frank Schultmann

**Organisation:** KIT Department of Economics and Management

**Part of:** Business Administration

**Credits** 9

**Grading scale** Grade to a tenth

**Recurrence** Each winter term

**Duration** 1 term

**Language** German/English

**Level** 4

**Version** 4

**Mandatory**

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>T-WIWI-102631</td>
<td>Planning and Management of Industrial Plants</td>
<td>5,5 CR</td>
<td>Schultmann</td>
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**Supplementary Courses (Election: at most 1 Item)**

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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>T-WIWI-102763</td>
<td>Supply Chain Management with Advanced Planning Systems</td>
<td>3,5 CR</td>
<td>Bosch, Göbelt</td>
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<tr>
<td>T-WIWI-102826</td>
<td>Risk Management in Industrial Supply Networks</td>
<td>3,5 CR</td>
<td>Schultmann</td>
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<tr>
<td>T-WIWI-102828</td>
<td>Supply Chain Management in the Automotive Industry</td>
<td>3,5 CR</td>
<td>Heupel, Lang</td>
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</tr>
<tr>
<td>T-WIWI-103134</td>
<td>Project Management</td>
<td>3,5 CR</td>
<td>Schultmann</td>
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**Supplementary Courses (Election: at most 1 Item)**

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<th>Course Code</th>
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<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102634</td>
<td>Emissions into the Environment</td>
<td>3,5 CR</td>
<td>Karl</td>
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</tr>
<tr>
<td>T-WIWI-112103</td>
<td>Global Manufacturing</td>
<td>3,5 CR</td>
<td>Sasse</td>
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<tr>
<td>T-WIWI-112155</td>
<td>Life Cycle Assessment and Global Forecasts</td>
<td>3,5 CR</td>
<td>Schultmann</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Planning and Managing of Industrial Plants* [2581952] 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 *Planning and Managing of Industrial Plants* [2581952] 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.
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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
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<td>9</td>
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<td>1 term</td>
<td>German/English</td>
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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-112155 | Life Cycle Assessment and Global Forecasts | 3.5 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-102828 | Supply Chain Management in the Automotive Industry | 3.5 CR | Heupel, Lang |
| T-WIWI-103134 | Project Management | 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 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.
# Module: Informatics [M-WIWI-101472]

**Responsible:**
- Dr.-Ing. Michael Färber
- 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:** Informatics

### Credits
9

### Grading scale
Grade to a tenth

### Recurrence
Each term

### Duration
1 term

### Level
4

### Version
15

#### Compulsory Elective Area (Election: )

<table>
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<th>Duration</th>
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<tbody>
<tr>
<td>T-WIWI-102680</td>
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#### Seminars and Advanced Labs (Election: between 0 and 1 items)

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<td>T-WIWI-110144</td>
<td>Emerging Trends in Digital Health</td>
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<td>T-WIWI-109249</td>
<td>Sociotechnical Information Systems Development</td>
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<td>T-WIWI-110548</td>
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<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
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</table>
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.
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)**  

<table>
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<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
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<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
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**Supplementary Courses (Election: )**

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<th>Course Title</th>
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<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
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<tr>
<td>T-WIWI-102640</td>
<td>Market Engineering: Information in Institutions</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4,5 CR</td>
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**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 analyses 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 chosen, 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**

The total workload for this module is approximately 270 hours. For further information see German version.
6.60 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)**

<table>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
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<td>Each term</td>
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**Compulsory Elective Courses (Election: at least 9 credits)**

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<tr>
<td>T-WIWI-105777</td>
<td>Business Intelligence Systems</td>
<td>4,5 CR</td>
<td>Mädche, Nadj, Toreini</td>
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<tr>
<td>T-WIWI-110851</td>
<td>Designing Interactive Systems</td>
<td>4,5 CR</td>
<td>Mädche</td>
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<tr>
<td>T-WIWI-108437</td>
<td>Practical Seminar: Information Systems and Service Design</td>
<td>4,5 CR</td>
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**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 information 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.
6.61 Module: Innovation and Growth [M-WIWI-101478]

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

<table>
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Compulsory Elective Courses (Election: between 9 and 10 credits)

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<td>Dynamic Macroeconomics</td>
<td>4.5</td>
<td>Brumm</td>
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<tr>
<td>T-WIWI-102840</td>
<td>Innovation Theory and Policy</td>
<td>4.5</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-111318</td>
<td>Growth and Development</td>
<td>4.5</td>
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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 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
Students shall be given the ability to

- know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of micro- and macroeconomic theories
- understand the important role of innovation to the overall economic growth and welfare
- 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

Content
The module includes courses that deal with issues of innovation and growth in the context of micro- and macroeconomic theories. The dynamic analysis makes it possible to analyze the consequences of individual decisions over time, and sheds light on the tension between static and dynamic efficiency in particular. In this context is also analyzed, which policy is appropriate to carry out corrective interventions in the market and thus increase welfare in the presence of market failure.

Workload
Total expenditure of time for 9 credits: 270 hours

Attendance time per lecture: 3x14h
Preparation and wrap-up time per lecture: 3x14h
Rest: Exam Preparation

The exact distribution is subject to the credits of the courses of the module.

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.

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

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### Compulsory Elective Courses (Election: between 9 and 10 credits)

- **T-WIWI-102840**  
  4.5 CR  
  Innovation Theory and Policy  
  Ott
- **T-WIWI-102906**  
  1.5 CR  
  Methods in Economic Dynamics  
  Ott
- **T-WIWI-109864**  
  3 CR  
  Product and Innovation Management  
  Klarmann
- **T-WIWI-102789**  
  3 CR  
  Seminar in Economic Policy  
  Ott

### 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 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 shall be given the ability to

- understand the important role of innovation for economic growth and welfare
- understand the relevance of alternative incentive mechanisms for the emergence and dissemination of innovations
- know basic terms of product and innovation concepts
- know fundamental concepts of innovation management
- work with fundamental theoretical innovation models and to implement them in appropriate computer algebra systems
- query appropriate data sources and to analyse and visualise them using statistical methods

### Content

The module provides students with knowledge about implications of technological and organizational changes.

Addressed economic issues are incentives for developing innovations, diffusion processes, and associated effects. In this context the module analyses appropriate policies in the presence of market failures to take corrective action on the market process and thus to increase the dynamic efficiency of economies.

Furthermore, the module offers the possibility to learn about different aspects of theoretical modelling of innovation-based growth as a part of the seminar and the methods-workshop. This includes the implementation of formal models in computer algebra systems as well as recording, processing and econometric analysis of related data from relational databases (concerning for example patents or trademarks). Moreover, methods of network theory are applied.

Finally, the module emphasises the business perspective: Issues of all stages of innovation processes will be discussed, from innovation strategies up to the market commercialisation.

### Workload

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

### 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 quantitative-mathematical methods.
## 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** 9  
**Grading scale** Grade to a tenth  
**Recurrence** Each term  
**Duration** 1 term  
**Language** German/English  
**Level** 4  
**Version** 9

### Mandatory

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<td>Innovation Management: Concepts, Strategies and Methods</td>
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### Compulsory Elective Courses (Election: 1 item)

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<td>The negotiation of open innovation</td>
<td>3 CR</td>
<td>Beyer</td>
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<tr>
<td>T-WIWI-108875</td>
<td>Digital Transformation and Business Models</td>
<td>3 CR</td>
<td>Koch</td>
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<td>T-WIWI-112143</td>
<td>Development of Sustainable Business Models</td>
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<td>T-WIWI-111823</td>
<td>Successful Transformation Through Innovation</td>
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<td>T-WIWI-102852</td>
<td>Case Studies Seminar: Innovation Management</td>
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<td>Globalization of Innovation – Innovation for Globalization: Methods and Analyses</td>
<td>3 CR</td>
<td>Schneider</td>
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<td>T-WIWI-112157</td>
<td>Innovation &amp; Space</td>
<td>3 CR</td>
<td>Beyer</td>
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<td>T-WIWI-108774</td>
<td>Analyzing and Evaluating Innovation Processes</td>
<td>3 CR</td>
<td>Beyer</td>
</tr>
<tr>
<td>T-WIWI-110234</td>
<td>Innovation Processes Live</td>
<td>3 CR</td>
<td>Beyer</td>
</tr>
<tr>
<td>T-WIWI-110263</td>
<td>Methods in Innovation Management</td>
<td>3 CR</td>
<td>Koch</td>
</tr>
<tr>
<td>T-WIWI-102853</td>
<td>Roadmapping</td>
<td>3 CR</td>
<td>Koch</td>
</tr>
<tr>
<td>T-WIWI-110987</td>
<td>Seminar Methods along the Innovation process</td>
<td>3 CR</td>
<td>Beyer</td>
</tr>
<tr>
<td>T-WIWI-110986</td>
<td>Strategic Foresight China</td>
<td>3 CR</td>
<td>Weissenberger-Eibl</td>
</tr>
<tr>
<td>T-WIWI-109932</td>
<td>A Closer Look at Social Innovation</td>
<td>3 CR</td>
<td>Beyer</td>
</tr>
<tr>
<td>T-WIWI-102858</td>
<td>Technology Assessment</td>
<td>3 CR</td>
<td>Koch</td>
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<tr>
<td>T-WIWI-102854</td>
<td>Technologies for Innovation Management</td>
<td>3 CR</td>
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</table>

### Supplementary Courses (Election: 1 item)

<table>
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<tbody>
<tr>
<td>T-WIWI-102866</td>
<td>Design Thinking</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-110867</td>
<td>The negotiation of open innovation</td>
<td>3 CR</td>
<td>Beyer</td>
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<tr>
<td>T-WIWI-108875</td>
<td>Digital Transformation and Business Models</td>
<td>3 CR</td>
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</tr>
<tr>
<td>T-WIWI-102833</td>
<td>Entrepreneurial Leadership &amp; Innovation Management</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
<tr>
<td>T-WIWI-102864</td>
<td>Entrepreneurship</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
<tr>
<td>T-WIWI-111823</td>
<td>Successful Transformation Through Innovation</td>
<td>3 CR</td>
<td>Busch</td>
</tr>
<tr>
<td>T-WIWI-102852</td>
<td>Case Studies Seminar: Innovation Management</td>
<td>3 CR</td>
<td>Weissenberger-Eibl</td>
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<tr>
<td>T-WIWI-111822</td>
<td>Globalization of Innovation – Innovation for Globalization: Methods and Analyses</td>
<td>3 CR</td>
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<tr>
<td>T-WIWI-112157</td>
<td>Innovation &amp; Space</td>
<td>3 CR</td>
<td>Beyer</td>
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<tr>
<td>T-WIWI-108774</td>
<td>Analyzing and Evaluating Innovation Processes</td>
<td>3 CR</td>
<td>Beyer</td>
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<td>T-WIWI-110234</td>
<td>Innovation Processes Live</td>
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<tr>
<td>T-WIWI-102858</td>
<td>Technology Assessment</td>
<td>3 CR</td>
<td>Koch</td>
</tr>
</tbody>
</table>
Competence Certificate
See German version.

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.

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

Recommendation
None
6.64 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)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
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<td>Grade to a tenth</td>
<td>Each summer term</td>
<td>1 term</td>
<td>German</td>
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<table>
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<th>Mandatory</th>
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<tbody>
<tr>
<td>T-MACH-109054</td>
</tr>
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</table>

**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

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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**Intellectual Property Law (Election: at least 1 item as well as at least 9 credits)**

<table>
<thead>
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<tbody>
<tr>
<td>T-INFO-101308</td>
<td>Copyright</td>
<td>3 CR</td>
<td>Dreier</td>
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<tr>
<td>T-INFO-101313</td>
<td>Trademark and Unfair Competition Law</td>
<td>3 CR</td>
<td>Matz</td>
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<tr>
<td>T-INFO-101307</td>
<td>Internet Law</td>
<td>3 CR</td>
<td>Dreier</td>
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<td>T-INFO-108462</td>
<td>Selected Legal Issues of Internet Law</td>
<td>3 CR</td>
<td>Dreier</td>
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<tr>
<td>T-INFO-111403</td>
<td>Seminar: Patent Law</td>
<td>3 CR</td>
<td>Dammel</td>
</tr>
</tbody>
</table>

**Prerequisites**

None
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)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>German</td>
<td>4</td>
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</table>

**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**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
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</thead>
<tbody>
<tr>
<td>T-BGU-108000</td>
<td>Lean Construction</td>
<td>4.5 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-101007</td>
<td>Project Paper Lean Construction</td>
<td>1.5 CR</td>
<td>Haghsheno</td>
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</table>

**Electives (Elective: between 1 and 2 items as well as between 3 and 4.5 credits)**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
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<tbody>
<tr>
<td>T-BGU-111921</td>
<td>Turnkey Construction</td>
<td>3 CR</td>
<td>Haghsheno</td>
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<tr>
<td>T-BGU-111922</td>
<td>Civil Engineering Structures and Regenerative Energies</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-103427</td>
<td>Site Management</td>
<td>1.5 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-111211</td>
<td>Energetic Refurbishment</td>
<td>1.5 CR</td>
<td>Lennerts, Schneider</td>
</tr>
<tr>
<td>T-BGU-103432</td>
<td>Project Management in Construction and Real Estate Industry I</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-103433</td>
<td>Project Management in Construction and Real Estate Industry II</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
</tbody>
</table>

**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
6.67 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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>9</td>
<td>Grade to a tenth</td>
<td>Each summer term</td>
<td>1 term</td>
<td>English</td>
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</table>

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

Dieter Arnold et. al.: Handbuch Logistik, 2008
Marc Goetschalkx: Supply Chain Engineering, 2011
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:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each winter term

**Duration:** 1 term

**Language:** German

**Level:** 4

**Version:** 5

**Mandatory**

<table>
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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
</tr>
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<tbody>
<tr>
<td>T-MACH-110963</td>
<td>Machine Tools and High-Precision Manufacturing Systems</td>
<td>9 CR</td>
</tr>
</tbody>
</table>

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

6.69 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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
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<th>Duration</th>
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</tbody>
</table>

Mandatory

| T-MACH-105401 | Integrated Product Development | 18 CR | Albers, Albers Assistenten |

Competence Certificate
oral examination (60 minutes)

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

- **Responsible:** Prof. Dr. Marcus Wouters
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Business Administration
- **Credits:** 9
- **Grading scale:** Grade to a tenth
- **Recurrence:** Each term
- **Duration:** 2 terms
- **Language:** English
- **Level:** 4
- **Version:** 3

### Mandatory

<table>
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<tr>
<th>Code</th>
<th>Course Description</th>
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<th>Grading</th>
<th>Recurrence</th>
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<td>4,5 CR</td>
<td>Wouters</td>
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<td>T-WIWI-102801</td>
<td>Management Accounting 2</td>
<td>4,5 CR</td>
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</table>

**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-term 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 summer semester
- The course Management Accounting 2, which is offered in every winter semester

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Manufacturing Technology [M-MACH-101276]

**Responsibility:** Prof. Dr.-Ing. Volker Schulze

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences

**Compulsory Elective Modules (Engineering Sciences)**

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
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<th>Level</th>
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<tbody>
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<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>1 term</td>
<td>German</td>
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**Mandatory**

<table>
<thead>
<tr>
<th>Module Code</th>
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<tbody>
<tr>
<td>T-MACH-102105</td>
<td>Manufacturing Technology</td>
<td>9 CR</td>
</tr>
</tbody>
</table>

**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”.

**Workload**

- Regular attendance: 63 hours
- Self-study: 207 hours

**Learning type**

Lectures, exercise, excursion
6.72 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)

<table>
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<td>T-WIWI-102640</td>
<td>Market Engineering: Information in Institutions</td>
<td>4,5 CR</td>
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**Supplementary Courses (Elective: 4,5 credits)**

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<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-102613</td>
<td>Auction Theory</td>
<td>4,5 CR</td>
<td>Ehrhart</td>
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<tr>
<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4,5 CR</td>
<td>Schuster, Uhrig-Homburg</td>
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<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-107503</td>
<td>Energy Networks and Regulation</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-102614</td>
<td>Experimental Economics</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-111109</td>
<td>KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-107504</td>
<td>Smart Grid Applications</td>
<td>4,5 CR</td>
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**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 *Market Engineering: Information in Institutions* [2540460] is compulsory and must be examined.

**Competence Goal**
The students

- know the design criteria 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 of 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 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.

**Annotation**
The course "Computational Economics" [2590458] will not be offered any more in this module from winter term 2015/2016 on. The examination will be offered latest until summer term 2016 (repeaters only).

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
Recommendation
None
6.73 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)

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<th>Language</th>
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Compulsory Elective Courses (Elective: at least 1 item)

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<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-WIWI-111099</td>
<td>Judgement and Decision Making</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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<tr>
<td>T-WIWI-107720</td>
<td>Market Research</td>
<td>4,5 CR</td>
<td>Klarmann</td>
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<tr>
<td>T-WIWI-109864</td>
<td>Product and Innovation Management</td>
<td>3 CR</td>
<td>Klarmann</td>
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Supplementary Courses (Elective: at most 1 item)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-106981</td>
<td>Digital Marketing and Sales in B2B</td>
<td>1,5 CR</td>
<td>Klarmann, Konhäuser</td>
</tr>
<tr>
<td>T-WIWI-110985</td>
<td>International Business Development and Sales</td>
<td>6 CR</td>
<td>Casenave, Klarmann, Terzidis</td>
</tr>
<tr>
<td>T-WIWI-102835</td>
<td>Marketing Strategy Business Game</td>
<td>1,5 CR</td>
<td>Klarmann</td>
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<tr>
<td>T-WIWI-111848</td>
<td>Online Concepts for Karlsruhe City Retailers</td>
<td>1,5 CR</td>
<td>Klarmann</td>
</tr>
<tr>
<td>T-WIWI-102891</td>
<td>Price Negotiation and Sales Presentations</td>
<td>1,5 CR</td>
<td>Klarmann, Schröder</td>
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<tr>
<td>T-WIWI-111246</td>
<td>Pricing Excellence</td>
<td>1,5 CR</td>
<td>Bill, Klarmann</td>
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Compentence 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.

Annotation
Please note that only one of the listed 1.5-ECTS courses can be chosen in the module.

Workload
The total workload for this module is approximately 270 hours.
Module: Material Flow in Logistic Systems [M-MACH-101277]

Responsible: Prof. Dr.-Ing. Kai Furmans
Organisation: KIT Department of Mechanical Engineering
Part of: Engineering Sciences
Compulsory Elective Modules (Engineering Sciences)

Mandatory
T-MACH-102151 Material Flow in Logistic Systems 9 CR Furmans

Competence Certificate
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under T-MACH-102151.

Prerequisites
none

Competence Goal
The student

- acquires comprehensive and well-founded knowledge on the main topics of logistics, an overview of different logistic questions in practice and knows the functionality of material handling systems,
- is able to illustrate logistic systems with adequate accuracy by using simple models,
- is able to realize coherences within logistic systems,
- is able to evaluate logistic systems by using the learnt methods.

Content
The module Material Flow in Logistic Systems provides comprehensive and well-founded basics for the main topics of logistics. Within the lectures, the interaction between several components of logistic systems will be shown. The module focuses on technical characteristics of material handling systems as well as on methods for illustrating and evaluating logistics systems. To gain a deeper understanding, the course is accompanied by exercises and case studies.

Workload
270 hours

Learning type
Lectures, tutorials.
6.75 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)

<table>
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<tr>
<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
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**Mandatory**

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<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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</thead>
<tbody>
<tr>
<td>T-MACH-105189</td>
<td>Mathematical Models and Methods for Production Systems</td>
<td>6 CR</td>
<td>Baumann, Furmans</td>
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</table>

**Material flow in interconnected logistics systems (Election: )**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-MACH-112213</td>
<td>Applied material flow simulation</td>
<td>4.5 CR</td>
<td>Baumann</td>
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<tr>
<td>T-MACH-105151</td>
<td>Energy Efficient Intralogistic Systems</td>
<td>4 CR</td>
<td>Kramer, Schönung</td>
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<tr>
<td>T-MACH-111003</td>
<td>Global Logistics</td>
<td>4 CR</td>
<td>Furmans</td>
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<tr>
<td>T-MACH-102128</td>
<td>Information Systems and Supply Chain Management</td>
<td>3 CR</td>
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<td>T-MACH-105187</td>
<td>IT-Fundamentals of Logistics</td>
<td>4 CR</td>
<td>Thomas</td>
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<td>T-MACH-105174</td>
<td>Warehousing and Distribution Systems</td>
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<td>T-MACH-105175</td>
<td>Airport Logistics</td>
<td>3 CR</td>
<td>Richter</td>
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<tr>
<td>T-MACH-105171</td>
<td>Safety Engineering</td>
<td>4 CR</td>
<td>Kany</td>
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**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.
Module: Mathematical Programming [M-WIWI-101473]

Responsibility: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: Operations Research
Compulsory Elective Modules (Operations Research)

<table>
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<th>Credits</th>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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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-110162 Optimization Models and Applications 4.5 CR Sudermann-Merx
- 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 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 "Mixed Integer Programming I", "Parametric Optimization", "Convex Analysis", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

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 module 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. For further information see German version.
6.77 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)

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<td>1 term</td>
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**Compulsory Elective Courses (Election: at least 9 credits)**

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<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4,5 CR</td>
<td>Mitusch</td>
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<tr>
<td>T-WIWI-102861</td>
<td>Advanced Game Theory</td>
<td>4,5 CR</td>
<td>Ehrhart, Puppe, Reiß</td>
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<tr>
<td>T-WIWI-102859</td>
<td>Social Choice Theory</td>
<td>4,5 CR</td>
<td>Puppe</td>
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<td>T-WIWI-102613</td>
<td>Auction Theory</td>
<td>4,5 CR</td>
<td>Ehrhart</td>
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<tr>
<td>T-WIWI-105781</td>
<td>Incentives in Organizations</td>
<td>4,5 CR</td>
<td>Nieken</td>
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**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 separately.

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 microeconomic problems mathematically and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs.

An example of a positive question is: which regulation policy results in which firm decisions under imperfect competition? An example of a normative question is: which voting rule has appealing properties?

**Content**

The student should gain an understanding of advanced topics in economic theory, game theory and welfare economics. Core topics are, among others, strategic interactions in markets, cooperative and non-cooperative bargaining (Advanced Game Theory), allocation under asymmetric information and general equilibrium over time (Advanced Topics in Economic Theory), voting and the aggregation of preferences and judgements (Social Choice Theory).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
# 6.78 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)**

<table>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<th>Recurrence</th>
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<tr>
<td>T-MACH-102166</td>
<td>Fabrication Processes in Microsystem Technology</td>
<td>3 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-100530</td>
<td>Physics for Engineers</td>
<td>6 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>3 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-102191</td>
<td>Polymers in MEMS B: Physics, Microstructuring and Applications</td>
<td>3 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-102192</td>
<td>Polymers in MEMS A: Chemistry, Synthesis and Applications</td>
<td>3 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-102200</td>
<td>Polymers in MEMS C: Biopolymers and Bioplastics</td>
<td>3 CR</td>
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<td>3 CR</td>
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<td>T-MACH-109122</td>
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<td>4 CR</td>
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</table>

### 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
- acquires 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
### 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)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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**Mikrooptik (Election: at least 9 credits)**

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<tr>
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<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
<td>Last</td>
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</tr>
<tr>
<td>T-MACH-102165</td>
<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
<td>3 CR</td>
<td>Heckele, Mappes</td>
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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<tr>
<td>T-ETIT-100741</td>
<td>Laser Physics</td>
<td>4 CR</td>
<td>Eichhorn</td>
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<tr>
<td>T-ETIT-101945</td>
<td>Optical Waveguides and Fibers</td>
<td>4 CR</td>
<td>Koos</td>
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<tr>
<td>T-MACH-109122</td>
<td>X-ray Optics</td>
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**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 knowledge 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
- knowledge on X-ray imaging methods

**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
# 6.80 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)**

<table>
<thead>
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<th>Credits</th>
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<table>
<thead>
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<th>Module Code</th>
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<tr>
<td>T-MACH-102165</td>
<td>Selected Topics on Optics and Microoptics for Mechanical Engineers</td>
<td>3 CR</td>
<td>Heckele, Mappes</td>
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<tr>
<td>T-MACH-100967</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II</td>
<td>3 CR</td>
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<td>T-MACH-100968</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III</td>
<td>3 CR</td>
<td>Guber</td>
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<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
<td>Hölscher</td>
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<tr>
<td>T-MACH-105182</td>
<td>Introduction to Microsystem Technology I</td>
<td>3 CR</td>
<td>Badili, Jouda, Korvink</td>
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<tr>
<td>T-MACH-105183</td>
<td>Introduction to Microsystem Technology II</td>
<td>3 CR</td>
<td>Jouda, Korvink</td>
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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<td>T-MACH-102080</td>
<td>Nanotechnology with Clusterbeams</td>
<td>3 CR</td>
<td>Gspann</td>
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<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
<td>Kohl, Sommer</td>
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<td>T-ETIT-101907</td>
<td>Optoelectronic Components</td>
<td>4 CR</td>
<td>Freude</td>
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<td>T-MACH-100530</td>
<td>Physics for Engineers</td>
<td>6 CR</td>
<td>Dienwiebel, Gumbsch, Nesterov-Müller, Weygand</td>
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<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
<td>Last</td>
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</table>

**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**  
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
Module: Mobile Machines [M-MACH-101267]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences

<table>
<thead>
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<th>Credits</th>
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<th>Level</th>
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<tr>
<td>T-MACH-105168</td>
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**Mobile Machines (Election: at least 1 credit)**

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<tbody>
<tr>
<td>T-MACH-105307</td>
<td>Drive Train of Mobile Machines</td>
<td>4</td>
<td>Geimer, Wydra</td>
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<td>T-MACH-105311</td>
<td>Design and Development of Mobile Machines</td>
<td>4</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-108887</td>
<td>Design and Development of Mobile Machines - Advance</td>
<td>0</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-102093</td>
<td>Fluid Power Systems</td>
<td>5</td>
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<td>T-MACH-111389</td>
<td>Fundamentals in the Development of Commercial Vehicles</td>
<td>3</td>
<td>Weber</td>
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<tr>
<td>T-MACH-105172</td>
<td>Simulation of Coupled Systems</td>
<td>4</td>
<td>Geimer</td>
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<tr>
<td>T-MACH-108888</td>
<td>Simulation of Coupled Systems - Advance</td>
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<td>Geimer, Xiang</td>
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<td>T-MACH-111821</td>
<td>Steuerung mobiler Arbeitsmaschinen</td>
<td>4</td>
<td>Becker, Geimer</td>
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<td>Steuerung mobiler Arbeitsmaschinen-Vorleistung</td>
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</table>

**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 separately.

**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].
6.82 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 |

**Mandatory**

<table>
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<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>1 term</td>
<td>German</td>
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</table>

**Competence Certificate**

The Master Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Industrial Engineering and Management. The Master Thesis is described in detail in § 11 of the examination regulation.

The review is carried out by at least one examiner of the Department of Economics and Management, or, after approval by at least one examiner of another faculty. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.

The regular processing time takes six months. On a reasoned request of the student, the examination board can extend the processing time of a maximum of three months. If the Master Thesis is not completed in time, this exam is "failed", unless the student is not being responsible (eg maternity leave).

With consent of the examiner the thesis can be written in English as well. Other languages require besides the consent of the examiner the approval of the examination board. The issue of the Master Thesis may only returned once and only within the first month of processing time. A new topic has to be released within four weeks.

The module grade is the grade for the Master 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 examiner 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: "I hereby declare that I produced this thesis without external assistance, and that no other than the listed references have been used as sources of information. Passages taken literally or analogously from published or non published sources is marked as this." 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 examiner. The topic has to be related to Industrial Engineering and Management and has to refer to subject-specific or interdisciplinary problems.

**Workload**

The total workload for this module is approximately 900 hours. For further information see German version.
6.83 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)

<table>
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<tr>
<th>Credits</th>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<th>Author(s)</th>
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<td>4 CR</td>
<td>Dienwiebel, Hölscher, Walheim</td>
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<tr>
<td>T-MACH-102080</td>
<td>Nanotechnology with Clusterbeams</td>
<td>3 CR</td>
<td>Gspann</td>
</tr>
<tr>
<td>T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>3 CR</td>
<td>Dienwiebel, Hölscher</td>
</tr>
<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
<td>Last</td>
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<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
<td>Kohl, Sommer</td>
</tr>
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<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
<td>Hölscher</td>
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<td>T-ETIT-100740</td>
<td>Quantum Functional Devices and Semiconductor Technology</td>
<td>3 CR</td>
<td>Koos</td>
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**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**
one

**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 "Nanotechnology with scanning probe methods" 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
Module: Natural Hazards and Risk Management

**Responsible:** apl. Prof. Dr. Michael Kunz

**Organisation:** KIT Department of Economics and Management

**Part of:** Engineering Sciences

**Compulsory Elective Modules (Engineering Sciences)**

<table>
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<tr>
<th>Credits</th>
<th>Grading scale</th>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
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</table>

**Wahlpflichtangebot (Election: between 9 and 12 credits)**

| T-BGU-101499 | Introduction to Hydrogeology | 5 CR | Goldscheider |
| T-BGU-108943 | Engineering Hydrology        | 3 CR | Ehret        |
| 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.
6.85 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)

<table>
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<td>Grade to a tenth</td>
<td>Each term</td>
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<th>Compulsory Elective Courses (Election: 9 credits)</th>
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<td>T-WIWI-102712</td>
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<td>T-WIWI-102713</td>
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**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**
The total workload for this module is approximately 270 hours. For further information see German version.

**Recommendation**
Basics of microeconomics obtained within the undergraduate programme (B.Sc) of economics are required.

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Research  
**Compulsory Elective Modules (Operations Research)**

<table>
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<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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</table>

**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)

<table>
<thead>
<tr>
<th>Code</th>
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<td>Graph Theory and Advanced Location Models</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-106200</td>
<td>Modeling and OR-Software: Advanced Topics</td>
<td>4,5</td>
<td>CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4,5</td>
<td>CR</td>
<td>Nickel</td>
</tr>
</tbody>
</table>

### Supplementary Courses (Election: at most 1 item)

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-112213</td>
<td>Applied material flow simulation</td>
<td>4,5</td>
<td>CR</td>
<td>Baumann</td>
</tr>
<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization</td>
<td>4,5</td>
<td>CR</td>
<td>Rebennack</td>
</tr>
<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
<td>4,5</td>
<td>CR</td>
<td>Speckermann</td>
</tr>
<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4,5</td>
<td>CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
<td>4,5</td>
<td>CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-110162</td>
<td>Optimization Models and Applications</td>
<td>4,5</td>
<td>CR</td>
<td>Sudermann-Merx</td>
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<tr>
<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
<td>4,5</td>
<td>CR</td>
<td>Rebennack</td>
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<tr>
<td>T-WIWI-111587</td>
<td>Multicriteria Optimization</td>
<td>4,5</td>
<td>CR</td>
<td>Rebennack</td>
</tr>
<tr>
<td>T-WIWI-112109</td>
<td>Topics in Stochastic Optimization</td>
<td>4,5</td>
<td>CR</td>
<td>Rebennack</td>
</tr>
</tbody>
</table>

**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 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. Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

**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 Supply Chain Management, 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.
**6.87 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)

<table>
<thead>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each term</td>
<td>1 term</td>
<td>German</td>
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**Optoelektronik und Optische Kommunikationstechnik (Kernbereich) (Election: 1 item)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-ETIT-100639</td>
<td>Optical Transmitters and Receivers</td>
<td>6 CR</td>
<td>Freude</td>
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**Optoelektronik und Optische Kommunikationstechnik (Ergänzungsbereich) (Election: at least 5 credits)**

<table>
<thead>
<tr>
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<th>Credits</th>
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<tbody>
<tr>
<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
<td>Kohl, Sommer</td>
</tr>
<tr>
<td>T-ETIT-101938</td>
<td>Communication Systems and Protocols</td>
<td>5 CR</td>
<td>Becker, Becker</td>
</tr>
<tr>
<td>T-ETIT-100741</td>
<td>Laser Physics</td>
<td>4 CR</td>
<td>Eichhorn</td>
</tr>
<tr>
<td>T-ETIT-100740</td>
<td>Quantum Functional Devices and Semiconductor Technology</td>
<td>3 CR</td>
<td>Koos</td>
</tr>
<tr>
<td>T-ETIT-101945</td>
<td>Optical Waveguides and Fibers</td>
<td>4 CR</td>
<td>Koos</td>
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</table>

**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
6.88 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:** 9  
**Grading scale:** Grade to a tenth  
**Recurrence:** Each term  
**Duration:** 2 terms  
**Level:** 4  
**Version:** 3

**Principles of Food Process Engineering (Election: 1 item)**

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<th>Credits (CR)</th>
<th>Grade</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>T-CIWVT-111536</td>
<td>Process Engineering: Example Food Processing</td>
<td>6</td>
<td></td>
<td>Gaukel</td>
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<tr>
<td>T-CIWVT-100152</td>
<td>Advanced Food Processing</td>
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<td>Gaukel</td>
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</table>

**Elective Courses: Food Process Engineering (Election: between 3 and 8 credits)**

<table>
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<tr>
<td>T-CIWVT-112174</td>
<td>Extrusion Technology in Food Processing</td>
<td>4</td>
</tr>
<tr>
<td>T-CIWVT-108801</td>
<td>Food Science and Functionality</td>
<td>4</td>
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</tbody>
</table>

**Prerequisites**

none

**Competence Goal**

See German version.
### 6.89 Module: Private Business Law [M-INFO-101216]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
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<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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#### Private Business Law (Election: at least 1 item as well as at least 9 credits)

<table>
<thead>
<tr>
<th>Code</th>
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<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-INFO-111405</td>
<td>Seminar: Commercial and Corporate Law in the IT Industry</td>
<td>3 CR</td>
<td>Dreier, Nolte</td>
</tr>
<tr>
<td>T-INFO-101288</td>
<td>Corporate Compliance</td>
<td>3 CR</td>
<td>Herzig</td>
</tr>
<tr>
<td>T-INFO-102036</td>
<td>Computer Contract Law</td>
<td>3 CR</td>
<td>Menk</td>
</tr>
<tr>
<td>T-INFO-111436</td>
<td>Employment Law</td>
<td>3 CR</td>
<td>Hoff</td>
</tr>
<tr>
<td>T-INFO-111437</td>
<td>Tax Law</td>
<td>3 CR</td>
<td>Dietrich</td>
</tr>
</tbody>
</table>

**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.
6.90 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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>German</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>

**Mandatory**

- **T-BGU-101844 Process Engineering** 3 CR Schneider

**Electives (Selection: 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
6.91 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)**

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>German</td>
<td>4</td>
<td>3</td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-BGU-103432</td>
<td>Project Management in Construction and Real Estate Industry I</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-111921</td>
<td>Turnkey Construction</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
</tbody>
</table>

### Electives (Election: between 1 and 2 items as well as between 3 and 4,5 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-BGU-103427</td>
<td>Site Management</td>
<td>1.5 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-111211</td>
<td>Energetic Refurbishment</td>
<td>1.5 CR</td>
<td>Lennerts, Schneider</td>
</tr>
<tr>
<td>T-BGU-111922</td>
<td>Civil Engineering Structures and Regenerative Energies</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
<tr>
<td>T-BGU-103433</td>
<td>Project Management in Construction and Real Estate Industry II</td>
<td>3 CR</td>
<td>Haghsheno</td>
</tr>
</tbody>
</table>

### 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
## 6.92 Module: Public Business Law [M-INFO-101217]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Compulsory Elective Modules (Law or Sociology)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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</tbody>
</table>

### Public Business Law (Election: at least 1 item as well as at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-INFO-101309</td>
<td>Telecommunications Law</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-101312</td>
<td>European and International Law</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-111404</td>
<td>Seminar: IT- Security Law</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-INFO-111406</td>
<td>Data Protection Law</td>
<td>3 CR</td>
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</table>

**Competence Certificate**  
see course description.
Module: Rail System Technology [M-MACH-101274]

Responsible:  Prof. Dr.-Ing. Marcus Geimer
             Prof. Dr.-Ing. Peter Gratzfeld

Organisation:  KIT Department of Mechanical Engineering

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

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

Mandatory

T-MACH-102143  Rail System Technology  9 CR  Geimer, Gratzfeld

Competence Certificate
Oral examination
Duration: ca. 45 minutes
No tools or reference materials may be used during the exam.

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 and 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 judge 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: principles, 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

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
6.94 Module: Safety, Computing and Law in Highway Engineering [M-BGU-101066]

**Responsible:** Prof. Dr.-Ing. Ralf Roos

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** Engineering Sciences

**Compulsory Elective Modules (Engineering Sciences)**

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
<td>T-BGU-101804</td>
<td>IT-Based Road Design</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-101674</td>
<td>Safety Management in Highway Engineering</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-BGU-106615</td>
<td>Laws concerning Traffic and Roads</td>
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**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
### 6.95 Module: Seminar Module [M-WIWI-101808]

**Responsible:** Studiendekan des KIT-Studienganges  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Compulsory Elective Modules (mandatory)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Duration</th>
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<td>Each term</td>
<td>1 term</td>
<td>German</td>
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</table>

**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)

<table>
<thead>
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<tr>
<td>T-WIWI-103474</td>
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<tr>
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<td>3 CR</td>
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<tr>
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<tr>
<td>T-WIWI-103479</td>
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<tr>
<td>T-WIWI-103480</td>
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<tr>
<td>T-WIWI-103481</td>
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<td>Nickel, Rebennack, Stein</td>
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<tr>
<td>T-WIWI-103482</td>
<td>Seminar in Operations Research B (Master)</td>
<td>3 CR</td>
<td>Nickel, Rebennack, Stein</td>
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<tr>
<td>T-WIWI-103483</td>
<td>Seminar in Statistics A (Master)</td>
<td>3 CR</td>
<td>Grothe, Schienle</td>
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<tr>
<td>T-WIWI-103484</td>
<td>Seminar in Statistics B (Master)</td>
<td>3 CR</td>
<td>Grothe, Schienle</td>
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<tr>
<td>T-INFO-101997</td>
<td>Seminar: Legal Studies I</td>
<td>3 CR</td>
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<td>T-INFO-105945</td>
<td>Seminar: Legal Studies II</td>
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<tr>
<td>T-MACH-102135</td>
<td>Conveying Technology and Logistics</td>
<td>3 CR</td>
<td>Furmans, Pagani</td>
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<tr>
<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
<td>3 CR</td>
<td>Fleischer, Lanza, Schulze</td>
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<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
<td>3 CR</td>
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<tr>
<td>T-ETIT-100754</td>
<td>Seminar Creating a Patent Specification</td>
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<td>T-WIWI-108763</td>
<td>Seminar in Engineering Science Master (approval)</td>
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<td>Fachvertreter ingenieurwissenschaftlicher Fakultäten</td>
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#### Interdisciplinary Qualifications (Election: at least 3 credits)

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<td>T-WIWI-111439</td>
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<td>T-WIWI-111440</td>
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<td>T-WIWI-111441</td>
<td>Self-Booking-HOC-SPZ-ZAK-STK-Ungraded</td>
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<td>T-WIWI-111442</td>
<td>Self-Booking-HOC-SPZ-ZAK-STK-Ungraded</td>
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</table>
 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 detailed description of 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

The total workload for this module is approximately 270 hours. For further information see German version.
6.96 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)

<table>
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Mandatory

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<tr>
<td>T-ETIT-101911</td>
<td>Sensors</td>
<td>3 CR</td>
<td>Menesklou</td>
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Compulsory Elective (Election: at most 2 items as well as at least 6 credits)

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<tr>
<td>T-ETIT-100707</td>
<td>Seminar Sensors</td>
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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-105182</td>
<td>Introduction to Microsystem Technology I</td>
<td>3 CR</td>
<td>Badili, Jouda, Korvink</td>
</tr>
<tr>
<td>T-MACH-105183</td>
<td>Introduction to Microsystem Technology II</td>
<td>3 CR</td>
<td>Jouda, Korvink</td>
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</table>

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.
6.97 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)

<table>
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<tr>
<th>Compulsory Elective Courses (Elective: 9 credits)</th>
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<tbody>
<tr>
<td>T-WIWI-108715 Artificial Intelligence in Service Systems</td>
</tr>
<tr>
<td>T-WIWI-111219 Artificial Intelligence in Service Systems - Applications in Computer Vision</td>
</tr>
<tr>
<td>T-WIWI-105777 Business Intelligence Systems</td>
</tr>
<tr>
<td>T-WIWI-102899 Modeling and Analyzing Consumer Behavior with R</td>
</tr>
<tr>
<td>T-WIWI-112152 Practical Seminar: Artificial Intelligence in Service Systems</td>
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<tr>
<td>T-WIWI-109940 Special Topics in Information Systems</td>
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</table>

**Compulsory Elective Courses (Elective: 9 credits)**

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 2 terms

**Language:** German

**Level:** 4

**Version:** 8

**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

- know the theoretical bases and the key components of Business Intelligence systems,
- acquire 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**

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

**Recommendation**

The course Service Analytics A [2595501] should be taken.
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
- Deep knowledge of the innovation method Design Thinking, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one’s ideas, to test and iteratively develop them, and to converge on a solution
- Learn to apply the method to a real innovation projects issued by industry partners.

Content
- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (intern. Design Thinking network).
- Design Space Exploration: Exploring the problem space through customer and user observation as well as desk research.
- Critical Function Prototype: Identification of critical features from the customer's perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are in the focus of this phase.
- Funky Prototype: Integration of the individually tested and successful functions to several complete solution scenarios, which are further tested and developed.
- Functional Prototype: Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is laid out in detail and tested with users.
- Final Prototype: Implementing the functional prototype and presenting it to the customer.

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 (http://sdt-koelruhe.de). Furthermore, the KSRI conducts an information event for applicants every year in May. This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.

Workload
The total amount of work for this module is approx. 270 hours (9 credits). The workload for this course is comparably high as the course runs in cooperation with partner universities from around the world as well as partner companies. This causes overhead.
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.
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)

<table>
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<td>T-WIWI-102640</td>
<td>Market Engineering: Information in Institutions</td>
<td>4.5</td>
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<td>T-WIWI-102641</td>
<td>Service Innovation</td>
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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.kibri.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
The total workload for this module is approximately 270 hours. For further information see German version.

Recommendation
None
6.100 Module: Service Innovation, Design & Engineering [M-WIWI-102806]

Responsibility: Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

Organisation: KIT Department of Economics and Management

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

<table>
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<th>Credits</th>
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**Compulsory Elective Courses (Election: 9 credits)**

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<tr>
<td>T-WIWI-110877</td>
<td>Engineering Interactive Systems</td>
<td>4,5 CR</td>
<td>Satzger</td>
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<tr>
<td>T-WIWI-102639</td>
<td>Business Models in the Internet: Planning and Implementation</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<tr>
<td>T-WIWI-110887</td>
<td>Practical Seminar: Service Innovation</td>
<td>4,5 CR</td>
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<td>T-WIWI-108437</td>
<td>Practical Seminar: Information Systems and Service Design</td>
<td>4,5 CR</td>
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<td>Service Innovation</td>
<td>4,5 CR</td>
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**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.kscri.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**
The total workload for this module is approximately 270 hours. For further information see German version.
**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].
6.101 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)

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<th>Duration</th>
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**Compulsory Elective Courses (Election: 9 credits)**

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<td>Artificial Intelligence in Service Systems - Applications in Computer Vision</td>
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<tr>
<td>T-WIWI-102899</td>
<td>Modeling and Analyzing Consumer Behavior with R</td>
<td>4.5 CR</td>
<td>Dorner, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-102641</td>
<td>Service Innovation</td>
<td>4.5 CR</td>
<td>Satzger</td>
</tr>
</tbody>
</table>

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

**Recommendation**
None
6.102 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)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
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</table>

**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 or Discrete-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)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
<td>4.5 CR</td>
<td>Spieckermann</td>
</tr>
<tr>
<td>T-WIWI-102884</td>
<td>Operations Research in Health Care Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-102716</td>
<td>Practical Seminar: Health Care Management (with Case Studies)</td>
<td>4.5 CR</td>
<td>Nickel</td>
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</table>

**Supplementary Courses (Election: at most 1 item)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>T-MACH-112213</td>
<td>Applied material flow simulation</td>
<td>4.5 CR</td>
<td>Baumann</td>
</tr>
<tr>
<td>T-WIWI-102872</td>
<td>Challenges in Supply Chain Management</td>
<td>4.5 CR</td>
<td>Mohr</td>
</tr>
<tr>
<td>T-WIWI-110971</td>
<td>Demand-Driven Supply Chain Planning</td>
<td>4.5 CR</td>
<td>Packowski</td>
</tr>
</tbody>
</table>

**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. Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

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

**Recommendation**
The course Practical Seminar Health Care should be combined with the course OR in Health Care Management.
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
9

### Grading scale
Grade to a tenth

### Recurrence
Each term

### Duration
2 terms

### Level
4

### Version
2

#### Mandatory

<table>
<thead>
<tr>
<th>Code</th>
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<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
<td>T-GEISTSOZ-104565</td>
<td>Computer Aided Data Analysis</td>
<td>0 CR</td>
<td>Nollmann</td>
<td></td>
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<tr>
<td>T-GEISTSOZ-109052</td>
<td>Application of Social Science Methods (WiWi)</td>
<td>9 CR</td>
<td>Nollmann</td>
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</table>

#### Prerequisites
Students must pass three exercise 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.
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)

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German</td>
<td>4</td>
<td>3</td>
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</table>

Elective Courses: Specialization in Food Process Engineering (Election: at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-CIWVT-111433</td>
<td>Drying of Dispersions</td>
<td>1,5 CR</td>
<td>Karbstein</td>
</tr>
<tr>
<td>T-CIWVT-108871</td>
<td>Microbiology for Engineers</td>
<td>3 CR</td>
<td>Schwartz</td>
</tr>
<tr>
<td>T-CHEMBIO-109442</td>
<td>Food Chemistry Basics</td>
<td>3 CR</td>
<td>Bunzel</td>
</tr>
<tr>
<td>T-CIWVT-111434</td>
<td>Additives and Active Substances</td>
<td>1,5 CR</td>
<td>van der Schaaf</td>
</tr>
<tr>
<td>T-CIWVT-111534</td>
<td>Introduction to Sensory Analysis with Practice</td>
<td>1,5 CR</td>
<td>Scherf</td>
</tr>
<tr>
<td>T-CIWVT-111535</td>
<td>Food Science and Functionality</td>
<td>3 CR</td>
<td>Watzl</td>
</tr>
<tr>
<td>T-CHEMBIO-108091</td>
<td>Introduction to Food Law</td>
<td>1,5 CR</td>
<td>Kuballa</td>
</tr>
<tr>
<td>T-CIWVT-112174</td>
<td>Extrusion Technology in Food Processing</td>
<td>4 CR</td>
<td></td>
</tr>
</tbody>
</table>

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.
6.105 Module: Specialization in Production Engineering [M-MACH-101284]

 responsible: Prof. Dr.-Ing. Volker Schulze

 Organisation: KIT Department of Mechanical Engineering

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

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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</table>

Vertiefung der Produktionstechnik (Election: at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>4 CR</td>
<td>Wawerla</td>
</tr>
<tr>
<td>T-MACH-110991</td>
<td>Global Production</td>
<td>4 CR</td>
<td>Lanza</td>
</tr>
<tr>
<td>T-MACH-110981</td>
<td>Tutorial Global Production</td>
<td>1 CR</td>
<td>Lanza</td>
</tr>
<tr>
<td>T-MACH-105188</td>
<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>4 CR</td>
<td>Schlichtenmayer</td>
</tr>
<tr>
<td>T-MACH-112115</td>
<td>Artificial Intelligence in Production</td>
<td>5 CR</td>
<td>Fleischer</td>
</tr>
<tr>
<td>T-MACH-105783</td>
<td>Learning Factory “Global Production”</td>
<td>6 CR</td>
<td>Lanza</td>
</tr>
<tr>
<td>T-MACH-108878</td>
<td>Laboratory Production Metrology</td>
<td>5 CR</td>
<td>Lanza</td>
</tr>
<tr>
<td>T-MACH-110318</td>
<td>Product- and Production-Concepts for Modern Automobiles</td>
<td>4 CR</td>
<td>Kienzle, Steegmüller</td>
</tr>
<tr>
<td>T-MACH-110984</td>
<td>Production Technology for E-Mobility</td>
<td>4 CR</td>
<td>Fleischer</td>
</tr>
<tr>
<td>T-MACH-110960</td>
<td>Project Internship Additive Manufacturing: Development and Production of an Additive Component</td>
<td>4 CR</td>
<td>Zanger</td>
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<tr>
<td>T-MACH-102107</td>
<td>Quality Management</td>
<td>4 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-112121</td>
<td>Seminar Application of Artificial Intelligence in Production</td>
<td>4 CR</td>
<td>Fleischer</td>
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<tr>
<td>T-MACH-105185</td>
<td>Control Technology</td>
<td>4 CR</td>
<td>Gönnheimer</td>
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<tr>
<td>T-MACH-105177</td>
<td>Metal Forming</td>
<td>4 CR</td>
<td>Herlan</td>
</tr>
<tr>
<td>T-MACH-102148</td>
<td>Gear Cutting Technology</td>
<td>4 CR</td>
<td>Klaiber</td>
</tr>
</tbody>
</table>

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 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
Module: Specific Topics in Materials Science [M-MACH-101268]

**Responsible:** Prof. Dr. Michael Hoffmann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences

**Compulsory Elective Modules (Engineering Sciences)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
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</table>

**Spezielle Werkstoffkunde (Elective: at least 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-102141</td>
<td>Constitution and Properties of Wearresistant Materials</td>
<td>4 CR</td>
<td>Ulrich</td>
</tr>
<tr>
<td>T-MACH-100287</td>
<td>Introduction to Ceramics</td>
<td>6 CR</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>T-MACH-102099</td>
<td>Experimental Lab Class in Welding Technology, in Groups</td>
<td>4 CR</td>
<td>Dietrich</td>
</tr>
<tr>
<td>T-MACH-102111</td>
<td>Principles of Ceramic and Powder Metallurgy Processing</td>
<td>4 CR</td>
<td>Schell</td>
</tr>
<tr>
<td>T-MACH-102154</td>
<td>Laboratory Laser Materials Processing</td>
<td>4 CR</td>
<td>Schneider</td>
</tr>
<tr>
<td>T-MACH-102102</td>
<td>Physical Basics of Laser Technology</td>
<td>5 CR</td>
<td>Schneider</td>
</tr>
<tr>
<td>T-MACH-102137</td>
<td>Polymer Engineering I</td>
<td>4 CR</td>
<td>Liebig</td>
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<tr>
<td>T-MACH-102138</td>
<td>Polymer Engineering II</td>
<td>4 CR</td>
<td>Liebig</td>
</tr>
<tr>
<td>T-MACH-102103</td>
<td>Superhard Thin Film Materials</td>
<td>4 CR</td>
<td>Ulrich</td>
</tr>
<tr>
<td>T-MACH-100531</td>
<td>Systematic Materials Selection</td>
<td>4 CR</td>
<td>Dietrich, Schulze</td>
</tr>
<tr>
<td>T-MACH-102139</td>
<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>4 CR</td>
<td>Gruber, Gumbsch</td>
</tr>
<tr>
<td>T-MACH-102140</td>
<td>Failure of Structural Materials: Deformation and Fracture</td>
<td>4 CR</td>
<td>Gumbsch, Weygand</td>
</tr>
<tr>
<td>T-MACH-102157</td>
<td>High Performance Powder Metallurgy Materials</td>
<td>4 CR</td>
<td>Schell</td>
</tr>
<tr>
<td>T-MACH-102179</td>
<td>Structural Ceramics</td>
<td>4 CR</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>T-MACH-102182</td>
<td>Ceramic Processing Technology</td>
<td>4 CR</td>
<td>Binder</td>
</tr>
<tr>
<td>T-MACH-102170</td>
<td>Structural and Phase Analysis</td>
<td>4 CR</td>
<td>Hinterstein, Wagner</td>
</tr>
<tr>
<td>T-MACH-105150</td>
<td>Constitution and Properties of Protective Coatings</td>
<td>4 CR</td>
<td>Ulrich</td>
</tr>
<tr>
<td>T-MACH-105170</td>
<td>Welding Technology</td>
<td>4 CR</td>
<td>Farajian</td>
</tr>
<tr>
<td>T-MACH-105164</td>
<td>Laser in Automotive Engineering</td>
<td>4 CR</td>
<td>Schneider</td>
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<tr>
<td>T-MACH-105157</td>
<td>Foundry Technology</td>
<td>4 CR</td>
<td>Wilhelm</td>
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<tr>
<td>T-MACH-105178</td>
<td>Practical Course Technical Ceramics</td>
<td>4 CR</td>
<td>Schell</td>
</tr>
<tr>
<td>T-MACH-105179</td>
<td>Functional Ceramics</td>
<td>4 CR</td>
<td>Hinterstein, Rheinheimer</td>
</tr>
</tbody>
</table>

**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.
### 6.107 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)**

<table>
<thead>
<tr>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
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<td>Each term</td>
<td>1 term</td>
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</table>

### Compulsory Elective Courses (Election: between 1 and 2 items)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
</tr>
<tr>
<td>T-WIWI-106548</td>
<td>Advanced Stochastic Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
</tr>
<tr>
<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
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</table>

### Supplementary Courses (Election: at most 1 item)

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
<td>4,5 CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4,5 CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
<td>4,5 CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-111247</td>
<td>Mathematics for High Dimensional Statistics</td>
<td>4,5 CR</td>
<td>Grothe</td>
</tr>
<tr>
<td>T-WIWI-111587</td>
<td>Multicriteria Optimization</td>
<td>4,5 CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4,5 CR</td>
<td>Grothe</td>
</tr>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4,5 CR</td>
<td>Nickel</td>
</tr>
<tr>
<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
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<td>Rebennack</td>
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<tr>
<td>T-WIWI-110162</td>
<td>Optimization Models and Applications</td>
<td>4,5 CR</td>
<td>Sudermann-Merx</td>
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<tr>
<td>T-WIWI-112109</td>
<td>Topics in Stochastic Optimization</td>
<td>4,5 CR</td>
<td>Rebennack</td>
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</table>

**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. Students who choose the module in the field "compulsory elective modules" may select any two courses of the module.

**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.
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)

<table>
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<tr>
<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<tr>
<td>9</td>
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<td>Each term</td>
<td>2 terms</td>
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Strategic Design of Modern Production Systems (Election: at least 9 credits)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Credits</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>4 CR</td>
<td>Wawerla</td>
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<tr>
<td>T-MACH-110991</td>
<td>Global Production</td>
<td>4 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-110981</td>
<td>Tutorial Global Production</td>
<td>1 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-105188</td>
<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>4 CR</td>
<td>Schlichtenmayer</td>
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<tr>
<td>T-MACH-105783</td>
<td>Learning Factory &quot;Global Production&quot;</td>
<td>6 CR</td>
<td>Lanza</td>
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<tr>
<td>T-MACH-110318</td>
<td>Product- and Production-Concepts for Modern Automobiles</td>
<td>4 CR</td>
<td>Kienzle, Steegmüller</td>
</tr>
<tr>
<td>T-MACH-102107</td>
<td>Quality Management</td>
<td>4 CR</td>
<td>Lanza</td>
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</table>

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
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)

<table>
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<th>Credits</th>
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<tr>
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<td>Each winter term</td>
<td>2 terms</td>
<td>English</td>
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</table>

**Mandatory**

- T-WIWI-102864 **Entrepreneurship**  
  Credits: 3 CR  
  Instructor: Terzidis
- T-WIWI-110166 **SIL Entrepreneurship Project**  
  Credits: 3 CR  
  Instructor: Terzidis
- T-WIWI-110287 **SIL Entrepreneurship Emphasis**  
  Credits: 3 CR  
  Instructor: 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/.
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.
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** 9
**Grading scale** Grade to a third
**Recurrence** Each winter term
**Duration** 2 terms
**Language** English
**Level** 4
**Version** 1

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<th>Mandatory</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<tr>
<td>T-ETIT-110291</td>
<td>9</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>English</td>
<td>4</td>
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</table>

**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 architecture
2. Submission of the reflection of the gate plans
3. Presentation of the High-fidelity Prototype

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.

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- Ability to cooperate: Students can analyse and assess their cooperation behaviour in the group.
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Content
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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.

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- 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

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.
Module: Technical Logistics [M-MACH-101279]

**Responsible:** Prof. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

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

<table>
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<th>Duration</th>
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<td>Each winter term</td>
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**Mandatory**

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**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 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.

T-MACH-109920 "Basics of Technical Logistics II" is based on T-MACH-109919 "Basics of Technical Logistics I". The contents are taught one after the other in one course in the winter semester. The individual exams are taken on one day at the end of the semester.

**Prerequisites**
none

**Competence Goal**
The student

- acquires well-founded knowledge on the main topics of technical logistics
- gets an overview of different applications of technical logistics in practice.
- acquires expertise and understanding about functionality of material handling systems.

**Content**
The module *Technical Logistics* provides in-depth basics on the main topics of technical logistics. The module focuses on technical characteristics of material handling technology. To gain a deeper understanding, the course is accompanied by exercises.

**Workload**
270 hours

**Learning type**
Lecture
### 6.112 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)

<table>
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<tr>
<th>Credits</th>
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<td>Each term</td>
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#### Compulsory Elective Courses (Election: 2 items)

<table>
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<th>Module Code</th>
<th>Title</th>
<th>Credits</th>
<th>Lecturer</th>
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<td>Spatial Economics</td>
<td>4.5 CR</td>
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<td>T-WIWI-100007</td>
<td>Transport Economics</td>
<td>4.5 CR</td>
<td>Mitusch, Szimba</td>
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### 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 major 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. For further information see German version.
### 6.113 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)**

<table>
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<th>Credits</th>
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**Compulsory Examination (Election: between 2 and 3 items as well as between 6 and 9 credits)**

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<thead>
<tr>
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<th>Course Name</th>
<th>Credits</th>
<th>Instructor</th>
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<td>T-BGU-101797</td>
<td>Methods and Models in Transportation Planning</td>
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<tr>
<td>T-BGU-101798</td>
<td>Traffic Engineering</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-101799</td>
<td>Traffic Management and Transport Telematics</td>
<td>3 CR</td>
<td>Vortisch</td>
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<tr>
<td>T-BGU-101800</td>
<td>Traffic Flow Simulation</td>
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<td>Vortisch</td>
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**Electives (Election: at most 1 item as well as between 0 and 3 credits)**

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<th>Course Name</th>
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<tr>
<td>T-BGU-100010</td>
<td>Transportation Data Analysis</td>
<td>3 CR</td>
<td>Kagerbauer</td>
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<td>T-BGU-106611</td>
<td>Freight Transport</td>
<td>3 CR</td>
<td>Chlond</td>
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<td>T-BGU-106301</td>
<td>Long-Distance and Air Traffic</td>
<td>3 CR</td>
<td>Chlond</td>
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<tr>
<td>T-BGU-101005</td>
<td>Tendering, Planning and Financing in Public Transport</td>
<td>3 CR</td>
<td>Vortisch</td>
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<td>T-BGU-100014</td>
<td>Seminar in Transportation</td>
<td>3 CR</td>
<td>Chlond, Vortisch</td>
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<tr>
<td>T-BGU-112552</td>
<td>Seminar on Modeling and Simulation in Transportation</td>
<td>3 CR</td>
<td>Kagerbauer, Vortisch</td>
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<tr>
<td>T-BGU-103425</td>
<td>Mobility Services and New Forms of Mobility</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-103426</td>
<td>Strategic Transport Planning</td>
<td>3 CR</td>
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<td>T-BGU-106608</td>
<td>Information Management for Public Mobility Services</td>
<td>3 CR</td>
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<td>T-BGU-111057</td>
<td>Sustainability in Mobility Systems</td>
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</table>

**Prerequisites**  
None

**Competence Goal**  
See German version.

**Recommendation**  
None
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)

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<td>T-BGU-112365</td>
<td>Urban Water Technologies</td>
<td>9 CR</td>
<td>Azari Najaf Abad, Fuchs</td>
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**Prerequisites**
none

**Recommendation**
none
# 6.115 Module: Vehicle Development [M-MACH-101265]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences

**Compulsory Elective Modules (Engineering Sciences)**

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**Vehicle Development (Election: at least 9 credits)**

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<td>Tires and Wheel Development for Passenger Cars</td>
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<td>T-MACH-111389</td>
<td>Fundamentals in the Development of Commercial Vehicles</td>
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<td>T-MACH-105163</td>
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<td>T-MACH-110796</td>
<td>Python Algorithm for Vehicle Technology</td>
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<td>T-MACH-105172</td>
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**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.
6.116 Module: Virtual Engineering A [M-MACH-101283]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering

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

<table>
<thead>
<tr>
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<tr>
<td>T-MACH-102185</td>
<td>CATIA CAD Training Course</td>
<td>2 CR</td>
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<tr>
<td>T-MACH-105312</td>
<td>CATIA Advanced</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-108491</td>
<td>Digitalization of Products, Services &amp; Production</td>
<td>4 CR</td>
<td>Pätzold</td>
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<td>Information Engineering</td>
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<td>4 CR</td>
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<td>T-MACH-111285</td>
<td>Virtual Solution Methods and Processes</td>
<td>4 CR</td>
<td>Maier, Ovtcharova</td>
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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 students should:

- have basic knowledge about the industrial application of Information Technology in product development,
- have understanding about current and future application of information systems in product development processes in the context of Product Lifecycle Management and Virtual Engineering,
- be able to operate current CAx- and PLM-systems in the product development process
- understands demands and relevance of interconnected IT-systems and respective methods for product development

Content
The Module Virtual Engineering A gives an overview about product development processes, beginning with requirement engineering, verification of manufacturing feasibility and virtual operation in the scope of Digital Factory. The guest-lectures contained in this module complete the content of the lecture with introducing current product development processes focusing.

Workload
- regular attendance: 140 hours
- Preparation and reworking: 20 hours
- Exam and exam revision/preparation: 110 hours

Learning type
Lecture, exercise
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)

<table>
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<td>Each term</td>
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<td>CR</td>
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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.
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 9
Grading scale Grade to a tenth
Recurrence Each winter term
Duration 1 term
Language German/English
Level 4
Version 2

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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
- Lecture notes will be provided in ILIAS
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: 9
Grading scale: Grade to a tenth
Recurrence: Each term
Duration: 2 terms
Level: 4
Version: 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.
7 Courses

7.1 Course: A Closer Look at Social Innovation [T-WIWI-109932]

**Responsible:** Dr. Daniela Beyer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

<table>
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**Competence Certificate**
Non exam assessment (following §4(2) 3 of the examination regulation). The grade consists of an innovation plan (comparable to an exposé) (15%), a guideline interview (25%), a presentation of the results (20%) and a seminar paper (40%).

**Prerequisites**
None

**Recommendation**
The previous attendance of the lecture Innovation Management is recommended.

**Annotation**
The course will be discontinued in the winter semester 2022/23.
7.2 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

<table>
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Events

| ST 2022 | 22209 | 1 SWS | Lecture / 🗣️ | van der Schaaf |

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. 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.

Below you will find excerpts from events related to this course:

Advanced Empirical Asset Pricing
2530569, WS 22/23, 2 SWS, Language: English, Open in study portal

Content
In this course we will discuss the fundamentals of Asset Pricing and how to test them. Although this is an Empirical Asset Pricing course, we deal with some concepts from Asset Pricing Theory that we can test afterwards (CAPM, ICAPM, CCAPM, recursive utility). Besides, the course will cover the most important empirical methods to do so. For that purpose, we will discuss the overarching tool Generalized Method of Moments, and the special cases of OLS and FMB regressions. Every second week, we will meet for a programing session, in which we will look at the data to draw our own conclusions. An introduction to the software MATLAB will be given at the beginning of the course. Students should bring a laptop to these sessions. Programing skills are not required but helpful.

We start with a review of the Stochastic Discount Factor, which is already known from the course „Asset Pricing“. We then derive the CAPM and the Consumption-CAPM as special cases from the general consumption-savings optimization problem of the rational investor. In the first part of the course we discuss the CAPM and, as natural extensions, models with multiple factors. Prominent phenomena such as the value premium and momentum are discussed. In the second part of the lecture we will study extensions of Consumption-CAPM and study the implications of exotic preferences.

Organizational issues
Veranstaltung findet montags um 9:45-11:15, aber nur in der ersten Semesterhälfte statt. Der Veranstaltungsort ist der Raum 320 im Geb. 09.21 (Blücherstraße).
Literature

Basisliteratur

zur Vertiefung/ Wiederholung
### 7.4 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

<table>
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#### Events

| ST 2022 | 22214 | Vertiefung verfahrenstechnischer Grundlagen am Beispiel Lebensmittel | 2 SWS | Lecture / 🗣 | Gaukel |

#### Exams

| ST 2022 | 7220004 | Advanced Food Processing | Gaukel |
| ST 2022 | 72200041 | Advanced Food Processing | Gaukel |

*Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled*
7 COURSES

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

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**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:_

**Advanced Game Theory**
2500037, WS 22/23, 2 SWS, Language: English, Open in study portal
7.6 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

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**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
### 7.7 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

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7 COURSES

| WT 22/23 | 7900141 | Advanced Lab Blockchain Hackathon (Master) | Sunyaev |
| WT 22/23 | 7900143 | Advanced Lab Development of Sociotechnical Information Systems (Master) | Sunyaev |
| WT 22/23 | 7900306 | Advanced Lab Realization of Innovative Services (Master) | Oberweis |
| WT 22/23 | 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.

Below you will find excerpts from events related to this course:

Lab Realisation of innovative services (Master)
2512205, SS 2022, 3 SWS, Language: German, Open in study portal

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).

Organizational issues
Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

Lab Automation in Everyday Life (Master)
2512207, SS 2022, 3 SWS, Language: German, Open in study portal

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.

Organizational issues
Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

Development of Sociotechnical Information Systems (Master)
2512401, SS 2022, 3 SWS, Language: German/English, Open in study portal

Content
The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

Project Lab Machine Learning
2512500, SS 2022, 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 4.5 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.
Content
The internship 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 backup one, to mattia.mossano@kit.edu before the kick-off. You can find a better description of the topics in ILIAS (link below). Topics are assigned first-come-first-served until all of them are filled. Topics in italics have been already assigned.

ILIAs link: https://ilias.studium.kit.edu/goto.php?target=crs_1792110&client_id=produktiv

Important dates:
Kick-off: 19.04.2022, 9:00-10:00 CET Uhr
Report + code submission: 09.09.2022, 23:59 CET
Presentation deadline: 25.09.2022, 23:59 CET
Presentation day: 28.09.2022, 16:00 CET

Topics:
Programming Usable Security Intervention
In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.aifb.kit.edu/english/TORPEDO.php) or PassSec + (https://secuso.aifb.kit.edu/english/PassSecPlus.php). Just as before, 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.

- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Improving the PassSec+ browser extension by investigating a security vulnerability in Mozilla Firefox Relay
- Development of a tool for the automated search for tweets on the topic of “phishing”
- Hacking TORPEDO
- Restructuring TORPEDO
- Authenticating on AR glasses: Implementing an authentication scheme for the Google Glass

Designing Security User studies (online studies only)
These topics are related to how to set up and conducting user studies of various types. This year, due to the Corona outbreak, we decided to conduct online studies only; otherwise, interviews and lab studies would have been possible. At the end of the semester, the students present a report / paper and a talk in which they present their results.

- Investigate brainwaves authentication
- Replication and extension of “What is this URL’s destination?”

Please note that registration is not required to participate in the kick-off meeting.
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.

Project Course Coding da Vinci - Cultural Heritage Hackathon (Master)
2512603, SS 2022, 3 SWS, Language: English, Open in study portal

Practical course (P)
Blended (On-Site/Online)
Content

Cultural heritage includes tangible and intangible heritage assets inherited from past generations. Cultural heritage data are usually stored in galleries, museums, archives and libraries (GLAM institutions) and in recent years, efforts by culture domain experts and computer scientists have begun to make this data more findable, accessible, interoperable and reusable by the general public, but also by researchers in the domains of history, social science, etc. This seminar follows up on these efforts by having student groups participate in the official Coding da Vinci culture hackathon with guidance and coaching by the course tutors.

The culture hackathon Coding da Vinci has brought together the cultural sector with creative technology communities to explore the creative potential of digital cultural heritage. Over a sprint of seven weeks the hackathon teams, together with representatives of cultural institutions, develop working prototypes that show surprising and inspiring new ways to make use of institutions' collections and artifacts in the digital age.

As part of this "Projektpraktikum", the students will take part in the official hackathon "Coding da Vinci Baden-Württemberg" (https://codingdavinci.de/index.php/de/events/baden-wuerttemberg-2022). They will form groups and implement their own interesting culture project by using the dataset(s) provided by Coding da Vinci. The goal is to create a project that is useful for the culture community and helps to explore and experience cultural heritage data in an interesting, innovative and fun way.

This "Projektpraktikum" is furthermore a chance to network with the community of culture enthusiasts and developers while creating a working application that adds value to the community. The groups will present their work at the official Codings da Vinci kick-off event and the award ceremony.

Contributions of the students:
The students will form groups of 3-4 people. They will be expected to first get familiar with datasets presented in the event, the technologies and methods they will utilize and will develop their own project idea. Each group will present their project idea on May 07, 2022 at the Coding da Vinci BW kick-off and will officially start the implementation of their project. On June 24, 2022, each group will present their final project at the official Coding da Vinci BW award ceremony. Following the event, each group will prepare a scientific seminar paper of not more than 16 pages.

Implementation:
Each group will implement their project idea based on the datasets given in the event using open source software and will publish their code using an open license via github.

Learning Goals:
- Basic understanding of knowledge graphs and Natural Language Processing
- Independent and self-organized realization of a group project
- Planning and execution of design, implementation and quality assurance of the group project
- Preparation of a scientific seminar paper for the group project of 16 pages
- Presentation of the group project in a comprehensible and structured manner

Registration:
The registration period for this course lasts from 01.02.2022 until 22.04.2022. The places are expected to be allocated on 25.04.2022 and must be accepted by the student within two days.

If you have any questions regarding the registration or course content, please contact tabea.tietz@kit.edu and oleksandra.bruns@kit.edu.

Modules: Informatik

Timeline:
20.04.2022 Plenary meeting: Introduction and Course Organization
27.04.2022 Plenary meeting: Forming of student groups and discussion of datasets
07.05.2022 Official Coding da Vinci Kick-off Event: Presentation of group idea
11.05.2022 Individual group sessions: Fixing a project plan and timeline
18.05.2022 Individual group sessions: Weekly progress meeting
25.05.2022 Individual group sessions: Weekly progress meeting
01.06.2022 Individual group sessions: Weekly progress meeting
08.06.2022 Individual group sessions: Weekly progress meeting
15.06.2022 Individual group sessions: Weekly progress meeting
22.06.2022 Individual group sessions: Weekly progress meeting
24.06.2022 Official Coding da Vinci Award Ceremony: Final Presentation
17.08.2022 Seminar paper submission and finalization (and documentation) of the code

Organizational issues
Considering the then current pandemic situation and in coordination with the participants the course will mostly taking place as online course with potentially a few "live" events (cf further description below).
Lab Realisation of innovative services (Master)
2512205, WS 22/23, 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). Further information can be found on the ILIAS page of the lab.

Organizational issues
Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

Practical Course Cognitive automobiles and robots (Master)
2512501, WS 22/23, 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 4.5 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.

Practical Course Security (Master)
2512557, WS 22/23, 4 SWS, Language: German, Open in study portal
Practical course (P) Blended (On-Site/Online)

Content
The lab deals with the IT security of everyday utensils. Implemented security mechanisms are first theoretically investigated and put to the test with practical attacks. Finally, countermeasures and suggestions for improvement are worked out. The lab is offered within the competence center for applied security technologies (KASTEL) and is supervised by several institutes.

The success control takes the form of a final presentation, a thesis and the handing over of the developed code.

More information on ILIAS.

Project lab Information Service Engineering (Master)
2512600, WS 22/23, 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. 20 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 15 students.

Participation in the lecture "Information Service Engineering" (summer semester) is required. There are video recordings on our youtube channel.

ISE Tutor Team:

- M. Sc. Russa Biswas
- M. Sc. Genet Åsefa Gesese
- M. Sc. Oleksandra Bruns
- M. Sc. Yiyi Chen
- M. Sc. Mary Ann Tan
- B. Sc. Tabea Tietz

Literature
ISE video channel on youtube: https://www.youtube.com/channel/UCjkkhNSNuXrJpMYZoeSBw6Q/
Course: Advanced Lab Security [T-WIWI-109786]

**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

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**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.

*Below you will find excerpts from events related to this course:*

**Practical Course Security (Master)**

2512557, WS 22/23, 4 SWS, Language: German, Open in study portal

**Content**

The lab deals with the IT security of everyday utensils. Implemented security mechanisms are first theoretically investigated and put to the test with practical attacks. Finally, countermeasures and suggestions for improvement are worked out. The lab is offered within the competence center for applied security technologies (KASTEL) and is supervised by several institutes.

The success control takes the form of a final presentation, a thesis and the handing over of the developed code.

More information on ILIAS.
7 COURSES

Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

T 7.9 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

Responsibility: 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

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Legend: 📱 Online, 🧩 Blended (On-Site/Online), 📣 On-Site, x 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 is expected to be offered from winter term 2018/2019.

Contents:

In the course of the programming lab, changing topics from the field of Human Factors in Security und Privacy will be worked on.

Learning goals:

The student
- can apply the basics of information security
- is able to implement appropriate measures to achieve different protection goals
- can structure a software project in the field of information security
- can use the Human Centred Security and Privacy by Design technique to develop user-friendly software
- can explain and present technical facts and the results of the programming lab in oral and written form

Below you will find excerpts from events related to this course:
Content
The internship 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 before the kick-off. You can find a better description of the topics in ILIAS (link below). Topics are assigned first-come-first-served until all of them are filled. Topics in italics have been already assigned.

ILIAS link: https://ilias.studium.kit.edu/goto.php?target=crs_1792110&client_id=produktiv

Important dates:
Kick-off: 19.04.2022, 9:00-10:00 CET - Microsoft Teams
Report + code submission: 09.09.2022, 23:59 CET
Presentation deadline: 25.09.2022, 23:59 CET
Presentation day: 28.09.2022, 16:00 CET

Topics:
Programming Usable Security Intervention
In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.aifb.kit.edu/english/TORPEDO.php) or PassSec+ (https://secuso.aifb.kit.edu/english/PassSecPlus.php). Just as before, 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.

- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Improving the PassSec+ browser extension by investigating a security vulnerability in Mozilla Firefox Relay
- Development of a tool for the automated search for tweets on the topic of “phishing”
- Hacking TORPEDO
- Restructuring TORPEDO

Please, note that registration is not required to participate in the kick-off meeting.
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.

Praktikum Security, Usability and Society (Bachelor)
2512554, WS 22/23, 3 SWS, Language: German/English, Open in study portal
Content

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 anne.hennig@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

Important dates:

Kick-off: 13.10.2022, 10:00 AM CET in Big Blue Button · Link Report + code submission: 30.01.2023 23:59 CET Presentation deadline: 30.01.2023, 23:59 CET

Presentation day: 01.02.2023

Topics:

Programming Usable Security Intervention

In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.aifb.kit.edu/english/TORPEDO.php) or PassSec + (https://secuso.aifb.kit.edu/english/PassSecPlus.php). Just as before, 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: Portfolio Graphical Recognition-Based PWDs with Gamepads

Number of students: 2 Bachelor or Master level

Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

Title: Development of a secure web interface with a ticket system for the Hashcat Password Cracker

Number of students: 2 Bachelor or Master level

Description: Hashcat is a console application which allows to crack passwords using a given wordlist or password pattern. In order to allow multiple not necessarily trustworthy users to register a password cracking job with the specified parameters in parallel, a web platform with a ticket system should be developed within the framework of this laboratory topic. Therefore a frontend and backend should be implemented separately and a clear description of the interface between is essential part of this work. Python with Flask Web Framework can be used to implement the backend. Good knowledge in programming, APIs and web security are required.

Designing Security User studies

These topics are related to how to set up and conducting user studies of various types. This year, due to the Corona outbreak, we decided to conduct online studies only; otherwise, interviews and in lab studies would have been possible. At the end of the semester, the students present a report / paper and a talk in which they present their results.

Title: NoPhish Cardgame

Number of students: 1/2 Bachelor level

Description: Das NoPhish Konzept findet bereits in vielen Formen Anwendung. Es hilft dabei betrügerische Nachrichten von legitemen zu Unterscheiden. Die neueste Form ist ein Cardgame bei dem man spielerisch lernen kann Phishing zu erkennen. Hierbei wird sowohl grundlegendes Wissen, als auch konkretes Wissen vermittelt. Aufgabe: Erheben von Daten (Studiendesign ist bereits vorhanden) und Auswertung bestehender Daten mit neu erhobenen Daten

Title: Analysing the perceptions on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'

Number of students: 1/2 Bachelor or Master level

Description: Email subject extensions are used in my organisation to reduce the risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

Title: Benützerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten

Number of students: 2 Bachelor or Master level


Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)

Number of students: 1 Bachelor or Master level

Description: The Privacy Friendly Apps are a set of applications developed by the SECUOSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users (https://secuso.aifb.kit.edu/english/105.php). One of these apps is “Sudoku”, available for Android on both the Google Store and F-Droid. Although the app is friendlier to privacy that other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g., https://idarinstitute.com/products/arthritis-simulation-gloves). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis.
Title: Replication and extension of "What is this URL's destination?" (English only)
Number of students: 1 Bachelor level
Description: Replication of studies is a fundamental part of the scientific process: it allows to confirm or deny experimental results and can open new lines of research. This topic is a replication of the study presented in Albakry, S., Vaniea, K. & Wolters, M.K. (2020) What is this URL's destination? Empirical Evaluation of Users' URL Reading" (https://doi.org/10.1145/3313831.3376168). The student will re-implement the study following the precise description from the original authors, run it and then compare the results with the previous iteration.

Title: Password Generator Defaults
Number of students: 2 Bachelor or Master level
Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking
Number of students: 1/2 Bachelor or Master level

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.

Praktikum Security, Usability and Society (Master)
2512555, WS 22/23, 3 SWS, Language: German/English, Open in study portal

Practical course (P) Online
Content
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 anne.hennig@kit.edu. Topics are assigned first-come-first-served until all of them are filled. The deadline for the first round is 18.07.2022. Topics in italics have been already assigned.

WiWi portal: https://portal.wiwi.kit.edu/ys/6273

Important dates:
Kick-off: 13.10.2022, 10:00 AM CET in Big Blue Button - Link
Report + code submission: 30.01.2023 23:59 CET
Presentation deadline: 30.01.2023, 23:59 CET
Presentation day: 01.02.2023

Topics:
Programming Usable Security Intervention
In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.aifb.kit.edu/english/TORPEDO.php) or PassSec + (https://secuso.aifb.kit.edu/english/PassSecPlus.php). Just as before, 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: Portfolio Graphical Recognition-Based PWDs with Gamepads
Number of students: 2 Bachelor or Master level
Description: Graphical passwords use graphical elements as passwords and they are usually easier to remember than textual passwords. Moreover, they can be combined with "portfolio authentication" techniques to make them shoulder surfing resistant. The goal of this topic is to implement a graphical portfolio authentication scheme for gamepads, based on previous textual schemes implementations.

Title: Development of a secure web interface with a ticket system for the Hashcat Password Cracker
Number of students: 2 Bachelor or Master level
Description: Hashcat is a console application which allows to crack passwords using a given wordlist or password pattern. In order to allow multiple not necessarily trustworthy users to register a password cracking job with the specified parameters in parallel, a web platform with a ticket system should be developed within the framework of this laboratory topic. Therefore a frontend and backend should be implemented separately and a clear description of the interface between is essential part of this work. Python with Flask Web Framework can be used to implement the backend. Good knowledge in programming, APIs and web security are required.

Designing Security User studies
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Title: Analysing the perceptions on email subject extensions like 'Caution - This e-mail is sent from someone outside the company'
Number of students: 1/2 Bachelor or Master level
Description: Email subject extensions are in use in order to cause a risk to become a victim of a phishing email - why should your boss e.g. send you an external email? Likely to be a phish! The idea is to develop the study protocol and to collect first data which should be analysed.

Title: Benutzerstudie zur Erkennung von Angriffen auf die E-Mail Absicherung mit S/MIME-Zertifikaten
Number of students: 2 Bachelor or Master level

Title: Evaluation of the Sudoku Privacy Friendly App usability for users with rheumatoid arthritis (English only)
Number of students: 1 Bachelor or Master level
Description: The Privacy Friendly Apps are a set of applications developed by the SECUSO group that do not contain any advertisement or tracking mechanism, hence preserving the privacy of their users (https://secuso.aifb.kit.edu/english/105.php). One of these apps is "Sudoku", available for Android on both the Google Store and F-Droid. Although the app is friendly to privacy that other alternatives, it requires multiple tactile interactions with the mobile device. This can be an issue for users with reduced hand mobility, such as those suffering from rheumatoid arthritis. To approximate the reduced mobility caused by reumatoid arthritis in healthy users, it is common to use arthritis simulation gloves (e.g., https://idarinstitution.com/products/arthritis-simulation-gloves). The task of the student is to design a lab study involving arthritis simulation gloves that evaluates the Sudoku app usability for users suffering from rheumatoid arthritis.
Title: Password Generator Defaults
Number of students: 2 Bachelor or Master level
Description: Password Managers are useful tools that help the use of complex passwords and avoid the password recycle practice. Moreover, they support users by providing password generator tools, that create random password of specific length. However, the defaults settings might be at odds with the password policies of popular website, e.g., they can contain forbidden characters or be too long/short. Moreover, we need to understand if Password Managers users change the default settings to generate passwords, in how many cases and for what reasons. The students task is therefore two-folds: (1) compare the default settings of several Password Managers to the privacy policies of popular websites; (2) design and implement a survey to collect the behavior of Password Managers users with regard to the password generator tools.

Title: Benutzerstudie zur Auswertung der PassSec+ Browser Extension mittels Eye-Tracking
Number of students: 1/2 Bachelor or Master level

Title: User study on user’s knowledge about brainwaves verification
Number of students: 1 Master level
Description: Brainwaves can be used to authenticate users. However, several questions are left unanswered regarding the users' stance on this: What is the prior knowledge of users about verification and brainwaves? Are they comfortable wearing a device to record their brainwaves? How are they feeling regarding storing their brainwaves samples? Which kind of information can be extracted from the samples? How secure would such an authentication scheme be? The task of the student is to design, implement an pre-test a user study investigating these questions.

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](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).
7.10 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**
Examination of another type

**Credits**
4.5

**Grading scale**
Grade to a third

**Recurrence**
Each term

**Version**
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### Events

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**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
7.11 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**

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**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:

**Advanced Machine Learning**

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
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

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**Exams**

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**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](https://portal.wiwi.kit.edu/forms/form/fbv-ulrich-msc-project).

An online meetup will be offered at 14:00 on Tuesday of the first week of summer semester 2022 (i.e., 19.04.2022).

Below you will find excerpts from events related to this course:

**Advanced Machine Learning and Data Science**

2530357, SS 2022, 4 SWS, Language: English, Open in study portal

**Content**

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.

**Organizational issues**

Location: Räume des Lehrstuhls, Blücherstraße 17, E-008

**Literature**

Literatur wird in der ersten Vorlesung bekannt gegeben.
7.13 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**: Oral examination  
**Credits**: 4.5  
**Grading scale**: Grade to a third  
**Recurrence**: Each winter term  
**Version**: 2

<table>
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<tr>
<th>Events</th>
<th>Credits</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 22/23 2579907</td>
<td>4 SWS</td>
<td>Lecture / On-Site</td>
</tr>
</tbody>
</table>

*Wouters, Dickemann*

**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).

*Below you will find excerpts from events related to this course:*

**Advanced Management Accounting**

2579907, WS 22/23, 4 SWS, Language: English, [Open in study portal](#)
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.
### 7.14 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

<table>
<thead>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Each winter term</td>
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**Events**

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<th>Type</th>
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<td>Lecture</td>
<td>Grothe</td>
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<td>WT 22/23</td>
<td>Practice</td>
<td>Übung zu Statistik für Fortgeschrittene</td>
<td>2</td>
<td>Practice</td>
<td>Grothe</td>
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**Exams**

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<th>Title</th>
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<tr>
<td>ST 2022</td>
<td>Exam</td>
<td>Advanced Statistics</td>
<td>Grothe</td>
<td></td>
</tr>
</tbody>
</table>

**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

**Below you will find excerpts from events related to this course:**

#### Advanced Statistics

- **2550552, WS 22/23, 2 SWS, Language: German**, [Open in study portal](#)

### Literature

**Skrift zur Vorlesung**
7.15 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

<table>
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<td>Grade to a third</td>
<td>Irregular</td>
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</table>

**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.
7.16 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

<table>
<thead>
<tr>
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<th>Grading scale</th>
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<th>Version</th>
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<tr>
<td>Examination of another type</td>
<td>3</td>
<td>Grade to a third</td>
<td>Each term</td>
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</tbody>
</table>

**Events**

| ST 2022 | 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.

*Below you will find excerpts from events related to this course:*

**Advanced Topics in Digital Management**

2573016, SS 2022, 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
7.17 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

| Responsible: | Prof. Dr. Kay Mitusch |
| Organisation: | KIT Department of Economics and Management |
| Part of:      | M-WIWI-101406 - Network Economics  
M-WIWI-101497 - Agglomeration and Innovation  
M-WIWI-101500 - Microeconomic Theory  
M-WIWI-101502 - Economic Theory and its Application in Finance |

| Type          | Written examination |
| Credits       | 4.5 |
| Grading scale | Grade to a third |
| Recurrence    | Irregular |
| Version       | 1 |

**Events**

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<td>Advanced Topics in Economic Theory</td>
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<tr>
<td>ST 2022 2520528</td>
<td>1 SWS</td>
<td>Übung zu Advanced Topics in Economic Theory</td>
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**Exams**

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<td>ST 2022 00227</td>
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<tr>
<td>ST 2022 7900269</td>
<td>Advanced Topics in Economic Theory</td>
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</table>

**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:

<table>
<thead>
<tr>
<th>Advanced Topics in Economic Theory</th>
</tr>
</thead>
<tbody>
<tr>
<td>2520527, SS 2022, 2 SWS, Language: English, Open in study portal</td>
</tr>
</tbody>
</table>

**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.Winston, and J.R.Green.
7.18 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

<table>
<thead>
<tr>
<th>Type</th>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Grade to a third</td>
<td>Each term</td>
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<table>
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<th>Recurrence</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>ST 2022 2573014</td>
<td>2 SWS</td>
<td>Colloquium (K/🗣)</td>
<td>Nieken, Mitarbeiter</td>
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</tr>
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</table>

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 interested in an academic career path.

*Below you will find excerpts from events related to this course:*

**Advanced Topics in Human Resource Management**
2573014, SS 2022, 2 SWS, Language: English, [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
Geb. 05.20, Raum 2A-25, Termine werden bekannt gegeben
7.19 Course: Airport Logistics [T-MACH-105175]

**Responsible:** Dr.-Ing. André Richter

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101278 - Material Flow in Networked Logistic Systems
- M-MACH-104888 - Advanced Module Logistics

<table>
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<th>Recurrence</th>
<th>Version</th>
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<td>Each winter term</td>
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<td>2117056</td>
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<tr>
<td>Airport logistics</td>
<td>2 SWS</td>
<td>Lecture / 🗣</td>
<td></td>
<td>Richter</td>
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</tbody>
</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**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

**Below you will find excerpts from events related to this course:**

**Airport logistics**
2117056, WS 22/23, 2 SWS, Language: German, [Open in study portal]

**Content**

**Media**
Presentations

**Learning content**
- Introduction
- Airport installations
- Luggage transport
- Passenger transport
- Security on the airport
- Legal bases of the air traffic
- Freight on the airport

**Learning goals**
The students are able to:
- Describe material handling and informations technology activities on airports,
- Evaluate processes and systems on airports as the law stands, and
- Choose appropriate processes and material handling systems for airports.

**Recommendations**
None

**Workload**
Regular attendance: 21 hours
Self-study: 99 hours

**Note**
Limited number of participants: allocation of places in sequence of registration (first come first served). Registration via "ILIAS" mandatory.
Personal presence during lectures mandatory.

**Organizational issues**
Termine: siehe ILIAS.
Literature

7 COURSES

Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

7.20 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

<table>
<thead>
<tr>
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<th>Recurrence</th>
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**Events**

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<td>2134150</td>
<td>Gas, lubricating oil and operating media analysis in drive train development</td>
<td>Lecture / Online</td>
<td>Each summer term</td>
<td>Gohl</td>
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**Exams**

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<tr>
<td>ST 2022</td>
<td>76-T-MACH-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>Lecture (V)</td>
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<td>WT 22/23</td>
<td>76-T-MACH-105173</td>
<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
<td>Lecture (V)</td>
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</table>

**Competence Certificate**  
Letter of attendance or oral exam (25 minutes, no auxiliary means)

**Prerequisites**
none

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 2022, 2 SWS, Language: German, [Open in study portal](#)

**Literature**
Die Vorlesungsunterlagen werden vor jeder Veranstaltung an die Studenten verteilt.
### 7.21 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

<table>
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#### Events

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<th>Type</th>
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<td>2134134</td>
<td>Analysis tools for combustion diagnostics</td>
<td>2</td>
<td>Lecture</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>Pfeil</td>
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#### Exams

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<th>Title</th>
<th>Type</th>
<th>Grading</th>
<th>Recurrence</th>
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<tr>
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<td>Analysis Tools for Combustion Diagnostics</td>
<td>Lecture</td>
<td>Grade to a third</td>
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<td>WT 22/23</td>
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<td>Analysis Tools for Combustion Diagnostics</td>
<td>Lecture</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>Koch</td>
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</table>

**Competence Certificate**

oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**

none

#### Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
<th>Event Type</th>
<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Grading</th>
<th>Recurrence</th>
<th>Responsible</th>
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<tr>
<td>Lecture (V)</td>
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<td>Analysis tools for combustion diagnostics</td>
<td>Lecture</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>Pfeil</td>
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</table>

**Literature**

Skrift, erhaltenlich in der Vorlesung
7.22 Course: Analyzing and Evaluating Innovation Processes [T-WIWI-108774]

Responsible: Dr. Daniela Beyer
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 | see Annotations | 1

### Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation).
Innovation plan (exposé) (20%), Guided interviews/quantitative survey (20%), presentation of results (20%), seminar paper (about 5 pages per person) (40%).

### Prerequisites
None

### Recommendation
Prior attendance of the course Innovation Management is recommended.

### Annotation
The course will be discontinued in the winter semester 2022/23.
### 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

<table>
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<td>Political Dedates and Polarization in the German Parliament Part 2</td>
<td>2 SWS</td>
<td>Seminar</td>
<td>Blended</td>
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<td>ST 2022 5011006</td>
<td></td>
<td>Gender Pay Gap</td>
<td>2 SWS</td>
<td>Seminar</td>
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<td>Decomposition and Regression Analysis</td>
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#### Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
Course: Applied Econometrics [T-WIWI-111388]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I

Type: Written examination
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 1

Events
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<td>Lecture</td>
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<td>2</td>
<td>Practice</td>
<td>Krüger, Koster</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The assessment of this course is a written examination (90 min) according to §4(2), 1 of the examination regulation.

Prerequisites
None

Below you will find excerpts from events related to this course:

Applied Econometrics
2520020, WS 22/23, 2 SWS, Language: English, Open in study portal

Content
The course covers two econometric topics: (1) Conditional expectation and regression, and (2) Causal inference. Part (1) reviews foundations like the best linear predictor, least squares estimation, and robust covariance estimation. Part (2) introduces the potential outcomes framework for studying causal, what-if type questions such as ‘How does an internship affect a person’s future wage?’. It then presents research strategies like randomized trials, instrumental variables, and regression discontinuity.

For each part, we discuss econometric methods and theory, empirical examples (including recent research papers), and R implementation.

Learning goal:
Students are able to assess the properties of various econometric estimators and research designs, and to implement econometric estimators using R software.

Workload:
Total workload for 4.5 CP: approx. 135 hours
Attendance: 30 hours
Independent Study: 105 hours

Literature

Industrial Engineering and Management M.Sc.
Module Handbook as of 04/10/2022

**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

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<td>Sunyaev, Teigeler,</td>
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#### Exams

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**Legend:** Online, Blended (On-Site/Online), On-Site, Cancelled

#### Competence Certificate

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The 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.

Successful participation in the exercise by submitting correct solutions to 50% of the exercises can earn a grade bonus. 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

#### Annotation

Replaces from winter semester 2019/2020 T-WIWI-109445 "Applied Informatics - Internet Computing".

Below you will find excerpts from events related to this course:

**Applied Informatics - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services**

2511032, SS 2022, 2 SWS, Language: German, Open in study portal
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
7.26 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

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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

Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
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<td>On-Site</td>
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</table>
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.

Recommendations:

- Basic statistical skills
- Prior knowledge of a common programming language (Java, Python, ...).
- 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

Literature


### 7.27 Course: Artificial Intelligence in Production [T-MACH-112115]

**Responsible:** Prof. Dr.-Ing. Jürgen Fleischer  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering  
M-MACH-105968 - Artificial Intelligence in Production

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**Exams**

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</table>

**Competence Certificate**

Written Exam (90 min)

**Prerequisites**

none

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Below you will find excerpts from events related to this course:

### Artificial Intelligence in Production

2149921, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)  
Lecture (V)  
Blended (On-Site/Online)
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

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/).
7.28 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

**Events**

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**Exams**

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</table>

**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.

Below you will find excerpts from events related to this course:

**Artificial Intelligence in Service Systems**
2595650, WS 22/23, 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 in 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

7 COURSES

Course: Artificial Intelligence in Service Systems - Applications in Computer Vision [T-WIWI-111219]

7.29 Course: Artificial Intelligence in Service Systems - Applications in Computer Vision [T-WIWI-111219]

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: Examination of another type
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each summer term
Version: 1

Events

| ST 2022 | 2595501 | Artificial Intelligence in Service Systems - Applications in Computer Vision | 3 SWS | Lecture / 🗣 | Satzger, Schmitz |

Exams

| ST 2022 | 7900003_neu | Artificial Intelligence in Service Systems - Applications in Computer Vision | Satzger |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

Competence Certificate
Alternative exam assessment.

Modeled Conditions
The following conditions have to be fulfilled:

1. The course T-WIWI-105778 - Service Analytics A must not have been started.

Annotation
This course is admission restricted (see http://dsi.iism.kit.edu).
The course replaces "Service Analytics A" as of summer semester 2021.

Below you will find excerpts from events related to this course:

Artificial Intelligence in Service Systems - Applications in Computer Vision
2595501, SS 2022, 3 SWS, Language: English, Open in study portal

Lecture (V)
On-Site
Content
---We renamed this course from "Service Analytics A" to "Artificial Intelligence in Service Systems - Applications in Computer Vision" ---

Learning objectives
This course teaches students how to apply machine learning concepts to develop predictive models that form the basis of many innovative service offerings and business models today. Using a selected use case each term, students learn the foundations of selected algorithms and development frameworks and apply them to build a functioning prototype of an analytics-based service. Students will become proficient in writing code in Python to implement a data science use case over the course period.

Description
Data-driven services have become a key differentiator for many companies. Their development is based on the increasing availability of structured and unstructured data and their analysis through methods from data science and machine learning. Examples comprise highly innovative service offerings based on technologies such as natural language processing, computer vision or reinforcement learning.

Using a selected use case, this lecture will teach students how to develop analytics-based services in an applied setting. We teach the theoretical foundations of selected machine learning algorithms (e.g., convolutional neural networks) and development concepts (e.g., developing modeling, training, inference pipelines) and teach how to apply these concepts to build a functioning prototype of an analytics-based service (e.g., inference running on a device). During the course, students will work in small groups to apply the learned concepts in the programming language Python using packages such as Keras, Tensorflow or Scikit-Learn. For more information on recent projects as part of the course, please visit the website of our lecture: https://www.aiss-cv.com.

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
The lecture will be held as part of 7 blocks within the summer semester. Due to the practical group sessions in the course, the number of participants is limited. The official application period in the WiWi portal will open mid of February. Please apply here until April, 3rd: http://go.wiwi.kit.edu/aiss_cv. The course will be held mainly online via Zoom. For interim and final presentation, we will meet in person in building 05.20, room 1C-03. Further information on the dates of interim and final presentation will be announced via Ilias and mail.

Literature
### 7.30 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

<table>
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<td>Each summer term</td>
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**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:**

**Asset Pricing**  
2530555, SS 2022, 2 SWS, Language: German, [Open in study portal]

**Literature**

**Basisliteratur**


**Zur Wiederholung/Vertiefung**

7.31 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

<table>
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**Events**

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<td>Ehrhart</td>
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**Exams**

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**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:*

**Auktionstheorie**

2520408, WS 22/23, 2 SWS, Open in study portal

**Literature**

- Ehrhart, K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011  
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999
### 7.32 Course: Automated Manufacturing Systems [T-MACH-102162]

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

**Part of:** M-MACH-101298 - Automated Manufacturing Systems

<table>
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**Events**

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**Exams**

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**Competence Certificate**

written exam (120 minutes)

**Prerequisites**

"T-MACH-108844 - Automatisierte Produktionsanlagen" must not be commenced.

**Below you will find excerpts from events related to this course:**

<table>
<thead>
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<th>Lecture / Practice (VÜ)</th>
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<td>Blended (On-Site/Online)</td>
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Legend: 🖥 Online, ☑️ Blended (On-Site/Online), 🗣 On-Site, ☑️ Cancelled
Content
The lecture provides an overview of the structure and functioning of automated manufacturing systems. In the introduction chapter the basic elements for the realization of automated manufacturing systems are given. This includes:

- Drive and control technology
- Handling technology for handling work pieces and tools
- Industrial Robotics
- Quality assurance in automated manufacturing
- automatic machines, cells, centers and systems for manufacturing and assembly
- structures of multi-machine systems
- planning of automated manufacturing systems

An interdisciplinary view of these subareas enables Industry 4.0 solutions.

In the second part of the lecture, the basics are illustrated using implemented manufacturing processes for the production of automotive components (chassis and drive technology). The analysis of automated manufacturing systems for manufacturing of defined components is also included.

In the field of vehicle power train both, the automated manufacturing process for the production of the conventional internal-combustion engine and the automated manufacturing process for the production of the prospective electric power train (electric motor and battery) are considered. In the field of car body, the focus is on the analysis of the process chain for the automated manufacturing of conventional sheet metal body parts, as well as for automated manufacturing of body components made out of fiber-reinforced plastics.

Within tutorials, the contents from the lecture are advanced and applied to specific problems and tasks.

Learning Outcomes:
The students...

- are able to analyze implemented automated manufacturing systems and describe their components.
- are capable to assess the implemented examples of implemented automated manufacturing systems and apply them to new problems.
- are able to name automation tasks in manufacturing plants and name the components which are necessary for the implementation of each automation task.
- are capable with respect to a given task to plan the configuration of an automated manufacturing system and to determine the necessary components to its realization.
- are able to design and select components for a given use case of the categories: "Handling Technology", "Industrial Robotics", "Sensory" and "Controls".
- are capable to compare different concepts for multi-machine systems and select a suitable concept for a given use case.

Workload:
MACH:
regular attendance: 63 hours
self-study: 177 hours

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

Organizational issues
Start: 21.04.2022
Vorlesungstermine dienstags 8:00 Uhr und donnerstags 8:00 Uhr, Übungstermine donnerstags 09:45 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/).
7.33 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

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**Exams**

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**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 22/23, 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
7.34 Course: Automotive Engineering I [T-MACH-100092]

**Responsible:** Prof. Dr. Frank Gauterin  
Dr.-Ing. Hans-Joachim Unrau

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

<table>
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**Exams**

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**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.

Below you will find excerpts from events related to this course:

### 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/](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)

Kann nicht mit der Veranstaltung [2113809] kombiniert werden.
Can not be combined with lecture [2113809].
Literature


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:
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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


### Course: Automotive Engineering II [T-MACH-102117]

**Responsibility:** Prof. Dr. Frank Gauterin  
Dr.-Ing. Hans-Joachim Unrau  

**Organisation:** KIT Department of Mechanical Engineering

**Type:** Written examination  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

### Events

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### Exams

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**Competence Certificate**  
Written Examination

**Duration:** 90 minutes

**Auxiliary means:** none

**Prerequisites:** none

Below you will find excerpts from events related to this course:

**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**

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter [https://fast-web-01.fast.kit.edu/Passwoerterilias/](https://fast-web-01.fast.kit.edu/Passwoerterilias/)

Kann nicht mit der Veranstaltung [2114855] kombiniert werden.

Can not be combined with lecture [2114855]
Literature

Automotive Engineering II
2114855, SS 2022, 2 SWS, Language: English, Open in study portal

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.

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

Literature
Elective literature:
### 7.36 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

**Responsible:**
- Gerd Gutekunst
- Prof. Dr. Berthold Wigger

**Organisation:**
- KIT Department of Economics and Management

**Part of:**
- M-WIWI-101511 - Advanced Topics in Public Finance

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**Exams**

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**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:

**Basics of German Company Tax Law and Tax Planning**

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**Content**

**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.
7 COURSES

Course: Basics of Technical Logistics I [T-MACH-109919]

7.37 Course: Basics of Technical Logistics I [T-MACH-109919]

**Responsible:** Dr.-Ing. Martin Mittwollen  
Dr.-Ing. Jan Oellerich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101279 - Technical Logistics

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<td>3 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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**Exams**

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<td>76-T-MACH-109919</td>
<td>Basics of Technical Logistics I</td>
<td>Lecture / Practice (VÜ)</td>
<td>Mittwollen</td>
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<td>76-T-MACH-109919-mPr</td>
<td>Basics of Technical Logistics I</td>
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<td>Basics of Technical Logistics I</td>
<td>Lecture / Practice (VÜ)</td>
<td>Mittwollen</td>
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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 regulation.

**Prerequisites**
none

**Recommendation**
Knowledge of the basics of technical mechanics preconditioned.

Below you will find excerpts from events related to this course:

**Basics of Technical Logistics I**  
2117095, WS 22/23, 3 SWS, Language: German, Open in study portal

**Content**

- effect model of conveyor machines
- elements for the change of position and orientation
- conveyor processes
- identification systems
- drives
- mechanical behaviour of conveyors
- structure and function of conveyor machines
- elements of intralogistics
- sample applications and calculations in addition to the lectures inside practical lectures

**Students are able to:**

- Describe processes and machines of technical logistics,
- Model the fundamental structures and the impacts of material handling machines with mathematical models,
- Refer to industrially used machines
- Model real machines applying knowledge from lessons and calculate their dimensions.
Organizational issues
Die Erfolgskontrolle erfolgt in Form einer schriftlichen oder mündlichen Prüfung (nach §4 (2), 1 bzw. 2SPO).
The assessment consists of a written or oral exam according to Section 4 (2), 1 or 2 of the examination regulation.
Es wird Kenntnis der Grundlagen der Technischen Mechanik vorausgesetzt.
Basics knowledge of technical mechanics is preconditioned.
Ergänzungsblätter, Präsentationen, Tafel.
Supplementary sheets, presentations, blackboard.
Präsenz: 48 Std
Nacharbeit: 132 Std
presence: 48h
rework: 132h

Literature
Empfehlungen in der Vorlesung / Recommendations during lessons
### Course: Basics of Technical Logistics II [T-MACH-109920]

**Responsible:** Dr.-Ing. Maximilian Hochstein  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101279 - Technical Logistics

<table>
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<td>Basics of Technical Logistics II</td>
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<td>Basics of Technical Logistics II</td>
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<td>Oellerich, Hochstein, Mittwollen</td>
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<td>Basics of Technical Logistics II</td>
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<td>Mittwollen, Oellerich, Hochstein</td>
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<td>76-T-MACH-109920</td>
<td>Basics of Technical Logistics II</td>
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**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 regulation.

**Prerequisites**  
none

**Recommendation**  
Knowledge of the basics of technical mechanics and out of "Basic of Technical Logistics I" (T-MACH-109919) preconditioned.
**Course: Behavioral Experiments in Action [T-WIWI-111393]**

**Responsible:** Prof. Dr. Benjamin Scheibehenne  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105714 - Consumer Research

<table>
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<tr>
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**Events**

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<td>3 SWS</td>
<td>Lecture / 🗣</td>
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**Exams**

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</table>

**Legend:**  
- 🖥 Online  
- 🧩 Blended (On-Site/Online)  
- 🗣 On-Site  
- ✗ Cancelled

**Competence Certificate**  
Gradings will be based on the quality of the experimental program, data, and the research report in Stage 2.

**Prerequisites**  
Experimental design (either take the course in our module, or gain basic knowledge of experimental design by self-education)

**Annotation**  
In this course, students will gain first-hand experience into how to conduct an experimental study in the area of behavioral economics/psychology.

The course contains two stages. In Stage 1, students will learn how to plan, program, and run an experiment by attending to blocked lectures. In Stage 2, students will choose one classic experiment in the area of behavioral economics or psychology, conduct a replication of that experiment using the techniques acquired in Stage 1, and write a research report on the results of the replication.

The number of participants is limited. The registration will take place via the Wiwi-Portal.

*Below you will find excerpts from events related to this course:*

**Behavioral Experiments in Action**

<table>
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<tr>
<th>Code</th>
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<tr>
<td>2540600</td>
<td>ST 2022</td>
<td>Behavioral Experiments in Action</td>
<td>3 SWS</td>
<td>Lecture / 🗣</td>
<td>Scheibehenne, Liu</td>
</tr>
</tbody>
</table>

**Content**  
Registration on wiwi portal required. Class size is limited to 15.

**Content:**

In this course, students will gain first-hand experience into how to conduct an experimental study in the area of behavioral economics/psychology.

The course contains two stages. In Stage 1, students will learn how to plan, program, and run an experiment by attending to blocked lectures. In Stage 2, students will choose one classic experiment in the area of behavioral economics or psychology, conduct a replication of that experiment using the techniques acquired in Stage 1, and write a research report on the results of the replication.

**Evaluation:**

Gradings will be based on the quality of the experimental program, data, and the research report in Stage 2.

**Prerequisite:** experimental design (either take the course in our module, or gain basic knowledge of experimental design by self-education)

**ETCS:** 4.5

**Organizational issues**

registration on WIWI portal required
### 7.40 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-105714 - Consumer Research  
M-WIWI-105923 - Incentives, Interactivity & Decisions in Organizations

<table>
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**Events**

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<td>2540489</td>
<td>Behavioral Lab Exercise</td>
<td>Seminar</td>
<td>4.5 SWS</td>
<td>Scheibehenne, Nieken</td>
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</table>

Legend: 🌐 Online, 🧩 Blended (On-Site/Online), 🗂 On-Site, ✗ Canceled

**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.

**Below you will find excerpts from events related to this course:**

**Behavioral Lab Exercise**  
2540489, SS 2022, 4.5 SWS, Language: English, [Open in study portal](#)

**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.
7.41 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I [T-MACH-100966]

**Responsibility:** Prof. Dr. Andreas Guber

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101290 - BioMEMS

<table>
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**Events**

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<th>Credits</th>
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<td>2141864</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</td>
<td>2 SWS</td>
<td>Lecture /线上课程</td>
<td>Guber, Ahrens</td>
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**Exams**

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<th>Semester</th>
<th>Code</th>
<th>Modules</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>ST 2022</td>
<td>76-T-MACH-100966</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</td>
<td>Guber</td>
</tr>
</tbody>
</table>

**Competence Certificate**

written exam (75 Min.)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I**

2141864, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

Blended (On-Site/Online)

**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
### 7.42 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

<table>
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<td>Grade to a third</td>
<td>Each summer term</td>
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### Events

| ST 2022 | 2142883 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II | 2 SWS | Lecture / 📪 | Guber, Ahrens |

### Exams

| ST 2022 | 76-T-MACH-100967 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II | Guber |

**Competence Certificate**  
Written exam (75 Min.)

**Prerequisites**  
none

*Below you will find excerpts from events related to this course:*

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II**  
2142883, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Content**  
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:  
LabCD, Protein Crystallisation  
Microarrays  
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**  
Die Vorlesung findet im Sommersemester aufgrund der aktuellen Situation bis auf Weiteres online statt. Zu jedem Vorlesungstermin werden via ILIAS die jeweiligen Folien im PDF-Format zur Verfügung gestellt.  
Die Vorlesung wird voraussichtlich mit der Software ZOOM oder MS Teams zu den im Vorlesungsverzeichnis angekündigten Terminen (hier: Montag 11:30 - 13:00 Uhr) durchgeführt werden. Weitere Informationen werden sobald wie möglich via ILIAS zur Verfügung gestellt.
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
7.43 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

**Responsible:** Prof. Dr. Andreas Guber
**Organisation:** KIT Department of Mechanical Engineering

**Type:** Written examination  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 2

**Events**

| ST 2022 | 2142879 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III | 2 SWS | Lecture / 🖥 | Guber, Ahrens |

**Exams**

| ST 2022 | 76-T-MACH-100968 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III | Guber |

**Competence Certificate**  
Written exam (75 Min.)

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

---

**BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III**  
2142879, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**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**


**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
### 7.44 Course: Bionics for Engineers and Natural Scientists [T-MACH-102172]

**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

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#### Exams

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<td>76-T-MACH-102172</td>
<td>Einführung in die Bionik</td>
<td>Hölscher</td>
</tr>
<tr>
<td>WT 22/23</td>
<td>76-T-MACH-102172</td>
<td>Introduction into Biomimetics</td>
<td>Hölscher</td>
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</table>

**Competence Certificate**  
written or oral exam

**Prerequisites**  
none
7.45 Course: Blockchains & Cryptofinance [T-WIWI-108880]

**Responsible:** Dr. Philipp Schuster  
Prof. Dr. Marliese Uhrig-Homburg

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101409 - Electronic Markets  
M-WIWI-101446 - Market Engineering  
M-WIWI-101480 - Finance 3  
M-WIWI-101483 - Finance 2

<table>
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<td>Grade to a third</td>
<td>see Annotations</td>
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</table>

**Competence Certificate**
The examination is offered for the last time in winter semester 20/21 for first-time writers and then again for second attempts. The assessment consists of a written exam (75 min).

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.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment).

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The lecture is currently not offered.
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.

Below you will find excerpts from events related to this course:

**Bond Markets** 2530560, WS 22/23, 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 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.

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
wird als Blockveranstaltung angeboten
Alle Termine in Geb. 09.21 Raum 124 (Blücherstraße).
### 7.47 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

<table>
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**Events**

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<th>Code</th>
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<th>Credits</th>
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<td>2 SWS</td>
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**Exams**

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<th>Credits</th>
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<td>7900318</td>
<td>Bond Markets - Models &amp; Derivatives</td>
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<td>Uhrig-Homburg</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**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.

Below you will find excerpts from events related to this course:

**Bond Markets - Models & Derivatives**

2530565, WS 22/23, 2 SWS, Language: English, Open in study portal

**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).
7.48 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

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**Events**

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**Exams**

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<td>Bond Markets - Tools &amp; Applications</td>
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**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.

*Below you will find excerpts from events related to this course:*

**Bond Markets - Tools & Applications**  
2530562, WS 22/23, 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).
7.49 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

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗓 On-Site, ✗ Cancelled

**Competence Certificate**
oral exam, 20 min

**Prerequisites**
none
7.50 Course: BUS-Controls [T-MACH-102150]

**Responsible:** Simon Becker
Prof. Dr.-Ing. Marcus Geimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101266 - Automotive Engineering

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<td>Grade to a third</td>
<td>Each summer term</td>
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**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**
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108889 must have been passed.

**Recommendation**
Basic knowledge of electrical engineering is recommended. Programming skills are also helpful.

The number of participants is limited. 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.

**Annotation**
The students will get an overview of the theoretic and practical functioning of different bus systems.

After the practical oriented lessons the students will be able to visualize the communication structure of different applications, design basic systems and evaluate the complexity of programming of the complete system.

Hereunto the students program in the practical orientated lessons IFM-controllers using the programming environment CoDeSys.

**Content:**
- Knowledge of the basics of data communication in networks
- Overview of the operating mode of current field buses
- Explicit observation of the operating mode and application areas of CAN buses
- Practical programming of an example application (hardware is provided)

**Literature:**

Below you will find excerpts from events related to this course:

**Control of Mobile Machines**
2114080, SS 2022, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
Blended (On-Site/Online)
Content

- Basics of sensors, controls and control architectures in mobile machines
- Basics and functionalities of data communication in mobile machines (CAN-Bus, PROFIBUS, Ethernet, ...)
- Legal aspects and requirements (SIL-level, ...)
- Requirements for sensors for use in mobile machines
- Introduction to machine learning methods and their application for the control of mobile machines
- Overview of current research and developments in the field of agricultural robotics
- Implementation of a specific task within the exercise lessons
- The results of the semester task will be summarized in a short report as a pre-requisite for the exam.

Learning objectives

The students learn the theoretical basics of data communication as well as the architecture of control systems in mobile machines. Furthermore, they will be able to identify influences and general conditions during usage and derive practical and legal requirements for sensors and control systems. The students will learn methods of machine learning for control tasks in mobile machines as well as their architecture and the handling of training data. After participating in the exercise, they will be able to implement, train and validate a control system for a specific task.

Recommendations

Basic knowledge of electrical engineering and computer science is recommended. Initial programming knowledge, preferably in Python, is required. The number of participants is limited as hardware will be provided for the exercise. Prior registration is required, details will be announced on the web pages of the Institute of Vehicle Systems Engineering / Department of Mobile Machinery. In case of high registration numbers exceeding the capacities, a selection among all interested persons will take place according to qualification.

regular attendance: 21 hours
total self-study: 92 hours

Literature

AN-Bus-Technik einfach, anschaulich und praxisnah dargestellt; Poing: Franzis Verlag, 2002.
7 COURSES

Course: BUS-Controls - Advance [T-MACH-108889]

7.51 Course: BUS-Controls - Advance [T-MACH-108889]

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

Part of: M-MACH-101266 - Automotive Engineering

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Competence Certificate
Creation of control program

Prerequisites
none
7.52 Course: Business Data Analytics: Application and Tools [T-WIWI-109863]

**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

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**Events**

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<td>Excercise Business Data Analytics: Application and Tools</td>
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<td>Practice / On-Site</td>
<td>Badewitz, Grote, Sterk, Bezzaoui, Nikolajevic</td>
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**Exams**

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<th>Business Data Analytics: Application and Tools</th>
<th>Weinhardt</th>
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<tr>
<td>ST 2022</td>
<td>7900189</td>
<td>Business Data Analytics: Application and Tools</td>
<td>Weinhardt</td>
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</table>

**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 (object-oriented) programming and statistics is helpful.

*Below you will find excerpts from events related to this course:*

**Business Data Analytics: Application and Tools**  
2540466, SS 2022, 2 SWS, Language: German, [Open in study portal](#)
7.53 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

### Events

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<td>Each winter term</td>
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**WT 22/23**
- **2540484** Business Data Strategy 2 SWS Lecture / Practice / Weinhardt, Dinther, Badewitz
- **2540485** Übung zu Business Data Strategy 1 SWS Practice / Weinhardt, Badewitz

### Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation and an alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. The grade is determined 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.

Below you will find excerpts from events related to this course:

**Business Data Strategy**
- **2540484**, WS 22/23, 2 SWS, Language: German, [Open in study portal](https://portal.wiwi.kit.edu/ys/5254)

### 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/5254](https://portal.wiwi.kit.edu/ys/5254)

**Anmeldung**

## 7.54 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 | Written examination |
| Credits | 4.5 |
| Grading scale | Grade to a third |
| Recurrence | Each winter term |
| Version | 1 |

### Exams

| ST 2022 | 7900065 | Business Dynamics (Nachklausur WS 2021/2022) | 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

### Recommendation

None
Course: Business Intelligence Systems [T-WIWI-105777]

Responsible:  Prof. Dr. Alexander Mädche
Mario Nadj
Dr. Peyman Toreini

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: Examination of another type
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 2

Events

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Exams

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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:

Business Intelligence Systems
2540422, WS 22/23, 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 are supplying 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. The aim of this course is to introduce theoretical foundations, concepts, tools, and current practice of BI&A Systems from a managerial and technical perspective.

The course is complemented with an engineering capstone project, where students work in a team with real-world use cases and data in order to create running Business intelligence & Analytics system prototypes.

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 a capacity of 50 places. The capacity limitation is due to the attractive format of the accompanying engineering capstone project. Strong analytical abilities and profound skills in SQL as well as Python and/or R are required. Students have to apply with their CV and transcript of records. All organizational details and the underlying registration process of the lecture and the capstone project will be presented in the first lecture. The teaching language is English.

Literature
- Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term”

Further literature will be made available in the lecture.
### 7.56 Course: Business Models in the Internet: Planning and Implementation [T-WIWI-102639]

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102806 - Service Innovation, Design & Engineering

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<td>Übungen zu Geschäftsmodellen im Internet: Planung und Umsetzung</td>
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**Exams**

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<td>Business Models in the Internet: Planning and Implementation</td>
<td>Weinhardt</td>
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</table>

**Competence Certificate**

As of summer semester 2022, the course “Business Models in the Internet: Planning and Implementation” can no longer be taken. The exam will be offered in summer semester 2022 and winter semester 2022/23 for repeaters.

**Prerequisites**

None

**Recommendation**

None

*Below you will find excerpts from events related to this course:*

**Internet Business Models**

2540456, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Organizational issues**

Im SoSem. 22 wird nur die Prüfung angeboten.

**Literature**

Wird in der Vorlesung bekannt gegeben.
7.57 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)

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<td>Business Planning for Founders in the field of IT-Security (KASTEL)</td>
<td>2 SWS</td>
<td>Seminar / Online</td>
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<td>WT 22/23</td>
<td>2545109</td>
<td>Business Planning for Founders</td>
<td>2 SWS</td>
<td>Seminar / Online</td>
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**Exams**

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<td>WT 22/23</td>
<td>7900023</td>
<td>Business Planning for Founders</td>
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**Competence Certificate**

Alternative exam assessment.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Business Planning for Founders in the field of IT-Security (KASTEL)**

2545109, SS 2022, 2 SWS, Language: English, [Open in study portal](#)

**Content**

The seminar introduces students to basic concepts of business planning based on technological innovations. On the one hand, this involves concepts for the concretization of business ideas (business modeling, market potential assessment, resource planning, etc.) and, on the other hand, the creation of a feasible business plan (with or without VC financing).

**Learning Objectives**

During the seminar, students are familiarized with methods to develop technological inventions and initial business ideas into a more concrete business plan. After completing this seminar, students will have learned and actually practiced the whole business model development process.

**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**

Block event in the framework of the KASTEL project.

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.

**Business Planning for Founders**

2545109, WS 22/23, 2 SWS, Language: English, [Open in study portal](#)
Content

Course Content:

In the course Business Planning for Founders, you will be working in interdisciplinary teams on a real-world challenge presented by an industry partner (former partners have been e.g., EnBW and WIBU-Systems). To solve the case, you will learn about human-centered design using design thinking methods. These methods will help you develop your own business idea. Building on your idea, you will deploy a business plan and finally present, as a team, the results on the pitch day in front of the seminar participants and the industry partner.

Information about the seminar:

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.

Target group: Master Student

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.
7 COURSES

Course: Business Process Modelling [T-WIWI-102697]

7.58 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 22/23 2511210 Business Process Modelling 2 SWS Lecture / On-Site Oberweis
WT 22/23 2511211 Exercise Business Process Modelling 1 SWS Practice / On-Site Oberweis, Schüler

Exams
ST 2022 79AIFB_MvG_B4 Business Process Modelling (Registration until 18 July 2022) Oberweis
WT 22/23 79AIFB_MvG_C2 Business Process Modelling Oberweis

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

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:

Business Process Modelling
2511210, WS 22/23, 2 SWS, Language: German, Open in study portal

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 apply different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analyzing and assessing process models 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


Weitere Literatur wird in der Vorlesung bekannt gegeben.
7.59 Course: Business Strategies of Banks [T-WIWI-102626]

**Responsible:** Prof. Dr. Wolfgang Müller

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2

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<td>see Annotations</td>
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</table>

**Exams**

| ST 2022  | 7900079 | Business Strategies of Banks | Müller |

**Competence Certificate**

The lecture will be offered for the last time in the winter semester 2021/22. The exam will take place for the last time in the summer semester 2022 (only for repeaters).

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The lecture will be offered for the last time in the winter semester 2021/22.
7.60 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

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**Events**

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**Exams**

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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:

**Case studies seminar: Innovation management**
2545105, WS 22/23, 2 SWS, Language: German, Open in study portal

**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.
7 COURSES

7.61 Course: CATIA Advanced [T-MACH-105312]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr.-Ing. Jivka Ovtcharova</th>
</tr>
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<td>KIT Department of Mechanical Engineering</td>
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| Part of                      | M-MACH-101281 - Virtual Engineering B  
                              | M-MACH-101283 - Virtual Engineering A |

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Exams

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<td>CATIA Advanced</td>
<td>2123380</td>
<td>Ovtcharova</td>
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</table>

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

Below you will find excerpts from events related to this course:

CATIA advanced

2123380, SS 2022, 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-Kurs.

Literature

Keine / None

Advanced CATIA

2123380, WS 22/23, 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
7.62 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  
- M-MACH-101283 - Virtual Engineering A

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**Exams**

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<td>CATIA CAD Training Course</td>
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**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.

Below you will find excerpts from events related to this course:

**CATIA CAD training course**  
2123358, SS 2022, 2 SWS, Language: German/English, 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 wird einerseits vorlesungsbegleitend sowie andererseits als einwöchige Blockveranstaltung in der vorlesungsfreien Zeit angeboten. Weitere Informationen siehe ILIAS.
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
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- 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
**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

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**Events**

| ST 2022 | 2126730 | Ceramics Processing | 2 SWS | Lecture / 🧩 | Binder |

| Exams   | ST 2022 | 76-T-MACH-102182 | Ceramic Processing Technology | Binder |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 👤 On-Site, ✗ Cancelled

**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

Below you will find excerpts from events related to this course:

**Ceramics Processing**

2126730, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

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**Literature**


Course: Challenges in Supply Chain Management [T-WIWI-102872]

**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

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<td>Lecture (V)</td>
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**Competence Certificate**  
The assessment consists of a written paper and an oral exam of ca. 30-40 min.

**Prerequisites**  
None

**Recommendation**  
Basic knowledge as conveyed in the module "Introduction to Operations Research" is assumed.

**Annotation**  
The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is offered irregularly. The planned lectures and courses for the next three years are announced online.

Below you will find excerpts from events related to this course:

**Challenges in Supply Chain Management**  
2550494, SS 2022, 3 SWS, Language: German, Open in study portal  
Lecture (V)  
Blended (On-Site/Online)

**Content**  
The course consists of case studies of BASF which cover future challenges of supply chain management. Thus, the course aims at a case-study based presentation, critical evaluation and exemplary discussion of recent questions in supply chain management. The focus lies on future challenges and trends, also with regard to their applicability in practical cases (especially in the chemical industry).

The main part of the course is working on a project together with BASF in Ludwigshafen. 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 project topic.

This course will include working on cutting edge supply chain topics like Industry 4.0 / “Internet of Everything in production”, supply chain analytics, risk management, procurement and production in SCM. The team essays / project reports will be linked to industry-related challenges as well as to upcoming theoretical concepts. The topics of the seminar will be announced at the beginning of the term in a preliminary meeting.

**Organizational issues**  
Bewerbung bis 31.03.22 über das WiWi-Portal möglich:  
http://go.wiwi.kit.edu/ChallengesSCM

**Literature**  
Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.
# 7.65 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

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 📝 On-Site, 🗑 Cancelled

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
7 COURSES

Course: Civil Engineering Structures and Regenerative Energies [T-BGU-111922]

7.66 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 |

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| ST 2022 | 8240111922 | Civil Engineering Structures and Regenerative Energies |
| | | Haghsheno |

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none

Legends: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled
7.67 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

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**Events**

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**Exams**

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<th>CO2-neutral combustion engines and their fuels I</th>
<th>Kubach, Koch</th>
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</table>

**Competence Certificate**
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**
none

_Below you will find excerpts from events related to this course:_

**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

Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022
7.68 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

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<th>Recurrence</th>
<th>Version</th>
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<td>Each summer term</td>
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### Events

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<tbody>
<tr>
<td>ST 2022</td>
<td>2134151</td>
<td>CO2-neutral combustion engines and their fuels II</td>
<td>Lecture / Practice (VÜ)</td>
<td>3 SWS</td>
<td>Grade to a third</td>
<td>Each summer term</td>
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### Exams

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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<tr>
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<td>76-T-MACH-104609</td>
<td>Combustion Engines, Hydrogen Engines and CO2 neutral Fuels II</td>
<td>Lecture / Practice (VÜ)</td>
<td>Grade to a third</td>
<td>Each summer term</td>
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<td>76-T-MACH-104609</td>
<td>Combustion Engines, Hydrogen Engines and CO2 neutral Fuels II</td>
<td>Lecture / Practice (VÜ)</td>
<td>Grade to a third</td>
<td>Each summer term</td>
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</tbody>
</table>

**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

Below you will find excerpts from events related to this course:

**CO2-neutral combustion engines and their fuels II**  
2134151, SS 2022, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)  
On-Site
7.69 Course: Cognitive Modeling [T-WIWI-111392]

**Responsible:** Prof. Dr. Benjamin Scheibehenne

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105714 - Consumer Research

<table>
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<tr>
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<td>Grade to a third</td>
<td>Each winter term</td>
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</table>

**Events**

| WT 22/23 | 2540601 | Cognitive Modeling | 2 SWS | Lecture | Scheibehenne, Liu |

**Competence Certificate**

There will be 4 assignments during the course of the semester. Each will count 25% towards the final grade.

**Prerequisites**

Calculus, probability theory

**Annotation**

The goal of this course is to help students develop a basic understanding of computational models in the study of human cognition and behavior.

In the first half of the semester, we will go over the following contents to prepare for the learning of cognitive modeling: basics of the R software, foundations of probability, and parameter estimation. In the second half, we will discuss the general ideas of modeling in behavioral science as well as some specific cognitive models. The class will take a biweekly lecture form. All lectures, materials, and assignments are in English.

The number of participants is limited. The registration will take place via the Wiwi-Portal.
7.70 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

<table>
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**Events**

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<th>Communication Systems and Protocols</th>
<th>2 SWS</th>
<th>Lecture / 🗣</th>
<th>Becker, Becker</th>
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<tbody>
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<td>2311618</td>
<td>Tutorial for 2311616 Communication Systems and Protocols</td>
<td>1 SWS</td>
<td>Practice / 🗣</td>
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</table>

**Exams**

| ST 2022  | 7311616 | Communication Systems and Protocols | Becker, Becker |

_Legend:_  
🖥 Online,  
🧩 Blended (On-Site/Online),  
🗣 On-Site,  
🗙 Cancelled

**Prerequisites**

none
7.71 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

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**Events**

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<td>Competition in Networks</td>
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<td>2561205</td>
<td>Übung zu Wettbewerb in Netzen</td>
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<td>Practice/DAO</td>
<td>Wisotzky, Mitusch, Corbo</td>
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<td>Competition in Networks</td>
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<td>Mitusch</td>
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<td>7900274</td>
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</table>

**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.

Below you will find excerpts from events related to this course:

**Competition in Networks**

2561204, WS 22/23, 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.
Responsibility: apl. 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: Written examination
Credits: 4,5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 3

Events

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<th>Language</th>
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<td>Computational Economics</td>
<td>English</td>
<td>Lecture / Blended (On-Site/Online)</td>
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<td>2590459</td>
<td>Exercises to Computational Economics</td>
<td>English</td>
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Exams

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<th>Credits</th>
<th>Type</th>
<th>Language</th>
<th>Type</th>
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<td>Computational Economics</td>
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</table>

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). 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). The bonus only applies to the first and second exam of the semester in which it was obtained.

Prerequisites
None

Annotation
The credits have been changed to 5 starting summer term 2016.

Below you will find excerpts from events related to this course:

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


Weiterführende Literatur:

# 7.73 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

<table>
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<tr>
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| Events   |      |                                    |         |         |
|----------|------|------------------------------------|---------|
| WT 22/23 | 5011009 | Decompositions and regression methods | 2 SWS   | Nollmann |

| Exams   |      |                                    |         |         |
|---------|------|------------------------------------|---------|
| ST 2022 | 7400369 | Computer Aided Data Analysis       | Nollmann |

Legend: 🗿 Online, 🧩 Blended (On-Site/Online), 🗼 On-Site, ✗ Cancelled
7.74 Course: Computer Contract Law [T-INFO-102036]

**Responsible:** Michael Menk  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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<td>Grade to a third</td>
<td>Each winter term</td>
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**Events**

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<td>2 SWS</td>
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<td>7500066</td>
<td>Computer Contract Law</td>
<td></td>
<td>Dreier, Matz</td>
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**Legend:** Online: Online, Blended (On-Site/Online), On-Site, Cancelled

**Below you will find excerpts from events related to this course:**

**Computer Contract Law**

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<thead>
<tr>
<th>2411604, WS 22/23, 2 SWS, Language: German, Open in study portal</th>
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</thead>
<tbody>
<tr>
<td>Lecture (V) On-Site</td>
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</tbody>
</table>

**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.
**Course: Constitution and Properties of Protective Coatings [T-MACH-105150]**

**Responsible:** apl. Prof. Dr. Sven Ulrich  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

<table>
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**Events**

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<td>2 SWS</td>
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<td>Grade to a third</td>
<td>Each winter term</td>
<td>Ulrich</td>
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**Exams**

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<th>Type</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<td>2 SWS</td>
<td>Constitution and Properties of Protective Coatings</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>Ulrich</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

**Competence Certificate**

oral examination (about 30 min)

no tools or reference materials

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Constitution and Properties of Protective Coatings**

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 24.10.22.
Den entsprechenden MS Teams Link erhalten Sie dann per E-Mail am 26.10.22.

Literature

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed
Course: Constitution and Properties of Wearresistant Materials [T-MACH-102141]

**Responsible:** apl. Prof. Dr. Sven Ulrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101268 - Specific Topics in Materials Science

<table>
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<tr>
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**Exams**

| ST 2022 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

**Below you will find excerpts from events related to this course:**

**Constitution and Properties of Wear resistant materials**

2194643, SS 2022, 2 SWS, Language: German, Open in study portal
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
stellite 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
Aufgrund der aktuellen Situation findet die Blockveranstaltung online in folgendem Zeitraum statt:
11.04.-13.04.2022: jeweils von 8:00-16:00 Uhr;
Ort: online per MS-Teams
Anmeldung verbindlich bis zum 08.04.2022 unter sven.ulrich@kit.edu.
Nach der Anmeldung wird Ihnen der Link zur Vorlesung per E-Mail am 08.04.2022 mitgeteilt.

Literature
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
# 7.77 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

<table>
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### Events

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<th>SWS</th>
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<td>Maschinentechnik</td>
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### Exams

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<th>Event</th>
<th>Code</th>
<th>Course</th>
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<td>Construction Equipment</td>
<td>Gentes</td>
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</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
**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

<table>
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<tr>
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**Events**

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<td>Lecture</td>
<td>Kluwe</td>
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**Exams**

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<td>7303177</td>
<td>Control of Linear Multivariable Systems</td>
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**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.
7.79 Course: Control Technology [T-MACH-105185]

**Responsible:** Hon.-Prof. Dr. Christoph Gönnheimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

<table>
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<th>Control Technology</th>
<th>2 SWS</th>
<th>Lecture / Online</th>
<th>Gönnheimer</th>
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**Exams**

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<td>76-T-MACH-105185</td>
<td>Control Technology</td>
<td>Gönnheimer</td>
</tr>
</tbody>
</table>

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✖ Cancelled

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**Control Technology**

2150683, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V) Blended (On-Site/Online)
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

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/).
## 7.80 Course: Convex Analysis [T-WIWI-102856]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr. Oliver Stein</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation</td>
<td>KIT Department of Economics and Management</td>
</tr>
<tr>
<td>Part of</td>
<td>M-WIWI-101473 - Mathematical Programming</td>
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</table>

### 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).
Course: Conveying Technology and Logistics [T-MACH-102135]

**Responsible:** Prof. Dr.-Ing. Kai Furmans
Paolo Pagani

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-WIWI-101808 - Seminar Module

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<td>Each summer term</td>
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**Type:** Examination of another type  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

**Events**

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<td>Fördertechnik und Logistiksysteme</td>
<td>Furmans, Padhy</td>
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**Exams**

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<td>Seminar</td>
<td>Conveying Technology and Logistics</td>
<td>Furmans</td>
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</table>

**Competence Certificate**

Alternative test achievement (graded):
- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

None

*Below you will find excerpts from events related to this course:*

**Fördertechnik und Logistiksysteme**

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<td>German/English</td>
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</table>

**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

**Fördertechnik und Logistiksysteme**

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**Content**

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**Organizational issues**

Weiteres siehe Homepage
### 7.82 Course: Copyright [T-INFO-101308]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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Legend: 🖥 Online, 📦 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
### 7.83 Course: Corporate Compliance [T-INFO-101288]

**Responsible:** Andreas Herzig  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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#### Events

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
Course: Corporate Financial Policy [T-WIWI-102622]

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

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Events

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<td>2 SWS</td>
<td>Lecture / 🗣️</td>
<td>Corporate Financial Policy</td>
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<td>ST 2022 2530215</td>
<td>1 SWS</td>
<td>Practice / 🗣️</td>
<td>Übungen zu Corporate Financial Policy</td>
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Exams

| ST 2022 7900073 | Corporate Financial Policy | Ruckes |
| WT 22/23 7900058 | Corporate Financial Policy | 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

Below you will find excerpts from events related to this course:

Corporate Financial Policy
2530214, SS 2022, 2 SWS, Language: English, Open in study portal

Lecture (V) On-Site

Content

The course develops the foundations for the management and financing of firms in imperfect markets.

The course covers the following topics:

- Measures of good corporate governance
- Corporate finance
- Liquidity management
- Executive compensation and incentives
- Corporate takeovers

Learning outcomes: The students

- are able to explain the importance of information asymmetry for the contract design of firms,
- are capable to evaluate measures for the reduction of information asymmetry,
- are in the position to analyze contracts with regard to their incentive and communication effects.
7.85 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

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<td>Each summer term</td>
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</table>

**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.
7.86 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

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**Events**

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<td>2 SWS</td>
<td>Lecture</td>
<td>Sunyaev, Dehling, Bartsch</td>
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<td>2511401 Exercises to Critical Information Infrastructures</td>
<td>1 SWS</td>
<td>Practice</td>
<td>Sunyaev, Dehling, Bartsch</td>
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</tbody>
</table>

**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**

7.87 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

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**Events**

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<td>Current Directions in Consumer Psychology</td>
<td>2 SWS</td>
<td>Others (sons / 🗣)</td>
<td>Scheibehenne, Liu</td>
</tr>
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</table>

**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.

**Below you will find excerpts from events related to this course:**

**V Current Directions in Consumer Psychology**

2540441, SS 2022, 2 SWS, Language: English, [Open in study portal](#)

**Content**

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.
7.88 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

<table>
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<td>Seminar / Blended</td>
<td>Guber, Ahrens</td>
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</tr>
<tr>
<td>WT 22/23, 2143873</td>
<td>2 SWS</td>
<td>Seminar / Blended</td>
<td>Guber, Ahrens</td>
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Exams
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<th>Recurrence</th>
<th>Version</th>
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<td>Grade to a third</td>
<td>Each term</td>
<td>Version</td>
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</table>

Competence Certificate
active participation and own presentation (30 Min.)

Prerequisites
none

Below you will find excerpts from events related to this course:

Actual topics of BioMEMS
2143873, SS 2022, 2 SWS, Language: German, Open in study portal

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
Siehe Aushang

Actual topics of BioMEMS
2143873, WS 22/23, 2 SWS, Language: German, Open in study portal

Organizational issues
Wird bekannt gegeben
### 7.89 Course: Data Protection Law [T-INFO-111406]

**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

<table>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Each winter term</td>
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**Events**

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<td>Bereichschutz</td>
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<td>Lecture / 🗣</td>
<td>Boehm</td>
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**Exams**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
7.90 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

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Events

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<td>Practice / 📖</td>
<td>Oberweis, Fritsch</td>
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Exams

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<tr>
<th>Exams</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Database Systems and XML (Registration until 18 July 2022)</td>
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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

Below you will find excerpts from events related to this course:

**Database Systems and XML**

2511202, WS 22/23, 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 database 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.

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
Literature

- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2008

Weitere Literatur wird in der Vorlesung bekannt gegeben.
7.91 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

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<td>Each winter term</td>
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<td>Lecture</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>1 terms</td>
<td>Scheubner</td>
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**Exams**

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<td>Grade to a third</td>
<td>Each winter term</td>
<td>1 terms</td>
<td>Scheubner</td>
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**Competence Certificate**

Written Examination

**Duration:** 90 minutes

**Below you will find excerpts from events related to this course:**

**Data-Driven Algorithms in Vehicle Technology**

2113840, WS 22/23, 2 SWS, Language: English, [Open in study portal](https://fast-web-01.fast.kit.edu/)

**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/Passwoerterllias/](https://fast-web-01.fast.kit.edu/Passwoerterllias/)

Campus Ost, Geb. 70.04, Raum 219. Studierende müssen einen eigenen Laptop mitbringen.
7.92 Course: Decentrally Controlled Intralogistic Systems [T-MACH-105230]

**Responsible:** Prof. Dr.-Ing. Kai Furmans  
Dr.-Ing. Maximilian Hochstein

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-104888 - Advanced Module Logistics

<table>
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<td>Practical course</td>
<td>Furmans, Sperling, Ries</td>
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<td>2117084</td>
<td>Decentrally controlled intralogistic systems</td>
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<td>Practical course</td>
<td>Furmans, Sperling, Arndt</td>
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**Exams**

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<td>Decentrally Controlled Intralogistic Systems</td>
<td>Furmans</td>
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</table>

**Competence Certificate**  
Certificate by colloquium with presentation

**Prerequisites**  
None

*Below you will find excerpts from events related to this course:*
Course: Decentrally Controlled Intralogistic Systems [T-MACH-105230]

Content

Proof:
- Certificate by colloquium with presentation

Note:
- Number of participants limited
- Participants will be selected
- Compulsory attendance

Media:
- Lego Mindstorms, PC

Teaching content:
- Introduction to material handling systems
- Construction of a model for decentralized logistic systems
- Object-oriented programming with LabView (or Python* with reservation)
- Implementation of the model with Mindstorms
- Presentation of the results

Learning objectives:
Students are able to:
- Model complex cinematic systems and use object-oriented programming for this purpose,
- Built experimental setups in a team for decentralized controlled intralogistic systems, choose appropriate system components and models and finally proof the function by using experiments.

Effort:
- Regular attendance: 90 hours (workplace is provided)
- Self-study: 30 hours

Dates and further information see homepage

Organizational issues
Termine im SS22:
Gruppe 1 15.08.- 02.09.2022, davon Präsenz: 15.08., 22.08. - 02.09.2022
Gruppe 2 29.08.- 16.09.2022, davon Präsenz: 29.08., 05.09. - 16.09.2022

*Corona-bedingte Änderungen vorbehalten*

Anmeldezeitraum:
01.04.2022 8:00 Uhr - 31.05.2022 18:00 Uhr (via Ilias-Kurs)

Literature
keine

Decentrally controlled intralogistic systems
2117084, WS 22/23, 2 SWS, Language: German, Open in study portal

Practical course (P)
On-Site
Content
Proof:
- Certificate by colloquium with presentation

Note:
- Number of participants limited
- Participants will be selected
- Compulsory attendance

Media:
- Lego Mindstorms, PC

Teaching content:
- Introduction to material handling systems
- Construction of a model for decentralized logistic systems
- Object-oriented programming with LabView (or Python* with reservation)
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Learning objectives:
Students are able to:
- Model complex cinematic systems and use object-oriented programming for this purpose,
- Built experimental setups in a team for decentralized controlled intralogistic systems, choose appropriate system
  components and models and finally proof the function by using experiments.

Effort:
- Regular attendance: 90 hours (workplace is provided)
- Self-study: 30 hours

Dates and further information see homepage

Organizational issues
Termine im WS22/23:
Gruppe 1 06.02.- 24.02.2023, davon Präsenz: 06.02., 13.02. - 24.02.2023
Gruppe 2 20.02. - 10.03.2023, davon Präsenz: 20.02., 27.02. - 10.03.2023
Anmeldezeitraum:
01.11.2022 8:00 Uhr - 30.11.2021 18:00 Uhr (via Ilias-Kurs)
*Corona-bedingte Änderungen vorbehalten*

Literature
keine
7.93 Course: Demand-Driven Supply Chain Planning [T-WIWI-110971]

**Responsible:** Josef Packowski  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102805 - Service Operations

### Course Details

- **Type:** Written examination  
- **Credits:** 4.5  
- **Grading scale:** Grade to a third  
- **Recurrence:** Each winter term  
- **Version:** 1

### 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.
7.94 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

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Events

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<td>Practice</td>
<td>German</td>
<td>Thimme, Eska, Uhrig-Homburg</td>
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Exams

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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 2022, 2 SWS, Language: German, [Open in study portal]

Literature

Weiterführende Literatur:
T 7.95 Course: Design and Development of Mobile Machines [T-MACH-105311]

Responsible: Prof. Dr.-Ing. Marcus Geimer
Jan Siebert

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

<table>
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<th>Recurrence</th>
<th>Version</th>
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</table>
| WT 22/23 2113079 Design and Development of Mobile Machines 2 SWS Lecture / Geimer
| Exams  |         |               |                   |         |
| ST 2022 76-T-MACH-105311 Design and Development of Mobile Machines Geimer
| WT 22/23 76-T-MACH-105311 Design and Development of Mobile Machines Geimer

Compeitence 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. The partial service with the code T-MACH-108887 must have been passed.

Recommendation
Knowledge in Fluid Power Systems (LV 2114093)

Annotation
After completion of the lecture, students 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 describe interactions and links between subsystems of a mobile machine
- present and document solutions of a technical problem according to R&D standards

The number of participants is limited.

Content:
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 criteria 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

Below you will find excerpts from events related to this course:
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 being 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.
7 COURSES

7.96 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

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**Exams**

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<td>Geimer</td>
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<td>WT 22/23</td>
<td>76-T-MACH-108887</td>
<td>Design and Development of Mobile Machines - Advance</td>
<td>Geimer</td>
</tr>
</tbody>
</table>

**Competence Certificate**
Preparation of semester report

**Prerequisites**
none
**7.97 Course: Design Basics in Highway Engineering [T-BGU-106613]**

**Responsible:** Prof. Dr.-Ing. Ralf Roos  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-BGU-100998 - Design, Construction, Operation and Maintenance of Highways

<table>
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<td>Each summer term</td>
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**Events**

| ST 2022 | 6200408 | Design Basics in Highway Engineering | 2 SWS | Lecture / Roos, Zimmermann |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
Course: Design Thinking [T-WIWI-102866]

**Responsible:** Prof. Dr. Orestis Terzidis  
**Organisation:** KIT Department of Economics and Management

### Events

| ST 2022   | 2545008 | Design Thinking (Track 1) | 2 SWS | Seminar / On-Site | Jochem, Terzidis |
| WT 22/23  | 2545008 | Design Thinking (Track 1) | 2 SWS | Seminar / On-Site  | Abraham, Csernalabics |

**Exams**

| ST 2022   | 7900053 | Design Thinking (Track 1) | Terzidis |
| WT 22/23  | 7900084 | Design Thinking (Track 1) | Terzidis |

**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:**

### Design Thinking (Track 1)

2545008, SS 2022, 2 SWS, Language: English, [Open in study portal]

#### 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:**

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**

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.
Design Thinking (Track 1)
2545008, WS 22/23, 2 SWS, Language: English, Open in study portal

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.
7.99 Course: Designing Interactive Systems [T-WIWI-110851]

- **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

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**Exams**

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<td>Mädche</td>
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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.

**Annotation**

The course is held in English.

---

Below you will find excerpts from events related to this course:

**Designing Interactive Systems**

- **ST 2022**
  - 2540558, SS 2022, 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. This offers new possibilities but also challenges for the successful design of the interaction between human and computer. Interactive system are socio-technical systems in which users perform tasks by interacting with technology in a specific context in order to achieve specified goals and outcomes.

The aim of this course is to introduce advanced concepts and theories, interaction technologies as well as current practice of contemporary interactive systems.

The course is complemented with a design capstone project, where students in a team select and apply design methods & techniques in order to create an interactive prototype.

## Learning objectives

- Get an advanced understanding of conceptual foundations of interactive systems from a human and computer perspective
- Explore the theoretical grounding of Interactive Systems leveraging theories from reference disciplines such as psychology
- Know specific design principles for the design of advanced interactive systems
- Get hands-on experience in conceptualizing and designing advanced Interactive Systems to solve a real-world challenge from an industry partner by applying the lecture contents.

## Prerequisites

No specific prerequisites are required for the lecture.

## Literature

Die Vorlesung basiert zu einem großen Teil auf


Weiterführende Literatur wird in der Vorlesung bereitgestellt.
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

<table>
<thead>
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<td>Grade to a third</td>
<td>Each summer term</td>
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Events

| ST 2022 | 2134155 | Development of Hybrid Powertrains | 2 SWS | Lecture / 🗣 | Koch, Doppelbauer |

Exams

| ST 2022 | 76-T-MACH-110817 | Development of hybrid drivetrains | Koch |

Competence Certificate
written exam, 1 hour

Prerequisites
None

Below you will find excerpts from events related to this course:

Development of Hybrid Powertrains
2134155, SS 2022, 2 SWS, Language: German, Open in study portal

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
7.101 Course: Development of Sustainable Business Models [T-WIWI-112143]

**Responsible:** Prof. Dr. Marion Weissenberger-Eibl

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101507 - Innovation Management

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**Exams**

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<td>WT 22/23</td>
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<td>Development of Sustainable Business Models</td>
<td>Weissenberger-Eibl</td>
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**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

**Recommendation**

Prior attendance of the course Innovation Management is recommended.
### 7.102 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

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<td>Digital Health</td>
<td>2 SWS</td>
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**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.
### 7.103 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

| Responsible                  | Prof. Dr. Martin Klarmann  
<table>
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<tr>
<td>Anja Konhäuser</td>
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<tr>
<td>Organisation</td>
<td>KIT Department of Economics and Management</td>
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<td>Part of</td>
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### Events

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### Exams

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**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

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.

Below you will find excerpts from events related to this course:

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<th>Credits</th>
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<th>Recurrence</th>
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<td></td>
<td>Others (sonst.) On-Site</td>
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Open in study portal
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 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 115, Geb. 20.21, Termine werden noch bekannt gegeben

Literature -
### Course: Digital Transformation and Business Models [T-WIWI-108875]

**Responsible:** Dr. Daniel Jeffrey Koch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101507 - Innovation Management  
M-WIWI-101507 - Innovation Management

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#### Events

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<th>ST 2022</th>
<th>2545103</th>
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<th>Seminar / 🗣</th>
<th>Koch</th>
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| ST 2022 | 7900284 | Digital Transformation and Business Models | | Weissenberger-Eibl |

**Exams**

### Competence Certificate

Non exam assessment (following §4(2) 3 of the examination regulation). The final grade is composed 75% of the grade of the written paper and 25% of the presentation.

### Prerequisites

None

### Recommendation

Prior attendance of the course Innovation Management is recommended.

**Below you will find excerpts from events related to this course:**

#### Digital Transformation and Business Models

2545103, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Seminar (S) On-Site**

### Content

The seminar "Digital Transformation and Business Models" aims at the development of thematic aspects of digital transformation with simultaneous application of different business model methodologies. Established companies face the challenge of digital transformation. The digital transformation is particularly relevant for the business models of industrial enterprises. As part of innovation management, the examination of business model changes against the background of digital transformation is one of the main challenges facing the German economy. At the beginning, seminar topics will be assigned. These will be presented and discussed at the end of the seminar. In the first seminar date impulses to business model methodologies and the digital transformation take place, which are to be discussed then, in order to provide an understanding for the topic complex and to ensure the purposeful development of the seminar topics.
### 7.105 Course: Digitalization from Production to the Customer in the Optical Industry [T-MACH-110176]

**Responsible:** Dr.-Ing. Marc Wawerla  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101284 - Specialization in Production Engineering  
- M-MACH-105455 - Strategic Design of Modern Production Systems

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#### Exams

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<td>Digitalization from Production to the Customer in the Optical Industry</td>
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<td>WT 22/23</td>
<td>76-T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>Wawerla</td>
</tr>
</tbody>
</table>

#### 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

none

#### 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](https://www.wbk.kit.edu/english/education.php).

*Below you will find excerpts from events related to this course:*  

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<th>Location</th>
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<tr>
<td>V</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>Lecture (V) On-Site</td>
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</table>
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
Start: 28.10.2022

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:
### 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

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#### Events

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**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

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022
7.107 Course: Digitalization of Products, Services & Production [T-MACH-108491]

**Responsible:** Dr.-Ing. Bernd Pätzold  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101281 - Virtual Engineering B  
M-MACH-101283 - Virtual Engineering A

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**Events**

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<td>2122310</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗓 On-Site, ❌ Cancelled

**Competence Certificate**

Assessment of another type. Two presentations in team work and two written compositions. Grading: each composition 1/6 and each presentation 2/3.

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Digitalization of Products, Services & Production**

2122310, WS 22/23, 2 SWS, Language: German, Open in study portal

**Seminar (S) On-Site**

**Content**

- Digitalization of products, services and production in the context of Industry 4.0.
- Key drivers for ongoing digitalization and their impact on future product development and manufacturing.
- Methods and procedures to design the according transformation process.
- Intensive group discussions of use-case scenarios using practical examples from the industry.

**Students are able to**

- describe the fundamental challenges and objectives of the progressive digitalization of products, service and production. In context of these challenges, students can name and explain the essential terms.
- illustrate the key drivers and fundamental technologies behind the digitalization of products, services and processes.
- describe the challenges of the ongoing digitalization and the corresponding changes in business processes and distinguish between them in regards to time and place. Furthermore, students are able to assign the IT-Architecture and systems to the corresponding process steps.
- highlight the requirement for future information management in networks of product development and production institutions and can clarify how to validated and safeguard the corresponding IT processes.
- to analyze the challenges of digitalization and present potential solution approaches via self-created scenarios for future developments.

**Organizational issues**

Siehe Homepage zur Lehrveranstaltung

**Literature**

Vorlesungsfolien / lecture slides
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

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**Exams**

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<td>Each summer term</td>
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**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
7.109 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

**Responsible:** 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

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**Events**

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<th>2550488</th>
<th>Ereignisdiskrete Simulation in Produktion und Logistik</th>
<th>3 SWS</th>
<th>Lecture / 🗣 Spieckermann</th>
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**Exams**

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<th>7900271</th>
<th>Discrete-Event Simulation in Production and Logistics</th>
<th>Spieckermann</th>
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**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:**

**Ereignisdiskrete Simulation in Produktion und Logistik**

2550488, SS 2022, 3 SWS, Language: German, [Open in study portal]

**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.io.kit.edu
Literature

**Course: Drive Train of Mobile Machines [T-MACH-105307]**

**Responsible:** Prof. Dr.-Ing. Marcus Geimer
Marco Wydra

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

### Events

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**Events**

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<td>Drive Train of Mobile Machines</td>
<td>Lecture</td>
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<td>Geimer</td>
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<td>Practice</td>
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<td>Geimer, Herr</td>
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### Competence Certificate

The final assessment will be an oral examination (20 min) taking place during the recess period. The examination will be offered in every semester and can be repeated at any regular examination date.

### Prerequisites

none

### Recommendation

- General principles of mechanical 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.

---

Below you will find excerpts from events related to this course:

**Drive Train of Mobile Machines**

2113077, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)
Content
In this course will be discussed the different drive train of mobile machinerys. The focus of this course is:

- improve knowledge of fundamentals
- mechanical gears
- torque converter
- hydrostatic drives
- continuous variable transmission
- electrical 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
### Trending Courses

#### 7.111 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

<table>
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<td>Each summer term</td>
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**Events**

| ST 2022 | 22226 | Trocknen von Dispersionen | 1 SWS | Lecture / 🗣 | Karbstein |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
## 7.112 Course: Dynamic Macroeconomics [T-WIWI-109194]

### Responsible:
Prof. Dr. Johannes Brumm

### Organisation:
KIT Department of Economics and Management

### Part of:
- M-WIWI-101478 - Innovation and Growth
- M-WIWI-101496 - Growth and Agglomeration
- M-WIWI-101497 - Agglomeration and Innovation

### Type
Written examination

### Credits
4.5

### Grading scale
Grade to a third

### Recurrence
Each winter term

### Version
4

### Events

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<td>Lecture / ⏩</td>
<td>Each winter term</td>
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<td>2 SWS</td>
<td>Lecture / ⏩</td>
<td>Each winter term</td>
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#### Legend:
- ⏩: On-Site

### Competence Certificate
The assessment is a written exam (60 min.).

### Prerequisites
None.

### Below you will find excerpts from events related to this course:

**Dynamic Macroeconomics**

2560402, WS 22/23, 2 SWS, Language: English, [Open in study portal]

**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.
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

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<td>Dynamic Systems of Technical Logistics</td>
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<td>Mittwollen</td>
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</table>

**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.

**Below you will find excerpts from events related to this course:**

**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 Vorlesungsteil bis ca. Ende Juni gehalten wird. Der anschließende Zeitraum ist ausschließlich für die (optionale) Projektarbeit vorgesehen.
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

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**Events**

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</table>

**Prerequisites**

T-MACH-112113 (Dynamic Systems of Technical Logistics) must have been started.

**Competence Certificate**

Presentation of performed project and defense (30min) according to §4 (2), No. 3 of the examination regulation

**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 Donnerstags-Zeitslots für das Projekt ausschließlich der Vorlesungssteil bis ca. Ende Juni gehalten wird. Der anschließende Zeitraum ist ausschließlich für die (optionale) Projektarbeit vorgesehen.
7 COURSES

7.115 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsible: PD Dr. Patrick Jochem
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

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Events

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Exams

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<td></td>
<td>Lecture / On-Site</td>
<td>Each summer term</td>
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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:

Efficient Energy Systems and Electric Mobility
2581006, SS 2022, 2 SWS, Language: English, Open in study portal

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
s. Institutsaushang

Literature
Wird in der Vorlesung bekanntgegeben.
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

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**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.

**Below you will find excerpts from events related to this course:**

**Literature**

7 COURSES

Course: Electronics and EMC [T-ETIT-100723]

7.117 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

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Legend: 🖥 Online, 🡳 Blended (On-Site/Online), 🗿 On-Site, ✗ CANCELLED
7.118 Course: Emerging Trends in Digital Health [T-WIWI-110144]

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**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

### Events

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<td>2 SWS</td>
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### Exams

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<td>ST 2022 7900146</td>
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**Competence Certificate**

The alternative exam assessment consists of a final thesis.

**Prerequisites**

None.

**Annotation**

The course is usually held as a block course.
### 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

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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- Cancelled

**Competence Certificate**  
The alternative exam assessment consists of a final thesis.

**Prerequisites**  
None.

**Annotation**  
The course is usually held as a block course.
7.120 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

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<td>Emissions into the Environment</td>
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Exams

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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. 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

Below you will find excerpts from events related to this course:

V Emissions into the Environment

2581962, WS 22/23, 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.
### 7.121 Course: Employment Law [T-INFO-111436]

**Responsible:** Dr. Alexander Hoff  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
7.122 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-105597 - Facility Management in Hospitals

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**Exams**

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</table>
7.123 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

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Events

| ST 2022  | 2581003 | Energy and Environment | 2 SWS | Lecture / 🗣 | Karl |
| ST 2022  | 2581004 | Übungen zu Energie und Umwelt | 1 SWS | Practice / 🗣 | Langenmayr, Fichtner, Kraft |

Exams

| ST 2022  | 7981003 | Energy and Environment | Fichtner |

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place 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.

Below you will find excerpts from events related to this course:

Energy and Environment

Lecture (V)  
2581003, SS 2022, 2 SWS, Language: German, Open in study portal  
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)
7.124 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

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<th>6 SWS</th>
<th>Lecture / Practice (VÜ)</th>
<th>Bauer, Mitarbeiter, Wagner, Maas, Schwitzke, Wirbser</th>
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**Exams**

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<th>Energy and Process Technology I</th>
<th>Bauer, Wirbser, Schwitzke, Pritz</th>
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</table>

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

**Prerequisites**  
one

Below you will find excerpts from events related to this course:

**Energy and Process Technology I**  
2157961, WS 22/23, 6 SWS, Language: German, Open in study portal

**Content**  
The last third of the lecture deals with the topic **Thermal Turbomachinery**. The basic principles, the functionality and the scope of application of gas and steam turbines 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
7.125 Course: Energy and Process Technology II [T-MACH-102212]

**Responsibility:** 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

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**Events**

| ST 2022 | 2170832 | Energy and Process Technology II | 6 SWS | Lecture / Practice ( / ) | Schwitzke, Pritz, Maas |

**Exams**

| ST 2022 | 76-T-MACH-102212 | Energy and Process Technology II | Wirbser, Schwitzke, Bauer, Pritz |

**Legend:** Online, Blended (On-Site/Online), On-Site, C Cancelled

**Competence Certificate**

The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**V** Energy and Process Technology II  
2170832, SS 2022, 6 SWS, Language: German, Open in study portal  
Lecture / Practice (VÜ)  
On-Site

**Content**

**Thermal Turbomachinery** - 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 fossil 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, risks 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
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

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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.

*Below you will find excerpts from events related to this course:*

**Energy efficient intralogistic systems**

2117500, WS 22/23, 2 SWS, Language: German, [Open in study portal]

**Content**
The content of course "Basics of Technical Logistics" should be known.

**Organizational issues**
Blockveranstaltung 2021/2022. Die Veranstaltung wird im Januar als Online Veranstaltung (Link wird im ILIAS Kurs bereitgestellt) stattfinden. Termine

12.01.2022: 16:00 - 18:00 Uhr
14.01.2022: 16:00 - 18:00 Uhr
17.01.2022: 16:00 - 19:00 Uhr
18.01.2022: 16:00 - 19:00 Uhr
21.01.2022: 16:00 - 19:00 Uhr
24.01.2022: 16:00 - 19:00 Uhr
26.01.2022: 16:00 - 19:00 Uhr
28.01.2022: 16:00 - 18:00 Uhr
31.01.2022: 16:00 - 18:00 Uhr (als Fragestunde)

**Literature**
Keine.
### 7.127 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-103720 - eEnergy: Markets, Services and Systems

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ❌ Canceled

**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:**

**Energy Market Engineering**  
2540464, SS 2022, 2 SWS, Language: German, [Open in study portal](#)  
**Lecture (V)**  
On-Site

**Literature**

7.128 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

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Events

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Legend: 🖥 Online, ☺ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation.
The exam is offered every semester. Re-examinations are offered on every ordinary examination date.

Prerequisites
None

Recommendation
None

Annotation
Former course title until summer term 2017: T-WIWI-103131 "Regulatory Management and Grid Management - Economic Efficiency of Network Operation"

Below you will find excerpts from events related to this course:

Energy Networks and Regulation
2540494, WS 22/23, 2 SWS, Language: German, [Open in study portal]

Lecture (V)
On-Site
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”, redispacht, 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
7 COURSES

Course: Energy Systems Analysis [T-WIWI-102830]

| Responsible: | Dr. Armin Ardone, Prof. Dr. Wolf Fichtner |
| Organisation: | KIT Department of Economics and Management |
| Part of: | M-WIWI-101452 - Energy Economics and Technology |

### Type
- Written examination

### Credits
- 3

### Grading scale
- Grade to a third

### Recurrence
- Each winter term

### Version
- 1

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<td>2 SWS</td>
<td>Lecture / 🗣</td>
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### 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

### Annotation
Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

Below you will find excerpts from events related to this course:

**Energy Systems Analysis**
- 2581002, WS 22/23, 2 SWS, Language: English, [Open in study portal](#)

### Content
1. Overview and classification of energy systems modelling approaches
2. Usage of scenario techniques for energy systems analysis
3. Unit commitment of power plants
4. Interdependencies in energy economics
5. Scenario-based decision making in the energy sector
6. Visualisation and GIS techniques for decision support in the energy sector

**Learning goals:**
- The student has the ability to understand and critically reflect the methods of energy system analysis, the possibilities of its application in the energy industry and the limits and weaknesses of this approach
- can use select methods of the energy system analysis by her-/himself

### Organizational issues
Blockveranstaltung, Termine s. Institutsaushang
Literature
Weiterführende Literatur:

7.130 Course: Energy Trading and Risk Management [T-WIWI-112151]

Responsible: N.N.
Organisation: KIT Department of Economics and Management

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<td>Each summer term</td>
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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

Below you will find excerpts from events related to this course:

Energy Trading and Risk Management
2581020, SS 2022, 2 SWS, Language: English, Open in study portal

Content
1. Introduction to Markets, Mechanisms and Interaction
2. Electricity Trading (platforms, products, mechanisms)
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

Literature
Weiterführende Literatur:
www.riskglossary.com
# 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

<table>
<thead>
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**Competence Certificate**  
oral examination, Duration: 0,5 hours, no auxiliary means

**Prerequisites**  
none

**Recommendation**  
T-MACH-102194 Combustion Engines I

**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
### 7.132 Course: Engineering Hydrology [T-BGU-108943]

**Responsible:** Dr.-Ing. Uwe Ehret  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-WIWI-104837 - Natural Hazards and Risk Management

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**Exams**

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Legend: 🛃 Online, 🤖 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

See German version.

**Prerequisites**

None
7.133 Course: Engineering Interactive Systems [T-WIWI-110877]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-104080 - Designing Interactive Information Systems

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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.
7.134 Course: Entrepreneurial Leadership & Innovation Management [T-WIWI-102833]

- **Responsible:** Prof. Dr. Orestis Terzidis
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101488 - Entrepreneurship (EnTechnon)
  - M-WIWI-101507 - Innovation Management

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*Competence Certificate*
Please note: The seminar cannot be offered in the winter semester 2019/2020 due to organizational reasons. Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
None
7.135 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

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**Type:** Written examination  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each term  
**Version:** 1

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<td>Terzidis, Kuschel</td>
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<td>2 SWS</td>
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</table>

**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:*

**Entrepreneurship**  
2545001, SS 2022, 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 (from 16.15-17.15), 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: 24.06.2022, 6pm - 7.10pm, 30.46 Chemie, Neuer Hörsaal
24.06.2022, 6pm - 7.10pm, 30.95 Forum auditorium (Audimax)

Literature
Füglistaller, Urs, Müller, Christoph und Volery, Thierry (2008): Entrepreneurship
Ries, Eric (2011): The Lean Startup

Entrepreneurship
2545001, WS 22/23, 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 (from 17.00-18.00), 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 students are 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: 12/20/2022

Literature
Füglistaller, Urs, Müller, Christoph and Volery, Thierry (2008): Entrepreneurship
7.136 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)

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**Events**

| ST 2022 | 2545002 | Entrepreneurship Research | 2 SWS | Seminar / Terzidis, Dang, Kuschel |

**Exams**

| ST 2022 | 7900052 | Entrepreneurship Research | Terzidis |

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:

**Content**

The students independently develop a topic from entrepreneurship research in an international setting as a tandem with a partner. At first, there will be an introduction to the methodologies used such as systematic literature review, design science, qualitative and quantitative data analysis and more. As part of a written elaboration, the seminar topic must be presented scientifically on 15-20 pages. The results of the seminar paper will be presented in a block event at the end of the semester (20 min + 10 min open discussion).

**Learning Objectives**

As part of the written elaboration, the basics of independent scientific work (literature research, argumentation + discussion, citing literature sources, application of qualitative, quantitative and simulative methods) are trained. The skills acquired in the seminar are used to prepare for a potential master thesis. The course is therefore particularly aimed at students who want to write their thesis at the Chair for Entrepreneurship and Technology Management.

**Registration**

Registration is via the Wiwi portal.

**Organizational issues**

Termine werden noch bekannt gegeben.

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.

**Literature**

Wird im Seminar bekannt gegeben.
7.137 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

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<th>2 SWS</th>
<th>Lecture / Practice (VÜ)</th>
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**Exams**

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**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:

**Environmental and Ressource Policy**

2560548, SS 2022, 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
7.138 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

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Events

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

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
### 7.139 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

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**Events**

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**Exams**

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**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].
### 7.140 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

<table>
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#### Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

Written exam with 120 min

**Prerequisites**

None

**Annotation**

None
### 7.141 Course: European and International Law [T-INFO-101312]

**Responsible:** Ulf Brühann  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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**Events**

| ST 2022 | 24666 | Europäisches und Internationales Recht | 2 SWS | Lecture / 🗣 | Brühann |

**Exams**

| ST 2022 | 7500084 | European and International Law | | Dreier |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 7.142 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
- Completed coursework: Completed coursework
- Credits: 0
- Grading scale: pass/fail
- Recurrence: Each summer term
- Version: 1

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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
7 COURSES

Course: Excursions: Membrane Technologies [T-CIWVT-110864]

7.143 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

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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
7.144 Course: Excursions: Water Supply [T-CIWVT-110866]

**Responsible:** Dr. Gudrun Abbt-Braun
Prof. Dr. Harald Horn

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** M-CIWVT-101121 - Water Chemistry and Water Technology I

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### 7.145 Course: Exercises in Civil Law [T-INFO-102013]

**Responsible:** Prof. Dr. Thomas Dreier  
Dr. Yvonne Matz  

**Organisation:** KIT Department of Informatics  

**Part of:** M-INFO-101191 - Commercial Law

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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 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

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<td>4,5</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>Greif-Winzieth, Knierim, Peukert</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗝 On-Site, 🚧 Cancelled

**Competence Certificate**

The assessment consists of a written exam (60 min).

By successful completion of 70% of the maximum number of points in the exercise(s) 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). The exact criteria for the award of a bonus will be announced at the beginning of the lecture.

**Prerequisites**

None

**Below you will find excerpts from events related to this course:**

**Experimental Economics**  
2540489, WS 22/23, 2 SWS, Language: German, Open in study portal

**Literature**

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2. Aufl. 2006.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.
7.147 Course: Experimental Lab Class in Welding Technology, in Groups [T-MACH-102099]

**Responsibility:** Dr.-Ing. Stefan Dietrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Events**

| WT 22/23 | 2173560 | Welding Lab Course, in groups | 3 SWS | Practical course / On-Site | Dietrich, Schulze |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗿 On-Site, ✗ Cancelled

**Competence Certificate**
Certificate to be issued after evaluation of the lab class report.

**Prerequisites**
Certificate of attendance for Welding technique (The participation in the course Welding Technology I/II is assumed.).

**Annotation**
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. You need sturdy shoes and long clothes!

**Below you will find excerpts from events related to this course:**

**Welding Lab Course, in groups**
2173560, WS 22/23, 3 SWS, Language: German, Open in study portal

**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:**
Certificate to be issued after evaluation of the lab class report
You need sturdy shoes and long clothes!

**Workload:**
- Regular attendance: 31.5 hours
- Preparation: 8.5 hours
- Lab report: 80 hours

**Literature**
wird im Praktikum ausgegeben
### 7.148 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

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<td>Each term</td>
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**Competence Certificate**  
The assessment depends on which extraordinary course becomes part of the module "Cross-Functional Management Accounting".

**Prerequisites**  
None

**Annotation**  
The purpose of this placeholder is to make it possible to 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.
### 7.149 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

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**Events**

| WT 22/23 | 22246  | Extrusion Technology in Food Processing | 2 SWS | Lecture / 🗣 | Emin |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Learning control is an oral exam lasting about 20 minutes.

**Prerequisites**

None.
7.150 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

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**Events**

| ST 2022 | 2143882 | Fabrication Processes in Microsystem Technology | 2 SWS | Lecture / Bade |

**Exams**

| ST 2022 | 76-T-MACH-102166 | Fabrication Processes in Microsystem Technology | Bade |

**Competence Certificate**

Oral examination, 20 minutes

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*

**Fabrication Processes in Microsystem Technology**

2143882, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**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 and 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
# 7.151 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-105597 - Facility Management in Hospitals

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<td>Each term</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

### Competence Certificate

oral exam, appr. 20 min.

### Prerequisites

none

### Recommendation

none

### Annotation

none
### 7.152 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-105597 - Facility Management in Hospitals |

| **Type** | Examination of another type |
| **Credits** | 4,5 |
| **Grading scale** | Grade to a third |
| **Recurrence** | Each winter term |
| **Version** | 1 |

**Competence Certificate**

Term paper appr. 10 pages, with final presentation appr. 10 min.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 7.153 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

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**Legend:** 🪛 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**

oral exam ca. 30 minutes  
no tools or reference materials

**Prerequisites**

none

**Recommendation**

preliminary knowledge in mathematics, mechanics and materials science

**Below you will find excerpts from events related to this course:**

<table>
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2181711, WS 22/23, 3 SWS, Language: German, Open in study portal
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 elastic fracture mechanics
   - Crack resistance
   - 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 describe 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 knowledge 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!

Nach aktuellem Stand Präsenz

Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
7.154 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

<table>
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<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>Gruber, Gumbsch</td>
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**Exams**

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**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 knowledge in mathematics, mechanics and materials science

Below you will find excerpts from events related to this course:

**Failure of Structural Materials: Fatigue and Creep**

2181715, WS 22/23, 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 Description 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 knowledge 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.

Literature
- 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
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  

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**Exams**

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</table>

**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:**

**Financial Analysis**

2530205, SS 2022, 2 SWS, Language: German, [Open in study portal](#)  

**Literature**

7.156 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

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**Exams**

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**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:*

**Financial Econometrics**  
2520022, WS 22/23, 2 SWS, Language: English, Open in study portal  
Lecture (V)  
Blended (On-Site/Online)

**Content**

**Learning objectives:**
The student

- shows a broad knowledge of financial 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

Additional literature will be discussed in the lecture.
### 7.157 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

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**Competence Certificate**
Alternative exam assessment (Takehome Exam). Details will be announced at the beginning of the course.

**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.
7.158 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

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**Exams**

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**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:

**Financial Intermediation**
2530232, WS 22/23, 2 SWS, Language: German, Open in study portal

**Literature**

Weiterführende Literatur:
7.159 Course: Firm creation in IT security [T-WIWI-110374]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

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Exams

| ST 2022 | 7900236 | Business Planning for Founders in the field of IT-Security | Terzidis |

Competence Certificate
Alternative exam assessment. The grade consists of the presentation and the written elaboration.

Prerequisites
None
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

### Competence Certificate
The assessment consists of a written exam (90 minutes) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

### Prerequisites
none

Below you will find excerpts from events related to this course:

**Fluid Technology**
2114093, WS 22/23, 2 SWS, Language: German, Open in study portal

**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**
Skriftum zur Vorlesung Fluidtechnik
Institut für Fahrzeugsystemtechnik
downloadbar
### 7.161 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

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**Exams**

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*Legend: 🖥 Online,🧩 Blended (On-Site/Online),🗣 On-Site,🚫 Cancelled*

**Prerequisites**

None
7.162 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

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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
Course: Food Science and Functionality [T-CIWVT-108801]

### 7.163 Course: Food Science and Functionality [T-CIWVT-108801]

**Responsible:** Prof. Dr. Bernhard Watzl

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** M-CIWVT-101120 - Principles of Food Process Engineering

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#### Exams

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**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
### 7.164 Course: Foundry Technology [T-MACH-105157]

**Responsible:** Dr.-Ing. Christian Wilhelm  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Exams**

| ST 2022 | 76-T-MACH-105157 | Foundry Technology | Wilhelm |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

oral exam; about 25 minutes

**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).

Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
<th>Foundry Technology</th>
<th>2174575, SS 2022, 2 SWS, Language: German, Open in study portal</th>
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</table>

Lecture (V) Blended (On-Site/Online)
Content
Moulding and casting processes
Solidifying of melts
Castability
Fe-Alloys
Non-Fe-Alloys
Moulding and additive materials
Core production
Sand reclamation
Design in casting technology
Casting simulation
Foundry Processes

Learning objectives:
The students know the specific moulding and casting techniques and are able to describe them in detail. The students know the application of moulding and casting techniques concerning castings and metals, their advantages and disadvantages in comparison, their application limits and are able to describe these in detail.
The students know the applied metals and are able to describe advantages and disadvantages as well as the specific range of use.
The students are able, to describe detailed mould and core materials, technologies, their application focus and mould-affected casting defects.
The students know the basics of casting process of any casting parts concerning the above mentioned criteria and are able to describe detailed.

Requirements:
Required: Material Science and Engineering I and II

Workload:
The workload for the lecture Foundry Technology 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).

Organizational issues
29.4.
13.5. und 20.5.
3.6. und 24.6.
8.7., 15.7., 22.7. und 29.7

Literature
Literaturhinweise werden in der Vorlesung gegeben
Reference to literature, documentation and partial lecture notes given in lecture
### 7.165 Course: Freight Transport [T-BGU-106611]

**Responsible:** Dr.-Ing. Bastian Chlond  
**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

<table>
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**Competence Certificate**

written exam, 60 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none

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**Legend:**  
- 🖥 Online,  
- 🧩 Blended (On-Site/Online),  
- 🗣 On-Site,  
- ✗ Cancelled
7.166 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

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<td>76-T-MACH-105184</td>
<td>Fuels and Lubricants for Combustion Engines</td>
<td>Lecture / On-Site</td>
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**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:**

**Fuels and Lubricants for Combustion Engines**

2133108, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**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
7.167 Course: Functional Ceramics [T-MACH-105179]

**Responsible:** Dr. Manuel Hinterstein  
Dr.-Ing. Wolfgang Rheinheimer

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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<td>Grade to a third</td>
<td>Each winter term</td>
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**Exams**
| ST 2022 | 76-T-MACH-105179 | Functional Ceramics | Hinterstein |

**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
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

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### Exams

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<td>Bardehle, Unrau</td>
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<td>Unrau, Bardehle</td>
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**Legend:** 🤖 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

Oral group examination

Duration: 30 minutes

Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Fundamentals for Design of Motor-Vehicles Bodies I**

2113814, WS 22/23, 1 SWS, Language: German, [Open in study portal](https://fast-web-01.fast.kit.edu/Passwoerterllias/)

**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 technology
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/Passwoerterllias/](https://fast-web-01.fast.kit.edu/Passwoerterllias/)

CO, Geb. 70.04, Raum 219.

Termine und nähere Informationen: siehe 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
7.169 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

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Exams

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<td>Fundamentals for Design of Motor-Vehicle Bodies II</td>
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Competence Certificate

Oral group examination

Duration: 30 minutes

Auxiliary means: none

Prerequisites

none

Below you will find excerpts from events related to this course:

Fundamentals for Design of Motor-Vehicle Bodies II

2114840, SS 2022, 1 SWS, Language: German, [Open in study portal]

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

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter [https://fast-web-01.fast.kit.edu/PasswoerterIlias/](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)

Voraussichtliche Termine, nähere Informationen und evtl. Änderungen:

siehe Instituts homepage. Präsenzveranstaltung unter Vorbehalt der Pandemie-Entwicklung

Scheduled dates, further Information and possible changes of date:

see homepage of the institute.
Literature
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg

**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

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<td>4 SWS</td>
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**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**
The course is offered every second year.
7.171 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

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**Exams**

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**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

Below you will find excerpts from events related to this course:

**Fundamentals in the Development of Commercial Vehicles II**

2114844, SS 2022, 1 SWS, Language: German, Open in study portal  
Lecture (V)  
Online

**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

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Vorlesung findet nochmals als digitale Veranstaltung über ILIAS statt. Genaue Termine, nähere Informationen und eventuelle Terminänderungen:

siehe Institutshomepage.

### Literature

1. HILGERS, M.: Nutzfahrzeugtechnik lernen, Springer Vieweg, ISSN: 2510-1803

### Fundamentals in the Development of Commercial Vehicles I

2113812, WS 22/23, 1 SWS, Language: German, [Open in study portal](#)

#### 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/

CO, Geb. 70.04, Raum 219. Termine und Nähere Informationen: siehe Institutshomepage

Dates and further information will be published on the homepage of the institute.

#### Literature

7.172 Course: Fundamentals of Automobile Development I [T-MACH-105162]

**Responsible:** Prof. Dipl.-Ing. Rolf Frech

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

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Legend: ☀ Online, ☑ Blended (On-Site/Online), ☒ On-Site, × Cancelled

**Competence Certificate**

Written examination

**Duration:** 90 minutes

**Auxiliary means:** none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

### Fundamentals of Automobile Development I

2113810, WS 22/23, 1 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**On-Site**

**Content**

1. Process of automobile development
2. Conceptual dimensioning and design of an automobile
3. Laws and regulations - National and international boundary conditions
4. Aero dynamical dimensioning and design of an automobile I
5. Aero dynamical dimensioning and design of an automobile II
6. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines I
7. Thermo-management in the conflict of objectives between styling, aerodynamic and packaging guidelines II

**Learning Objectives:**

The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile. They are ready to judge goal conflicts in the field of automobile development and to work out approaches to solving a problem.
Organizational issues
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/
Campus Ost, geb. 70.04., Raum 219
Termine und nähere Informationen finden Sie auf der Institutshomepage.
Kann nicht mit Lehrveranstaltung 2113851 kombiniert werden.

Date and further information will be published on the homepage of the institute.
Cannot be combined with lecture 2113851.

Learning Objectives:
The students have an overview of the fundamentals of the development of automobiles. They know the development process, the national and the international legal requirements that are to be met. They have knowledge about the thermo-management, aerodynamics and the design of an automobile. They are ready to judge goal conflicts in the field of automobile development and to work out approaches to solving a problem.

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/
Campus Ost, geb. 70.04., Raum 219. Termine und nähere Informationen finden Sie auf der Institutshomepage.

Date and further information will be published on the homepage of the institute.
Cannot be combined with lecture 2113810.

Literature
Skrift zur Vorlesung wird zu Beginn des Semesters ausgegeben
The scriptum will be provided during the first lessons
7.173 Course: Fundamentals of Automobile Development II [T-MACH-105163]

- **Responsible:** Prof. Dipl.-Ing. Rolf Frech
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101265 - Vehicle Development

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗓️ On-Site, ✗ Cancelled

**Competence Certificate**

Written examination

Duration: 90 minutes

 Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Fundamentals of Automobile Development II**

2114842, SS 2022, 1 SWS, Language: German, Open in study portal

**Content**

1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

**Learning Objectives:**

The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile. They are ready to participate competently in the development process of the complete vehicle.

**Organizational issues**

Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Vorlesung findet als Blockvorlesung am Campus Ost, Geb. 70.04, Raum 219 statt. Termine werden über die Homepage bekannt gegeben.

Kann nicht mit der Veranstaltung [2114860] kombiniert werden.

Cannot be combined with lecture [2114860].
**Content**
1. Application-oriented material and production technology I
2. Application-oriented material and production technology II
3. Overall vehicle acoustics in the automobile development
4. Drive train acoustics in the automobile development
5. Testing of the complete vehicle
6. Properties of the complete automobile

**Learning Objectives:**
The students are familiar with the selection of appropriate materials and the choice of adequate production technology. They have knowledge of the acoustical properties of the automobiles, covering both the interior sound and exterior noise. They have an overview of the testing procedures of the automobiles. They know in detail the evaluation of the properties of the complete automobile. They are ready to participate competently in the development process of the complete vehicle.

**Organizational issues**
Kann nicht mit der Veranstaltung [2114842] kombiniert werden.
Cannot be combined with lecture [2114842].
Veranstaltung findet am Campus Ost, Geb. 70.04, Raum 219 statt. Genaue Termine entnehmen Sie bitte der Institushomepage.
Scheduled dates:
see homepage of the institute.

**Literature**
Das Skript zur Vorlesung ist über ILIAS verfügbar.
**7.174 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

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<td>Fundamentals of Catalytic Exhaust Gas Aftertreatment</td>
<td>2 SWS</td>
<td>Lecture/📍 On-Site</td>
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**Exams**

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**Competence Certificate**

oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Fundamentals of catalytic exhaust gas aftertreatment**  
2134138, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Organizational issues**

Blockvorlesung, Termin und Ort werden auf der Homepage des IFKM und ITCP bekannt gegeben.

**Literature**

Skript, erhältlich in der Vorlesung

7 COURSES

7.175 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

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**Events**

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**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.
7.176 Course: Gear Cutting Technology [T-MACH-102148]

**Responsible:** Dr.-Ing. Markus Klaiber  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101265 - Vehicle Development  
M-MACH-101284 - Specialization in Production Engineering

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<td>WT 22/23 76-T-MACH-102148</td>
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</table>

**Competence Certificate**  
Oral Exam (20 min)

**Prerequisites**  
none

Below you will find excerpts from events related to this course:

**Gear Technology**  
2149655, WS 22/23, 2 SWS, Language: German, Open in study portal  
Lecture (V)  
Blended (On-Site/Online)

**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

**Organizational issues**  
Start: 27.10.2022
Literature
Medien:
Scrip zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.
Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
T.177 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

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<th>2 SWS</th>
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**Exams**

| ST 2022 | 76-T-MACH-105159 | Global Production and Logistics - Part 2: Global Logistics / New: Global Logistics | Furmans |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**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

Below you will find excerpts from events related to this course:

**Global Logistics**

2149600, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

Blended (On-Site/Online)
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 appropriate 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 (Neuausfuhrung in Arbeit)
- Domschke. Logistik, Rundreisen und Touren, Oldenbourg Verlag, 1982
- Domschke/Drexl. Logistik, Standorte, Oldenbourg Verlag, 1996
- Gudehus. Logistik, Springer Verlag, 2007
- Tempelmeier. Bestandsmanagement in SupplyChains, Books on Demand 2006
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

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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. 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

Annotation
The lecture will be held for the first time in the winter semester 2022/23.

Below you will find excerpts from events related to this course:

Global Manufacturing
2581956, WS 22/23, 2 SWS, Language: English, Open in study portal

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.
7.179 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

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**Events**

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<td>Global Optimization I</td>
<td>2</td>
<td>Lecture / 🗣️</td>
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**Exams**

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</table>

**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:**

**Global Optimization I**  
2550134, SS 2022, 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 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

Weiterführende Literatur:
- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
7 COURSES  
Course: Global Optimization I and II [T-WIWI-103638]

7.180 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

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Exams

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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 2022, 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

Weiterführende Literatur:
- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
Literature

Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
7.81 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

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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:

Global Optimization II
2550136, SS 2022, 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


Weiterführende Literatur:

- W. Alt, Numerische Verfahren der konvexen, nichtglatten Optimierung, Teubner, 2004
- C.A. Floudas, Deterministic Global Optimization, Kluwer, 2000
7.182 Course: Global Production [T-MACH-110991]

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

**Part of:**  
M-MACH-101282 - Global Production and Logistics  
M-MACH-101284 - Specialization in Production Engineering  
M-MACH-105455 - Strategic Design of Modern Production Systems

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**Events**

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**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.

**Recommendation**  
Participation in "T-MACH-110981 - Tutorial Global Production" is recommended, but not mandatory.

*Below you will find excerpts from events related to this course:*
Content
The lecture examines the management of global production networks of manufacturing companies. It gives an overview of the influencing factors and challenges of global production. In-depth knowledge of common methods and procedures for planning, designing and managing global production networks is imparted.

Therefore, the lecture first of all discusses the connections and interdependencies between the business strategy and the production strategy and illustrates necessary tasks for the definition of a production strategy. Methods for site selection, for the site-specific adaptation of product design and production technology as well as for the establishment of new production sites and for the adaptation of existing production networks to changing framework conditions are subsequently taught within the context of the design of the network footprint. With regard to the management of global production networks, the lecture addresses challenges associated with coordination, procurement and order management in global networks. The lecture is complemented by a discussion on the use of industry 4.0 applications in global production and current trends in planning, designing and managing global production networks.

The topics include:

- Basic conditions and influencing factors of global production (historical development, targets, chances and threats)
- Framework for planning, designing and managing global production networks
- Production strategies for global production networks
  - From business strategy to production strategy
  - Tasks of the production strategy (product portfolio management, circular economy, planning of production depth, production-related research and development)
- Design of global production networks
  - Basic types of network structures
  - Planning process for the design of the network footprint
  - Adaptation of the network footprint
  - Site selection
  - Location-specific adaptation of production technology and product design
- Management of global production networks
  - Network coordination
  - Procurement process
  - Order management
- Trends in planning, designing and managing global production networks

Learning Outcomes:
The students ...

- can explain the general conditions and influencing factors of global production
- are capable to apply defined procedures for site selection and to evaluate site decisions with the help of different methods
- are able to select the adequate scope of design for site-appropriate production and product construction case-specifically
- can state the central elements in the planning process of establishing a new production site.
- are capable to make use of the methods to design and scale global production networks for company-individual problems
- are able to show up the challenges and potentials of the departments sales, procurement as well as research and development on global basis.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Recommendations:
Combination with Global Production and Logistics – Part 2

Organizational issues
Start: 24.10.2022
Literature
Medien
Skript zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt
empfohlene Sekundärliteratur:

Media
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
recommended secondary literature:
7.183 Course: Globalization of Innovation – Innovation for Globalization: Methods and Analyses [T-WIWI-111822]

**Responsible:** Sophie Schneider

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

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**Exams**

| ST 2022 | 7900018 | Globalization of Innovation – Innovation for Globalization: Methods and Analyses | Schneider |

**Competence Certificate**

Alternative exam assessment. The grade consists of a presentation of the results (30%), participation in the discussions (10%) and a seminar paper (60%).

**Recommendation**

Prior attendance of the course Innovation Management [2545015] is recommended.
7.184 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

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**Exams**

| ST 2022    | 7900001 | Graph Theory and Advanced Location Models | Nickel |

**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.i.or.kit.edu/english/Courses.php.
Course: Großdiesel- und -gasmotoren für Schiffsantriebe [T-MACH-110816]

**Responsible:** Dr.-Ing. Heiko Kubach

**Organisation:**
- Part of: M-MACH-101303 - Combustion Engines II

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<th>Large Diesel and Gas Engines for Ship Propulsions</th>
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<th>Lecture / 🗣</th>
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**Exams**

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</table>

**Competence Certificate**
- oral exam, 20 minutes

**Prerequisites**
- None

Below you will find excerpts from events related to this course:

**Large Diesel and Gas Engines for Ship Propulsions**
- 2134154, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Content**

- Introduction and History
- Types of Ships and Propulsion Systems
- Thermodynamic
- Boosting
- Design
- Fuels
- Lubricants
- Injection of Liquid Fuels
- Combustion Processes for Liquid Fuels
- Injection of Gaseous Fuels
- Combustion Processes for Gaseous Fuels
- Emissions
- Integration of Engines in Ships
- Large Engines in other Applications
7.186 Course: Growth and Development [T-WIWI-111318]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101478 - Innovation and Growth  
M-WIWI-101496 - Growth and Agglomeration

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**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.

**Annotation**  
Due to the research semester of Prof. Dr. Ingrid Ott, the course will not be offered in the winter semester 2021/22. The exam will take place. Preparation materials can be found in ILIAS.
# 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

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**Competence Certificate**  
Verbally  

**Duration:** 30 up to 40 minutes  
**Auxiliary means:** none

**Prerequisites**  
none

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**Handling Characteristics of Motor Vehicles I**  
2113807, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**  
On-Site

---

**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 important influencing factors on the driving behaviour and to contribute to the optimization of the handling characteristics.

**Organizational issues**  
*Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter [https://fast-web-01.fast.kit.edu/PasswoerterIlias/](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)*
Literature
### 7.188 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

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**Exams**

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**Competence Certificate**  
**Oral Examination**

- Duration: 30 up to 40 minutes
- Auxiliary means: none

**Prerequisites**

- none

---

Below you will find excerpts from events related to this course:

#### Handling Characteristics of Motor Vehicles II

**2114838, SS 2022, 2 SWS, Language: German, [Open in study portal](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)**

**Lecture (V)**  
**On-Site**

**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**

*Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter [https://fast-web-01.fast.kit.edu/PasswoerterIlias/](https://fast-web-01.fast.kit.edu/PasswoerterIlias/)*

**Literature**

7.189 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:** Written examination

**Credits:** 3

**Grading scale:** Grade to a third

**Recurrence:** Each summer term

**Version:** 1

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**Events**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

---

**Competence Certificate**

The lecture will be suspended in summer semester 2021. 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. 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

**Annotation**

See German version.

---

*Below you will find excerpts from events related to this course:*

**Heat Economy**

2581001, SS 2022, 2 SWS, Language: German, Open in study portal

**Organizational issues**

Block, Seminarraum Standort West - siehe Institutsaushang
7 COURSES

Course: High Performance Powder Metallurgy Materials [T-MACH-102157]

Responsible: Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101268 - Specific Topics in Materials Science

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Events

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Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
oral exam, 20-30 min

Prerequisites
none

Below you will find excerpts from events related to this course:

Advanced powder metals
2126749, SS 2022, 2 SWS, Language: German, Open in study portal
Lecture (V) Blended (On-Site/Online)

Literature

- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
### T.191 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

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
## 7.192 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

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### Exams

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**Prerequisites**

none
7.193 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

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**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.

The exam takes place every semester and can be repeated at every regular examination date.

**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.

*Below you will find excerpts from events related to this course:*
Human Factors in Security and Privacy
2511554, WS 22/23, 2 SWS, Language: German/English, Open in study portal

Content
Please take a look at all the information provided before the first event (e.g. first slides)!
The event will be conducted with 3G. Accordingly, either a one-time proof of vaccination or an official proof of a negative test is required for each event.
Some lectures are in English, some in German.
To participate in the quizzes at the beginning of the event a charged device is needed e.g. laptop or cell phone.

To successfully pass the course, the following requirements must be met:
Both need to be done:

- Reading Paper, Active Participation & 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
- Reading Paper, Active Participation & Pass Quiz “Users are not the enemy” Active participation exercise 1 – Part 2
- Reading Paper, Active Participation & Pass Quiz “Why Johnny can’t encrypt”
- Reading Paper, Active Participation & Pass Quiz “Put Your Warning Where Your Link Is: Improving and Evaluating Email Phishing Warnings”
- Active participation exercise 1 – Part 3
- Active participation exercise 1 – Part 4 Results
- Reading Paper, Active Participation & Pass Quiz “User-centered security” Active participation exercise 2 – Part 1

Here is a first preview of the topics planned for the lecture:

1. General Introduction
2. Self-Study: Knowledge of Information Security Lecture
3. Terminology + Basics
4. Evaluation and analyses methods
5. Risk Communication
6. Security Awareness
7. Security Indicators
8. Graphical Authentication
9. Shoulder Surfing Authentication
10. Usable Verifiable Electronic Voting
11. Q&A + Exam preparation

Literature
- Security and Usability: Designing Secure Systems that People Can Use von Lorrie Faith Cranor und Simson Garfinkel. 2005
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

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**Competence Certificate**
oral exam, appr. 25 minutes, no auxiliary means

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Hydrogen and reFuels - Energy Conversion in Combustion Engines**
2134155, WS 22/23, 2 SWS, Language: German, Open in study portal

**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 Combustion
Waste heat recovery
7 COURSES

Course: Ignition Systems [T-MACH-105985]

7.195 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

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**Competence Certificate**

oral exam, 20 min

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Ignition systems**

2133125, WS 22/23, 2 SWS, Language: German, Open in study portal

**Content**

- Ignition Process
- Spark Ignition
- Principle of Spark Ignition Systems
- Limits of Spark Ignition
- New Developments of Spark Ignition Systems
- New Alternative Ignition Systems
7.196 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

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**
The assessment of this course is a written examination (60 min). The exam takes place in every semester. Re-examinations are offered at every ordinary examination 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:*
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):
Behavioral Game Theory, Camerer, Russel Sage Foundation, 2003
Introduction to Econometrics, Wooldridge, Andover, 2014
Econometric Analysis of Cross Section and Panel Data, Wooldridge, MIT Press, 2010
### Course: Information Engineering [T-MACH-102209]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101281 - Virtual Engineering B  
- M-MACH-101283 - Virtual Engineering A

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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

### Competence Certificate
Alternative exam assessment (written composition and speech)

### Prerequisites
None

Below you will find excerpts from events related to this course:

#### Information Engineering

**2122014, SS 2022, 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**
Siehe ILIAS-Kurs

**Literature**
Themenspezifische Literatur
### 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  

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**Legend:** 🖥 Online, 🤒 Blended (On-Site/Online), 🗣️ On-Site, ❌ Cancelled

**Competence Certificate**
lecture accompanying exercises, appr. 5 pieces

**Prerequisites**
none

**Recommendation**
none

**Annotation**
none
7.199 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

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**Exams**

- ST 2022: 79AIFB_ISE_B3 Information Service Engineering (Registration until 18 July 2022) Sack
- WT 22/23: 79AIFB_ISE_B2 Information Service Engineering Sack

**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

Below you will find excerpts from events related to this course:

**Information Service Engineering**

2511606, SS 2022, 2 SWS, Language: English, [Open in study portal](#)
Content
- Information, Natural Language and the Web
- Natural Language Processing
  - NLP and Basic Linguistic Knowledge
  - NLP Applications, Techniques & Challenges
  - Evaluation, Precision and Recall
  - Regular Expressions and Automata
  - Tokenization
  - Language Model and N-Grams
  - Part-of-Speech Tagging
  - Distributional Semantics & Word Embeddings
- Knowledge Graphs
  - Knowledge Representations and Ontologies
  - Resource Description Framework (RDF) as simple Data Model
  - Creating new Models with RDFS
  - Querying RDF(S) with SPARQL
  - More Expressivity via Web Ontology Language (OWL)
  - From Linked Data to Knowledge Graphs
  - Wikipedia, DBpedia, and Wikidata
  - Knowledge Graph Programming
- Basic Machine Learning
  - Machine Learning Fundamentals
  - Evaluation and Generalization Problems
  - Linear Regression
  - Decision Trees
  - Unsupervised Learning
  - Neural Networks and Deep Learning
- ISE Applications
  - From Data to Knowledge
  - Data Mining, Information Visualization and Knowledge Discovery
  - Semantic Search
  - 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
7 COURSES

7.200 Course: Information Systems and Supply Chain Management [T-MACH-102128]

| Responsible: | Dr.-Ing. Christoph Kilger |
| Organisation: | KIT Department of Mechanical Engineering |
| Part of: | M-MACH-101278 - Material Flow in Networked Logistic Systems  
M-MACH-104888 - Advanced Module Logistics |

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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

Below you will find excerpts from events related to this course:

Information Systems in Logistics and Supply Chain Management

2118094, SS 2022, 2 SWS, Language: German, Open in study portal

Literature

### 7.201 Course: Infrastructure Management [T-BGU-106300]

**Responsible:** Prof. Dr.-Ing. Ralf Roos  
**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

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

written exam, 120 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
7.202 Course: Innovation & Space [T-WIWI-112157]

Responsible: Dr. Daniela Beyer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management

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Events

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<td>2500015</td>
<td>Innovation &amp; Space</td>
<td>2 SWS</td>
<td>Seminar</td>
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Exams

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<td>7900239</td>
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Competence Certificate
Non exam assessment. The final grade is composed of the grade of the written paper and of the presentation.

Prerequisites
None
### 7.203 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

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**Events**

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<td>2 SWS</td>
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<td>Each winter term</td>
<td>2 terms</td>
<td>1</td>
<td>Hohmann, Zwick, Sax, Stork, Nahm</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

see module description
7.204 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

<table>
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<td>Lecture / Blended (On-Site/Online)</td>
<td>2 SWS</td>
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<td>Innovation Management: Concepts, Strategies and Methods</td>
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<td>2 SWS</td>
<td>7900145</td>
<td>Innovation Management: Concepts, Strategies and Methods</td>
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</table>

**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:

### Innovation Management: Concepts, Strategies and Methods

**2545100, SS 2022, 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.

### 7.205 Course: Innovation Processes Live [T-WIWI-110234]

**Responsible:** Dr. Daniela Beyer  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101507 - Innovation Management  
M-WIWI-101507 - Innovation Management

<table>
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<td>3</td>
<td>Grade to a third</td>
<td>see Annotations</td>
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**Competence Certificate**

Alternative exam assessments (§4(2), 3 SPO). The grade consists of an exposé (15%), a guideline interview or an analysis tool (25%), a group presentation of the results (20%) and a seminar paper (40%).

**Prerequisites**

None.

**Recommendation**

Prior attendance of the course Innovation Management [2545015] is recommended.

**Annotation**

The course will be discontinued in the winter semester 2022/23.
### 7.206 Course: Innovation Theory and Policy [T-WIWI-102840]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101478 - Innovation and Growth  
M-WIWI-101497 - Agglomeration and Innovation  
M-WIWI-101514 - Innovation Economics

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### Events

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<td>Innovation theory and policy</td>
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<td>2 SWS</td>
<td>Lecture / 🗣️</td>
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<td>Innovation theory and policy</td>
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### Exams

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<td>Innovation theory and policy</td>
<td>Ott</td>
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<tr>
<td>WT 22/23</td>
<td>7900077</td>
<td>Innovation theory and policy</td>
<td>Ott</td>
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</table>

**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:**

#### Innovation theory and policy

<table>
<thead>
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<th>Type</th>
<th>Language</th>
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<tbody>
<tr>
<td>2560236</td>
<td>Lecture (V)</td>
<td>German/English</td>
<td>Open in study portal</td>
</tr>
</tbody>
</table>

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**Industrial Engineering and Management M.Sc.**  
Module Handbook as of 04/10/2022
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:

7.207 Course: Integrated Design Project in Water Resources Management [T-BGU-111275]

**Responsible:** 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

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<td>Each term</td>
<td>1 terms</td>
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**Events**

| ST 2022 | 6224801 | Integrated Design Project in Water Resources Management | 4 SWS | Lecture / Practice | Ehret, Seidel |

**Exams**

| ST 2022 | 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
7.208 Course: Integrated Product Development [T-MACH-105401]

**Responsible:** Prof. Dr.-Ing. Albert Albers 
Albers Assistenten

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-102626 - Major Field: Integrated Product Development

<table>
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<th>Version</th>
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<td>Each winter term</td>
<td>2</td>
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**Events**

| WT 22/23 | 2145156 | Integrated Product Development | 4 SWS | Lecture / 🗣 | Albers |

**Exams**

| WT 22/23 | 76-T-MACH-105401 | Integrated Product Development | Albers |

**Competence Certificate**
oral examination (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 homepage from april to july. The selection itself is made by Prof. Albers in personal interviews.

*Below you will find excerpts from events related to this course:*

**Integrated Product Development**
2145156, WS 22/23, 4 SWS, Language: German, Open in study portal
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 homepage 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
7.209 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:** Written examination

**Credits:** 9

**Grading scale:** Grade to a third

**Recurrence:** Each summer term

**Version:** 1

### Events

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<td>Lecture / Practice (VÜ)</td>
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### Exams

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<td>Lanza</td>
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<td>Lecture / Practice (VÜ)</td>
<td>Lanza</td>
<td>Each summer term</td>
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**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.

**Below you will find excerpts from events related to this course:**

**Integrated Production Planning in the Age of Industry 4.0**

2150660, SS 2022, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ) Blended (On-Site/Online)
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/).
7.210 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-101284 - Specialization in Production Engineering
- M-MACH-105455 - Strategic Design of Modern Production Systems

<table>
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<th>Version</th>
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<td>Each summer term</td>
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**Events**

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<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>2</td>
<td>Lecture / 🧩</td>
<td>Schlichtenmayer</td>
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<td>2</td>
<td>Lecture / 🧩</td>
<td>Schlichtenmayer</td>
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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*
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/).
Content
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- Global R&D and production
- Methods to identify core competencies

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self-study: 99 hours

Organizational issues
Die LV wird einmalig im WS 2022/23 als Ersatz für die Absage im SS 2022 angeboten.
Im SS 2023 findet die LV wieder regulär statt.

Literature
Medien:
Skrift zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
7.211 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

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**Exams**

| ST 2022 | 7900069 | Intelligent Agent Architectures (Nachklausur WS 2021/2022) | 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

**Recommendation**

It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".
### 7.212 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

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**Competence Certificate**

Oral (30 minutes) or 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.

**Annotation**

new lecture starting summer semester 2020

---

Below you will find excerpts from events related to this course:

**Intelligent Agents and Decision Theory**

2540537, SS 2022, 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 decisions 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. Information Learning objectives value: When should an agent gather new information?
9. Decisions under uncertainty: Complete lack of information
10. Learning: Statistical learning of bayesian networks
11. Learning: Supervised learning with neural networks
12. Learning: Reinforcement learning
13. Learning: Preference-based reinforcement learning
14. Discussion: Ethical and philosophical issues

Note: This rough outline may be subject to change.
Literature

Basic literature (by lecture):

1. Russell & Norvig (2016, chapter 1), Bamberg et al. (2019, chapters 1 & 2)
2. Russell & Norvig (2016, chapter 2)
4. Nickel et al. (2014, chapter 1) [German], Russell & Norvig (2016, chapter 3)
6. Bamberg et al. (2019, chapter 6)
7. Russell & Norvig (2016, chapters 13, 14, 16)
8. Russell & Norvig (2016, chapter 16), Bamberg et al. (2019, chapter 6)
9. Bamberg et al. (2019, chapter 5)
10. Russell & Norvig (2016, chapter 20)
11. Goodfellow et al. (2016, chapter 6)
13. Wirth et al. (2017)

Detailed references:
Course: International Business Development and Sales [T-WIWI-110985]

**Responsibility:** 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

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**Type:** Examination of another type
**Credits:** 6
**Grading scale:** Grade to a third
**Recurrence:** see Annotations
**Version:** 1

**Competence Certificate**
Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

**Annotation**
Please note that currently it cannot be guaranteed that the course will take place in the winter term 22/23. Please contact the Marketing and Sales Research Group for further information.

**Below you will find excerpts from events related to this course:**

**International Business Development and Sales**
2572189, WS 22/23, 4 SWS, Language: English, [Open in study portal](#)

**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.
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

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**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**

None

**Annotation**

The course is offered as a 14-day or block course.

*Below you will find excerpts from events related to this course:*

**International Finance**

2530570, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Organizational issues**

Die Veranstaltung wird als Blockveranstaltung angeboten, nach dem Kickoff am 27.04. nach Absprache.

**Literature**

Weiterführende Literatur:

### 7.215 Course: Internet Law [T-INFO-101307]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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**Legend:**  
🖥 Online,  
🧩 Blended (On-Site/Online),  
🗣 On-Site,  
🗙 Cancelled
**7.216 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

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<td>Each term</td>
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**Competence Certificate**  
Grades will be based on active participation (50%) and homework assignments (50%).

**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.
### 7.217 Course: Introduction to Ceramics [T-MACH-100287]

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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#### Events

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#### Literature

- 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

---

### 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

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**Below you will find excerpts from events related to this course:**

**Introduction to Ceramics**  
2125757, WS 22/23, 3 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**  
On-Site
7.218 Course: Introduction to Food Law [T-CHEMBIO-108091]

Responsible: Dr. Thomas Kuballa
Organisation: KIT Department of Chemistry and Biosciences
Part of: M-CIWVT-101119 - Specialization in Food Process Engineering

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Prerequisites
none
7.219 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

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**Events**

| WT 22/23 | 6339050 | Einführung in die Hydrogeologie | 4 SWS | Lecture / Practice | Goldscheider |

**Exams**

| ST 2022 | 8210_101499_WS | Introduction to Hydrogeology |     | Goldscheider |

**Competence Certificate**

Written exam with 90 minutes

**Prerequisites**

none
7 COURSES

Course: Introduction to Microsystem Technology I [T-MACH-105182]

**Responsible:** Dr. Vlad Badilita  
Dr. Mazin Jouda  
Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-ETIT-101158 - Sensor Technology I  
M-MACH-101287 - Microsystem Technology

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**Competence Certificate**

- written examination (60 min)

**Prerequisites**

- none

*Below you will find excerpts from events related to this course:*

**Introduction to Microsystem Technology I**

- 2141861, WS 22/23, 2 SWS, Language: English, [Open in study portal](#)

**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
7.221 Course: Introduction to Microsystem Technology II [T-MACH-105183]

**Responsible:** Dr. Mazin Jouda  
Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-ETIT-101158 - Sensor Technology I  
M-MACH-101287 - Microsystem Technology

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**Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
written examination (60 min)

**Prerequisites**
none

Below you will find excerpts from events related to this course:

**Introduction to Microsystem Technology II**

2142874, SS 2022, 2 SWS, Language: English, [Open in study portal](#)

**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
**Course: Introduction to Sensory Analysis with Practice [T-CIWVT-111534]**

**Responsible:** TT-Prof. Dr. Katharina Scherf  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101119 - Specialization in Food Process Engineering

<table>
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<th>Recurrence</th>
<th>Version</th>
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**Exams**

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<td>ST 2022 7220016</td>
<td>Introduction to Sensory Analysis with Practice</td>
<td>Scherf</td>
<td></td>
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</table>

**Prerequisites**  
None
### 7.223 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

<table>
<thead>
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<td>2550470</td>
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<td>Lecture</td>
<td>Rebennack</td>
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<tr>
<td>ST 22</td>
<td>2550471</td>
<td>Übung zur Einführung in die Stochastische Optimierung</td>
<td>1</td>
<td>Practice</td>
<td>Rebennack, Sinske</td>
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<td>Rechnerübung zur Einführung in die Stochastische Optimierung</td>
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**Exams**

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<th>Course Title</th>
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<td>Rebennack</td>
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**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.
7.224 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
  M-MACH-101283 - Virtual Engineering A

**Type** | **Credits** | **Grading scale** | **Recurrence** | **Version**
---|---|---|---|---
Examination of another type | 4 | Grade to a third | Each term | 2

### Events

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<th>Credits</th>
<th>Grading</th>
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<td>ST 2022</td>
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<td>IoT platform for engineering</td>
<td>3 SWS</td>
<td>Project (P / 🗣)</td>
<td>Each term</td>
<td>Ovtcharova, Maier</td>
<td></td>
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<tr>
<td>WT 22/23</td>
<td>2123352</td>
<td>IoT platform for engineering</td>
<td>3 SWS</td>
<td>Project (P / 🗣)</td>
<td>Each term</td>
<td>Ovtcharova, Maier</td>
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### Exams

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<td>IoT platform for engineering</td>
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</tr>
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</table>

**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:**

#### IoT platform for engineering

2123352, SS 2022, 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

**Literature**

Keine / None

---

#### IoT platform for engineering

2123352, WS 22/23, 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

**Literature**

Keine / None
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

<table>
<thead>
<tr>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Grade to a third</td>
<td>Each winter term</td>
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Events

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<th>Version</th>
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<tr>
<td>WT 22/23</td>
<td>2 SWS</td>
<td>Lecture / Practice</td>
<td>Online, Blended</td>
<td>Each winter term</td>
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</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

oral exam with 15 minutes

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.226 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:** Oral examination  
**Credits:** 4  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 3

### Events

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<th>2118184</th>
<th>IT-Fundamentals of Logistics: Opportunities for Digital Transformation</th>
<th>2 SWS</th>
<th>Lecture / 🧩</th>
<th>Thomas</th>
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</table>

### Exams

<table>
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<tr>
<th>ST 2022</th>
<th>76-T-MACH-105187</th>
<th>IT-Fundamentals of Logistics</th>
<th>Furmans, Mittwollen, Thomas</th>
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</thead>
</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled

**Competence Certificate**
The success control takes place in form of a written examination 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

**Annotation**
1) Detailed script can be downloaded online (www.tup.com), updated and enhanced annually.
2) CD-ROM with chapters and exercises at the end of the semester available from the lecturer, also updated and enhanced annually.

Below you will find excerpts from events related to this course:

<table>
<thead>
<tr>
<th>V IT-Fundamentals of Logistics: Opportunities for Digital Transformation</th>
<th>Lecture (V)</th>
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<tbody>
<tr>
<td>2118184, SS 2022, 2 SWS, Language: German, Open in study portal</td>
<td>Blended (On-Site/Online)</td>
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</table>
7.227 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)

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
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**Events**

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<th>Code</th>
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<th>Credits</th>
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<th>Recurrence</th>
<th>Credits</th>
<th>Grading scale</th>
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<tr>
<td>ST 2022</td>
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<td>Joint Entrepreneurship School</td>
<td>4 SWS</td>
<td>Seminar</td>
<td>Kleinn, Terzidis</td>
<td>ST 2022</td>
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<td>Joint Entrepreneurship Summer School</td>
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**Exams**

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</thead>
<tbody>
<tr>
<td>ST 2022</td>
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<td>Joint Entrepreneurship Summer School</td>
<td>4 SWS</td>
<td>Seminar</td>
<td>Kleinn, Terzidis</td>
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<td>Joint Entrepreneurship Summer School</td>
<td>Terzidis</td>
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</table>

**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.

**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:

<table>
<thead>
<tr>
<th>Joint Entrepreneurship School</th>
<th></th>
<th>Seminar (S) Online</th>
</tr>
</thead>
<tbody>
<tr>
<td>2545021, SS 2022, 4 SWS, Language: English</td>
<td>Open in study portal</td>
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</tr>
</tbody>
</table>

**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.

https://etm.entechnon.kit.edu/english/1095.php

**Organizational issues**
Vorbereitungstermine: tba

JES: 11.07.15.07.2022
Course: Judgement and Decision Making [T-WIWI-111099]

**Responsibility:** 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

<table>
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<tr>
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<th>Recurrence</th>
<th>Expansion</th>
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<td>Each winter term</td>
<td>1 terms</td>
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### Events

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<td>Lecture / 🗣</td>
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### Exams

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<th>Recurrence</th>
<th>Expansion</th>
<th>Version</th>
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<td>Lecture / 🗣</td>
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</table>

Legend: 🖥 Online, 🖥 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Written exam (90 min) at the end of the Semester

**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 influence 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.

**Below you will find excerpts from events related to this course:**

**Judgment and Decision Making**

Lecture (V)

2540440, WS 22/23, 3 SWS, Language: English, Open in study portal

**Blended (On-Site/Online)**

**Content**

In this lecture, students will be introduced to fundamental theories and key insights on human judgment and decision making. Topics include decision making under uncertainty, choice biases, simple heuristics, risk perception and -communication, as well as social and emotional influences on decision making, to name but a few. In the Wintersemester 20/21 this class will be held online. The lecture videos will be available for download and there will be regular online meetings to discuss the topics. The lecture will be held in English.
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

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<th>Grading scale</th>
<th>Recurrence</th>
<th>Expansion</th>
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<tbody>
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<td>Grade to a third</td>
<td>Each summer term</td>
<td>1 terms</td>
<td>1</td>
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</table>

Exams

| ST 2022 | 7900368 | KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics | Weinhardt |

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

Due to the laboratory capacity and in order to ensure an optimal supervision of the project groups, the number of participants is limited. Places are allocated according to preferences and suitability for the topics. In particular, previous knowledge in the field of experimental economics plays a role.

The course will be offered starting in the summer semester 2021.
### 7.230 Course: Knowledge Discovery [T-WIWI-102666]

**Responsible:** Dr.-Ing. Michael Färber  
**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

<table>
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<th>Version</th>
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<td>Each winter term</td>
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**Events**

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<th>Grading scale</th>
<th>Recurrence</th>
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<td>2 SWS</td>
<td>Lecture / 🗣️</td>
<td>Färber</td>
<td></td>
</tr>
<tr>
<td>WT 22/23 2511303</td>
<td>Exercises to Knowledge Discovery</td>
<td>1 SWS</td>
<td>Practice / 🗣️</td>
<td>Färber, Saier, Shao, Popovic</td>
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**Exams**

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<thead>
<tr>
<th>Events</th>
<th>Type</th>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Färber</td>
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<td>Knowledge Discovery</td>
<td></td>
<td></td>
<td>Färber</td>
<td></td>
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</table>

**Competence Certificate**

The assessment is a written exam (60 minutes).

1. Successful participation in the exercises can earn a grade bonus in two ways:  
   - By handing in the answers to an exercise sheet and reaching or exceeding 80% correct answers.  
   - By handing in the results of an implementation task related to machine learning, which reaches or exceeds a given evaluation value.

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).

**Prerequisites**

None

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*Below you will find excerpts from events related to this course:*

**Knowledge Discovery**

2511302, WS 22/23, 2 SWS, Language: English, [Open in study portal](#)
Content
The lecture gives an overview of approaches of machine learning and data mining for knowledge acquisition from large data sets. These are examined especially with respect to algorithms, applicability to different data representations and the use in real application scenarios. Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive. The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught. Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:
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 preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

Literature
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

Exercises to Knowledge Discovery
2511303, WS 22/23, 1 SWS, Language: English, Open in study portal

Content
The exercises are based on the lecture Knowledge Discovery. Several exercises are covered, which take up and discuss in detail the topics covered in the lecture Knowledge Discovery. Practical examples are demonstrated to the students to enable a knowledge transfer of the theoretical aspects learned into practical application. Contents of the lecture cover the entire machine learning and data mining process with topics on monitored and unsupervised learning processes and empirical evaluation. The learning methods covered range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:
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.

Literature
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley
7 COURSES

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Completed coursework</th>
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<th>Recurrence</th>
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**Events**

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<tr>
<td>ST 22</td>
<td>2183640</td>
<td>Laboratory &quot;Laser Materials Processing&quot;</td>
<td>3</td>
<td>Practical</td>
<td>On-Site/Online</td>
<td>Schneider, Pfleging</td>
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<tr>
<td>WT 22/23</td>
<td>2183640</td>
<td>Laboratory &quot;Laser Materials Processing&quot;</td>
<td>3</td>
<td>Practical</td>
<td>On-Site/Online</td>
<td>Schneider, Pfleging</td>
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**Exams**

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<tr>
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<td>ST 22</td>
<td>76-T-MACH-102154</td>
<td>Laboratory Laser Materials Processing</td>
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<td>Schneider</td>
</tr>
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</table>

**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.

Below you will find excerpts from events related to this course:

**Laboratory "Laser Materials Processing"**
2183640, SS 2022, 3 SWS, Language: German, Open in study portal
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 2022 sind bereits ausgebucht!
Anmeldung per Email an johannes.schneider@kit.edu
Das Praktikum findet semesterbegleitend in Kleingruppen am IAM-CMS (CS) bzw. IAM-AWP (CN) statt!
Die Termine werden zu Beginn des Semesters bekannt gegeben.

Literature
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
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
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- 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.

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 12 Teilnehmer/innen!
Aktuell sind nur noch wenige Plätze zu vergeben! Registrierung möglich per Email an johannes.schneider@kit.edu
Praktikum findet in Kleingruppen semesterbegleitend (dienstags bzw. mittwochs, ganztägig) bzw. als Blockpraktikum 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
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
**Course: Laboratory Production Metrology [T-MACH-108878]**

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

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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<table>
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**Events**

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<th>2150550</th>
<th>Laboratory Production Metrology</th>
<th>3 SWS</th>
<th>Practical course / 🗣</th>
<th>Lanza, Stamer</th>
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</table>

**Exams**

<table>
<thead>
<tr>
<th>ST 2022</th>
<th>76-T-MACH-108878</th>
<th>Laboratory Production Metrology</th>
<th>Lanza, Häfner</th>
</tr>
</thead>
</table>

**Competence Certificate**

Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments.

Oral Exam (15 min)

**Prerequisites**

none

**Annotation**

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).

---

**Below you will find excerpts from events related to this course:**

**Laboratory Production Metrology**  
2150550, SS 2022, 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
- Coordinate 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 assess 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
Die Lehrveranstaltung findet stets dienstags nachmittags statt.
The course always takes place on Tuesdays in the afternoon.

For organizational reasons the number of participants for the course is limited. Hence an selection process will take place. Applications are made via the homepage of wbk (http://www.wbk.kit.edu/studium-und-lehre.php).

Literature

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/). Additional reference to literature will be provided, as well.
### 7.233 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

<table>
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<th>Version</th>
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### Events

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<th>Recurrence</th>
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<td>Large-Scale Optimization</td>
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<td>Rebennack</td>
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<td>ST 2022</td>
<td>Übung zu Large-Scale Optimization</td>
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<td>Rebennack, Sinske</td>
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<td>ST 2022</td>
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<td>2 SWS</td>
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<td>Rebennack, Sinske</td>
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### Exams

<table>
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<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>ST 2022</td>
<td>Large-scale Optimization</td>
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<td>Rebennack</td>
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</table>

**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.
### 7.234 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

<table>
<thead>
<tr>
<th>Type</th>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Grade to a third</td>
<td>Each summer term</td>
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#### Events

| ST 2022 | 2182642 | Laser in automotive engineering | 2 SWS | Lecture / 🗣 | Schneider |

| Exams   | ST 2022 | 76-T-MACH-105164 | Laser in Automotive Engineering | Schneider |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**  
oral examination (30 min)

**Prerequisites**  
It is not possible, to combine this brick with brick Physical Basics of Laser Technology [T-MACH-109084] and brick Physical Basics of Laser Technology [T-MACH-102102]

**Recommendation**  
preliminary knowledge in mathematics, physics and materials science

*Below you will find excerpts from events related to this course:*

<table>
<thead>
<tr>
<th>V Laser in automotive engineering</th>
<th>Lecture (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2182642, SS 2022, 2 SWS, Language: German, Open in study portal</td>
<td>On-Site</td>
</tr>
</tbody>
</table>

Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022
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 automotive engineering
- economical aspects
- safety 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

Literature
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
## 7.235 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

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### Events

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<th>Recurrence</th>
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<td>Lecture / 🧩</td>
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<td>Grade to a third</td>
<td>Each winter term</td>
<td>Eichhorn</td>
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<td>Eichhorn</td>
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**Legend:** 📱 Online, 🧩 Blended (On-Site/Online), 🗂 On-Site, ✗ Cancelled

### Prerequisites

none
### 7.236 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

<table>
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<th>Version</th>
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<td>2 SWS</td>
<td>Lecture / 🗣️ Hönig</td>
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**Verkehrs-, Planungs- und Wegerecht** 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
7.237 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

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**Events**

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<td>Haghsheno</td>
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<td>Lean Construction</td>
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**Competence Certificate**

written exam, 70 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
### 7.238 Course: Learning Factory “Global Production” [T-MACH-105783]

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

#### Part of:
- M-MACH-101284 - Specialization in Production Engineering  
- M-MACH-105455 - Strategic Design of Modern Production Systems

<table>
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<tr>
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<th>Version</th>
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#### Events

| WT 22/23 | 2149612 | Learning Factory “Global Production” | 4 SWS | / 🧩 | Lanza |

#### Exams

| WT 22/23 | 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

Below you will find excerpts from events related to this course:
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 adoption 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 attendance: ~ 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:**

**Media:**
E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
T 7.239 Course: Liberalised Power Markets [T-WIWI-107043]

**Responsible:** Prof. Dr. Wolf Fichtner

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-102808 - Digital Service Systems in Industry

<table>
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**Events**

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**Exams**

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 Liberalised Power Markets
2581998, WS 22/23, 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:
### 7.240 Course: Life Cycle Assessment and Global Forecasts [T-WIWI-112155]

**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

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<td>Lecture / 🗣️</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, X 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. 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:

**Life Cycle Assessment and Global Forecasts**

2581995, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Content**

The lecture will focus on the analysis of environmental impacts of products using life cycle assessment (short: LCA). Structure and individual steps of life cycle assessment will be taught in detail and further developments will be pointed out. Forecasts of global developments using means of integrated assessment modelling and system dynamics will be addressed to put potential environmental impacts into global perspective.

Topics:

- Attributional LCA
- Life cycle sustainability assessment, social LCA and life cycle costing
- Consequential LCA
- Dynamic LCA
- System dynamics
- Integrated assessment modelling in the context of climate change

**Literature**

werden in der Veranstaltung bekannt gegeben
7.241 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

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**Exams**

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**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

**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.

Below you will find excerpts from events related to this course:

**Logistics and Supply Chain Management**

2118078, SS 2022, 4 SWS, Language: English, Open in study portal

**Lecture (V)**

Blended (On-Site/Online)

**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 (also in times during and after Corona) requires working in an international environment and therefore many terms are derived from English, the lecture will be held in English.
### 7.242 Course: Long-Distance and Air Traffic [T-BGU-106301]

**Responsible:** Dr.-Ing. Bastian Chlond  
**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

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**Exam:**

- **ST 2022 8245106301 Long-distance and Air Traffic**  
  - Chlond  

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

- Written exam, 60 min.

**Prerequisites**

- None

**Recommendation**

- None

**Annotation**

- None
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

**Events**

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<td>Each winter term</td>
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**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.

Below you will find excerpts from events related to this course:

### Machine Learning 1 - Fundamental Methods

V  
2511500, WS 22/23, 2 SWS, Language: German, Open in study portal

**Content**

The field of knowledge acquisition and machine learning is a rapidly expanding field of knowledge and the subject of numerous research and development projects. The acquisition of knowledge can take place in different ways. Thus a system can benefit from experiences already made, it can be trained, or it draws conclusions from extensive background knowledge.

The lecture covers symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as sub-symbolic techniques such as neural networks, support vector machines and genetic algorithms. The lecture introduces the basic principles and structures of learning systems and examines the algorithms developed so far. The structure and operation of learning systems is presented and explained with some examples, especially from the fields of robotics and image processing.

**Learning objectives:**

- 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

- 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.
### 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

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#### Events

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#### Exams

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**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.

Below you will find excerpts from events related to this course:

#### Machine Learning 2 - Advanced methods

2511502, SS 2022, 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 advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning), pulsed networks, hierarchical approaches, e.g. As well as dynamic, probabilistic relational methods. 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 (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

- 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.
7.245 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

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**Exams**

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**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.

Below you will find excerpts from events related to this course:

**V** Machine Tools and High-Precision Manufacturing Systems

2149910, WS 22/23, 6 SWS, Language: German, Open in study portal

**Lecture / Practice (VÜ)**

Blended (On-Site/Online)
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
Start: 24.10.2022
Lectures on Mondays and Wednesdays, tutorial on Thursdays.
The tutorial dates will announced in the first lecture.

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/).
### 7.246 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

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**Exams**

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<td>ST 2022</td>
<td>Management Accounting 1 (Mastervorzug und Master)</td>
<td>Wouters</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered either as a 120-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

**Annotation**

Students in the Bachelor's program can only take the related tutorial and examination. Students in the Master's program (and Bachelor's students who are already completing examinations for their Master's program) can only take the related tutorial and examination.

### Below you will find excerpts from events related to this course:

**Management Accounting 1**

2579900, SS 2022, 2 SWS, Language: English, [Open in study portal](#)
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
- In addition, several papers that will be available on ILIAS.
7.247 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

<table>
<thead>
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**Events**

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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 22/23</td>
<td>Management Accounting 2</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
<td>Wouters, Dickemann</td>
<td></td>
</tr>
<tr>
<td>WT 22/23</td>
<td>Tutorial Management Accounting 2 (Bachelor)</td>
<td>2 SWS</td>
<td>Practice / On-Site</td>
<td>Wouters</td>
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<tr>
<td>WT 22/23</td>
<td>Tutorial Management Accounting 2 (Master)</td>
<td>2 SWS</td>
<td>Practice / On-Site</td>
<td>Wouters</td>
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**Exams**

<table>
<thead>
<tr>
<th>Exams</th>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
<td>ST 2022</td>
<td>Management Accounting 2 (Bachelor)</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
<td>Wouters</td>
<td></td>
</tr>
<tr>
<td>ST 2022</td>
<td>Management Accounting 2 (Mastervorzug und Master)</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
<td>Wouters</td>
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</table>

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered either as a 120-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**

It is recommended to take part in the course "Management Accounting 1" before this course.

**Annotation**

Students in the Bachelor's program can only take the related tutorial and examination. Students in the Master's program (and Bachelor's students who are already completing examinations for their Master's program) can only take the related tutorial and examination.

**Below you will find excerpts from events related to this course:**

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
<td>Management Accounting 2</td>
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</table>

**Events**

- **WT 22/23:** 2579903, Management Accounting 2, 2 SWS, Language: English, Open in study portal
- **WT 22/23:** 2579904, Tutorial Management Accounting 2 (Bachelor), 2 SWS, Practice / On-Site
- **WT 22/23:** 2579905, Tutorial Management Accounting 2 (Master), 2 SWS, Practice / On-Site

**Exams**

- **ST 2022:** 79-2579903-B, Management Accounting 2 (Bachelor), Wouters
- **ST 2022:** 79-2579903-M, Management Accounting 2 (Mastervorzug und Master), Wouters

Students in the Bachelor’s program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.
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
- Zusätzlich werden Artikel auf ILIAS zur Vergügung gestellt.

Tutorial Management Accounting 2 (Bachelor)
2579904, WS 22/23, 2 SWS, Language: English, Open in study portal

Tutorial Management Accounting 2 (Master)
2579905, WS 22/23, 2 SWS, Language: English, Open in study portal
### 7.248 Course: Management of IT-Projects [T-WIWI-102667]

**Responsible:** Dr. Roland Schätzle  
**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

<table>
<thead>
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<td>Each summer term</td>
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#### Events

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<thead>
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<th>ST 2022</th>
<th>2511214</th>
<th>Management of IT-Projects</th>
<th>2 SWS</th>
<th>Lecture / On-Site</th>
<th>Schätzle</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>ST 2022</td>
<td>2511215</td>
<td>Übungen zu Management von Informatik-Projekten</td>
<td>1 SWS</td>
<td>Practice / On-Site</td>
<td>Schätzle</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Exam</th>
<th>ST 2022</th>
<th>79AIFB_MvIP_A1</th>
<th>Management of IT-Projects (Registration until 18 July 2022)</th>
<th>Oberweis</th>
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<tbody>
<tr>
<td></td>
<td>WT 22/23</td>
<td>79AIFB_MvIP_C3</td>
<td>Management of IT-Projects</td>
<td>Oberweis</td>
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</table>

**Legend:** 🏷 Online, 🔄 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

**Competence Certificate**

The assessment takes place in the form of a written examination (exam) in the amount of 60 minutes. The examination is offered every semester and can be repeated at any regular examination date.

**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.

**Below you will find excerpts from events related to this course:**

<table>
<thead>
<tr>
<th>Event</th>
<th>Management of IT-Projects</th>
<th>ST 2022 2511214, SS 2022, 2 SWS, Language: German, Open in study portal</th>
<th>Lecture (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>On-Site</td>
<td></td>
</tr>
</tbody>
</table>
Content
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 infrastructure
- 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 appropriate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:

Knowledge from the lecture 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

Übungen zu Management von Informatik-Projekten
2511215, SS 2022, 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. The lecture is accompanied by exercises in the form of tutorials. The date of the exercise will be announced later.
Course: Managing New Technologies [T-WIWI-102612]

**Responsible:** Dr. Thomas Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101488 - Entrepreneurship (EnTechon)

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Grade to a third</td>
<td>Each summer term</td>
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</tbody>
</table>

**Events**

| ST 2022 | 2545003 | Managing New Technologies | 2 SWS | Lecture / 🗣 | Reiß |

**Exams**

| ST 2022 | 7900169 | Managing New Technologies | Reiß |

**Competence Certificate**
Written exam 100% following §4, Abs. 2.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The credit points for T-WIWI-102612 “Management of New Technologies” were reduced to 3 credit points in the 2019 summer semester.

*Below you will find excerpts from events related to this course:*

**Managing New Technologies**
2545003, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Literature**
- Hausschildt/Salomo: Innovationsmanagement; Borchert et al.: Innovations- und Technologiemanagement;  
- Specht/Mühle: Gabler Lexikon Technologiemanagement

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.
7.250 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

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 22/23</td>
<td>9</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>3</td>
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<tr>
<td>2149657</td>
<td></td>
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<td>Schulze</td>
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</table>

**Exams**

<table>
<thead>
<tr>
<th>Exams</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
</tr>
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<tbody>
<tr>
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<td>Schulze</td>
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<tr>
<td>WT 22/23</td>
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<td>76-T-MACH-102105</td>
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<td>Schulze</td>
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</tbody>
</table>

**Competence Certificate**

Written Exam (180 min)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Manufacturing Technology**

2149657, WS 22/23, 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 lecture 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
Start: 24.10.2022

Vorlesungstermine montags und dienstags, Übungstermine mittwochs. Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Literature
Medien:
Skrift zur Veranstaltung wird über ilias (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
**Course: Market Engineering: Information in Institutions [T-WIWI-102640]**

**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:** Written examination  
**Credits:** 4.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

### Events

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<tr>
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<th>Code</th>
<th>Type</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
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<td>2 SWS</td>
<td>Online</td>
<td>Fegert, Weinhardt</td>
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<td>ST 2022</td>
<td>2540461</td>
<td>Practice</td>
<td>1 SWS</td>
<td>Blended (On-Site/Online)</td>
<td>Jachimowicz, Stein, Bezzaoui, Fegert</td>
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### Exams

<table>
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<tr>
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<th>Code</th>
<th>Type</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
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<td>7979235</td>
<td>Lecture</td>
<td>Online</td>
<td>Weinhardt</td>
<td></td>
</tr>
</tbody>
</table>

**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:**

**Market Engineering: Information in Institutions**  
2540460, SS 2022, 2 SWS, Language: English, [Open in study portal](#)  

**Literature**

### 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

<table>
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<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
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<td>Each summer term</td>
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**Events**

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<th>2571150</th>
<th>Market Research</th>
<th>2 SWS</th>
<th>Lecture / 🗣</th>
<th>Klarmann</th>
</tr>
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<tr>
<td>ST 2022</td>
<td>2571151</td>
<td>Market Research Tutorial</td>
<td>1 SWS</td>
<td>Practice / 🗣</td>
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**Exams**

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<tr>
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<th>Market Research</th>
<th>Klarmann</th>
</tr>
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<tbody>
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<td>Market Research</td>
<td>Klarmann</td>
</tr>
</tbody>
</table>

Legend: 🖥 Online, 🎯 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

The assessment of success takes place through a written exam with additional aids in the sense of an open book exam. The written exam will either take place in the lecture hall or online, depending on further pandemic developments. 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:

#### Market Research

2571150, SS 2022, 2 SWS, Language: English, Open in study portal

Lecture (V)  
On-Site
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
## 7.253 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

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>Examination of another type</td>
<td>4,5</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>5</td>
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### Events

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<th>Credits</th>
<th>Recurrence</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>WT 22/23</td>
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<td>Marketing Analytics</td>
<td>2 SWS</td>
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<td>Klarmann</td>
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<td>WT 22/23</td>
<td>2572171</td>
<td>Lecture / ⬆️</td>
<td></td>
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</tbody>
</table>

### 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:

**Marketing Analytics**

2572170, WS 22/23, 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, structural equation 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

- 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.

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
7.254 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
- M-WIWI-105312 - Marketing and Sales Management

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<td>Grade to a third</td>
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**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.
### 7.255 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

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<td>Grade to a third</td>
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**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
### 7.256 Course: Material Flow in Logistic Systems [T-MACH-102151]

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

**Part of:**  
M-MACH-101277 - Material Flow in Logistic Systems

<table>
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<td>Each winter term</td>
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**Exams**

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<td>Material Flow in Logistic Systems</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>3</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade):
  - 40% assessment of the result of the case studies as group work,
  - 20% assessment of the oral examination during the case study colloquiums as individual performance.

A detailed description of the learning control can be found under Annotations.

**Prerequisites**
none

**Recommendation**
Recommended elective subject: Probability Theory and Statistics

**Annotation**
Students are divided into groups for this course. Five case studies are carried out in these groups. The results of the group work during the lecture period are presented and evaluated in writing. In the oral examination during the case study colloquiums, the understanding of the result of the group work and the models dealt with in the course is tested. The participation in the oral defenses is compulsory and will be controlled. For the written submission the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

Below you will find excerpts from events related to this course:
Content

Learning Content:

- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehousing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

After successful completion of the course, you are able (alone and in a team) to:

- Accurately describe a material handling system in a conversation with an expert.
- Model and parameterize the system load and the typical design elements of a material handling system.
- Design a material handling system for a task.
- Assess the performance of a material handling system in terms of the requirements.
- Change the main lever for influencing the performance.
- Expand the boundaries of today's methods and system components conceptually if necessary.

Literature:
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin-Heidelberg, 7. Auflage 2019

Description:
This course is separated into 5 topic blocks which are structured in the following parts:
- self-study phase
- exercise
- plenary
- case study (group work)
- colloquium
- review of case study

The groups for the case study will be formed at the beginning of the course (first week). The results of the group work during the lecture period are presented and evaluated in writing. During the colloquiums, the result of the case study is presented and the understanding of the group work and the models dealt with in the course are tested in an oral defense. The participation in the colloquiums is compulsory and will be controlled. For the written submission and the presentation the group receives a common grade, in the oral defense each group member is evaluated individually.

After the lecture period, there is the final case study. This case study contains the curriculum of the whole semester. The students work individually on this case study which takes place at a predefined place and time (duration: 4h).

We strongly recommend to attend the introductory session on 26th of October 2022. In this session, the teaching concept of "Materialfluss in Logistiksysteme" is explained and outstanding issues are clarified.

The course registration including the group allocation with ILIAS is mandatory. The registration will be open for several days after the introductory session (registration duration: 26.10.2022 14:00 Uhr - 01.11.2022 14:00 Uhr)

Workload:

- Regular attendance: 35 h
- Self-study: 135 h
- Group work: 100 h

Competence Certificate:
The assessment (Prüfungsleistung anderer Art) consists of the following assignments:

- 40% assessment of the final case study as individual performance,
- 60% semester evaluation which includes working on 5 case studies and defending those (For both assessment types, the best 4 of 5 tries count for the final grade.):
  - 40% assessment of the result and the presentation of the case studies as group work,
  - 20% assessment of the oral examination during the colloquiums as individual performance.
**7.257 Course: Mathematical Models and Methods for Production Systems [T-MACH-105189]**

**Responsible:** Dr.-Ing. Marion Baumann  
Proff. Dr.-Ing. Kai Furmans

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101278 - Material Flow in Networked Logistic Systems

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<th>Recurrence</th>
<th>Version</th>
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**Events**

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<th>Type</th>
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<td>Lecture</td>
<td>Baumann, Furmans</td>
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**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

*Below you will find excerpts from events related to this course:*

**Mathematical models and methods for Production Systems**

**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 queueing systems

**Learning Goals:**

Students are able to:

- Describe queueing systems with analytical solvable stochastic models,
- Derive approaches for modeling and controlling material flow and production systems based on models of queueing theory,
- Use simulation and exact methods.

**Recommendations:**

- Basic knowledge of statistic
- recommended compulsory optional subject: Stochastics
- recommended lecture: Materials flow in logistic systems (also parallel)

**Workload:**

regular attendance: 42 hours
self-study: 198 hours
Literature
7.258 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

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Competence Certificate
The assessment consists of an oral exam (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.
**7.259 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

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**Events**

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<td>1 SWS</td>
<td>Practice / 🗣</td>
<td>Horn, Saravia, und Mitarbeiter</td>
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**Exams**

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**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.
7.260 Course: Metal Forming [T-MACH-105177]

**Responsible:** Dr.-Ing. Thomas Herlan  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering

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<td>Metal Forming</td>
<td>2 SWS</td>
<td>Lecture / 🧩</td>
<td>Herlan</td>
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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), ⬆ On-Site, ✗ Cancelled

**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**
none

Below you will find excerpts from events related to this course:

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<th>Event</th>
<th>Code</th>
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<th>Recurrence</th>
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<td>Lecture (V)</td>
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</table>
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.

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/)
### 7.261 Course: Methods and Models in Transportation Planning [T-BGU-101797]

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<tr>
<th>Responsible</th>
<th>Prof. Dr.-Ing. Peter Vortisch</th>
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<tr>
<td>Organisation</td>
<td>KIT Department of Civil Engineering, Geo and Environmental Sciences</td>
</tr>
<tr>
<td>Part of</td>
<td>M-BGU-101065 - Transportation Modelling and Traffic Management</td>
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#### Type
- Oral examination

#### Credits
- 3

#### Grading scale
- Grade to a third

#### Recurrence
- Each winter term

#### Version
- 1

| Events | Credits | Grading scale | Recurrence | Credits
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<td>2 SWS</td>
<td>Lecture / Practice ( / ) Vortisch, Mitarbeiter/innen</td>
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#### Prerequisites
- None

#### Recommendation
- None

#### Annotation
- None

---

Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022  
537
7.262 Course: Methods in Economic Dynamics [T-WIWI-102906]

**Responsible:** Prof. Dr. Ingrid Ott

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101514 - Innovation Economics

<table>
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**Events**

| ST 2022 | 2560240 | Methods in Economic Dynamics | 1 SWS | Lecture / 🗣 | Ott |

**Exams**

| ST 2022 | 7900108 | Methods in Economic Dynamics | Ott |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**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 quantitative-mathematical methods.

**Below you will find excerpts from events related to this course:**

**Methods in Economic Dynamics**

2560240, SS 2022, 1 SWS, Language: German/English, Open in study portal

**Lecture (V)**

On-Site

**Content**

The economic exploitation of inventions is an important part of innovation economics. Intellectual property rights such as patents or trademarks play a central role. Within this workshop, the recording, processing and analysis of such intellectual property rights will be deepened, e.g. considering specific technologies. Students will learn how to work with relational databases, the econometric evaluation of recorded data, and methods for visualising them.

**Learning objectives:**

The student

- learns to query data sources.
- is able to analyse data with statistical methods.
- visualises and interprets data evaluations (e.g. using dashboards or methods of network analysis).

**Recommendations:**

An interest in working with data, basic knowledge on databases as well as basic knowledge in economics and statistics are advantageous.

**Workload:**

The total workload for this course is approximately 45 hours.

- Classes: ca. 5 h
- Self-study: ca. 40 h

**Assessment:**

Non exam assessment according to § 4 paragraph 3 of the examination regulation (SPO 2015).
Organizational issues
The course is structured along two assignments, the first of which is an individual assignment, whereas the second assignment is a group project. Assignment 1 will be completed within one month’s time, whereas assignment 2 will take place on the 23. May 2022.

Literature
Relevante Literatur wird in der Vorlesung bekanntgegeben.
(Relevant literature will be announced in the lecture.)
7.263 Course: Methods in Innovation Management [T-WIWI-110263]

**Responsible:** Dr. Daniel Jeffrey Koch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

<table>
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**Events**

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<td>Methoden im Innovationsmanagement</td>
<td>2 SWS</td>
<td>Seminar / Koch</td>
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**Exams**

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<th>Type</th>
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<td>Methods in Innovation Management</td>
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</table>

**Weisenberger-Eibl**

**Competence Certificate**

Alternative exam assessments (§4(2), 3 SPO). The final grade is composed 75% of the grade of the written paper and 25% of the grade of the presentation.

**Prerequisites**

None.

**Recommendation**

Prior attendance of the course "Innovation Management: Concepts, Strategies and Methods" is recommended.

*Below you will find excerpts from events related to this course:*

**Methoden im Innovationsmanagement**

2545107, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Content**

The seminar “Methods in Innovation Management” aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

**Literature**

Werden in der ersten Veranstaltung bekannt gegeben.
7.264 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

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<td>Microactuators</td>
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**Exams**

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**Competence Certificate**  
written exam, 60 min.

**Prerequisites**  
none

**Below you will find excerpts from events related to this course:**

**Microactuators**  
2142881, SS 2022, 2 SWS, Language: German, Open in study portal  
Lecture (V)  
Blended (On-Site/Online)

**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:

- Microelectromechanical 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"  
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004  
7.265 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

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### Exams

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**Legend:** 🖥 Online, ☑️ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

None
Course: Mixed Integer Programming I [T-WIWI-102719]

7.266 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

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**Exams**

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**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 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).

**Below you will find excerpts from events related to this course:**

**Mixed-integer Programming II**
2550140, SS 2022, 2 SWS, Language: German, Open in study portal
Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as with discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, portfolio optimization with limitations on the number of securities, the choice of locations to serve customers at minimum cost, and the optimal design of vote allocations in election procedures. For the algorithmic identification of optimal points of such problems an interaction of ideas from discrete as well as continuous optimization is necessary.

The lecture focusses on mixed-integer nonlinear optimization problems and is structured as follows:

- Continuous relaxation and error bounds for roundings
- Branch-and-Bound for convex and nonconvex problems
- Generalized Benders decomposition
- Outer approximation methods
- Lagrange relaxation
- Dantzig-Wolfe decomposition
- Heuristics

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 mixed-integer linear optimization problems forms the contents of the lecture "Mixed-integer Programming I".

Learning objectives:
The student

- knows and understands the fundamentals of nonlinear mixed integer programming,
- is able to choose, design and apply modern techniques of nonlinear mixed integer programming in practice.

Literature

- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
# 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

<table>
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**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).

Below you will find excerpts from events related to this course:

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</table>

**Legend:**  
- 🗜️ Online  
- 🧩 Blended (On-Site/Online)  
- 🔴 On-Site  
- ✗ Canceled
Content

Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as with discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, portfolio optimization with limitations on the number of securities, the choice of locations to serve customers at minimum cost, and the optimal design of vote allocations in election procedures. For the algorithmic identification of optimal points of such problems an interaction of ideas from discrete as well as continuous optimization is necessary.

The lecture focusses on mixed-integer nonlinear optimization problems and is structured as follows:

- Continuous relaxation and error bounds for roundings
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- Generalized Benders decomposition
- Outer approximation methods
- Lagrange relaxation
- Dantzig-Wolfe decomposition
- Heuristics

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 mixed-integer linear optimization problems forms the contents of the lecture "Mixed-integer Programming I".

Learning objectives:

The student

- knows and understands the fundamentals of nonlinear mixed integer programming,
- is able to choose, design and apply modern techniques of nonlinear mixed integer programming in practice.

Literature

- J. Kallrath: Gemisch-t-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
7.268 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

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**Exams**

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**Competition Certificate**
The assessment consists of an oral exam (45 min) taking place in the recess period. The exam takes place in every semester. Retake 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**
After completion of the course the students have knowledge of:

- a wide range of mobile machines
- operation modes and working cycles of important mobile machines
- selected subsystems and components

**Content:**

- Introduction of the required components and machines
- Basics and structure of mobile machines
- Practical insight in the development techniques

Below you will find excerpts from events related to this course:

**Mobile Machines**

<table>
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<td>2114073, SS 2022, 4 SWS, Language: German, Open in study portal</td>
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</table>

**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
### 7.269 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

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| Events |  |  |  |
|--------|  |  |  |
| ST 2022 | 6232811 | Mobilitätsservices und neue Formen der Mobilität | 2 SWS Lecture / Practice ( / | Kagerbauer |

| Exams |  |  |  |
|-------|  |  |  |
| ST 2022 | 8240103425 | Mobility Services and new Forms of Mobility | Kagerbauer |

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None

---

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
7.270 Course: Modeling and Analyzing Consumer Behavior with R [T-WIWI-102899]

**Responsible:** Dr. Verena Dorner  
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101448 - Service Management  
M-WIWI-101506 - Service Analytics  
M-WIWI-103118 - Data Science: Data-Driven User Modeling

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**Exams**

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**Legend:** 🖥 Online, ⛔ Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

**Competence Certificate**

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). As of the summer semester 2022, a bonus for the examination can no longer be achieved. For students who have achieved the bonus in the summer semester 2021, it will be taken into account for the main exam in the summer semester 2022 and the post-exam in the winter semester 2022/23.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Number of participants limited.

Below you will find excerpts from events related to this course:

**Modeling and Analyzing Consumer Behavior with R**

2540470, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Literature**

Wickham, Hadley, ggplot2: Elegant Graphics for Data Analysis (Use R!), Springer 2009 (2nd edition)
### 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:
Written examination

#### Credits:
4.5

#### Grading scale:
Grade to a third

#### Recurrence:
Each winter term

#### Version:
4

### 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 capacity restrictions, registration before course start is required. For further information see the webpage of the course. The lecture is held in every 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:

#### Modellieren und OR-Software: Fortgeschrittene Themen

2550490, WS 22/23, 3 SWS, Language: German, Open in study portal

#### Organizational issues

Link zur Bewerbung:
http://go.wiwi-kit.edu/OR_Bewerbung

Bewerberzeitraum:
01.09.2022 00:00 - 09.10.2022 23:55

### 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 programming languages are OPL and ILOG Script.
7.272 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

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**Exams**

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**Competence Certificate**

See German version.

**Prerequisites**

None
7.273 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
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
see Annotations

Version
1

Exams
WT 22/23  7900009_WS2223_HK Multicriteria Optimization Stein

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
7.274 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

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**Events**

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**Exams**

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**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).

The exam is offered every semester. Re-examinations are offered only for repeaters.

**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.

**Below you will find excerpts from events related to this course:**

**Multivariate Verfahren**
2550554, SS 2022, 2 SWS, [Open in study portal](#)

**Literature**
Skript zur Vorlesung
### Course: Nanotechnology for Engineers and Natural Scientists [T-MACH-105180]

**Responsible:** Prof. Dr. Martin Dienwiebel  
apl. Prof. Dr. Hendrik Hölscher  
Stefan Walheim

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101294 - Nanotechnology

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**Exams**

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<td>An introduction into Nanotechnology</td>
<td>Hölscher</td>
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<td>76-T-MACH-105180</td>
<td>Introduction into Nanotechnology</td>
<td>Hölscher, Dienwiebel</td>
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</table>

**Competence Certificate**

written exam 90 min

**Prerequisites**

none
T 7.276 Course: Nanotechnology with Clusterbeams [T-MACH-102080]

**Responsible:** Dr. Jürgen Gspann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101287 - Microsystem Technology
- M-MACH-101294 - Nanotechnology

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**Competence Certificate**
- written examination
- presence in more than 70% of the lectures
- Duration: 1 h

**aids:** none

**Prerequisites**
- none
7.277 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

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**Legend:** 🖥 Online,🧩 Blended (On-Site/Online),🗣 On-Site, ❌ Cancelled

**Competence Certificate**
oral exam, about 25 min

**Prerequisites**
one

**Recommendation**
preliminary knowledge in mathematics and physics

Below you will find excerpts from events related to this course:

**V Nanotribology and -Mechanics**
2182712, SS 2022, 2 SWS, Language: German, [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 knowledge 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!
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

Nanotribology and -Mechanics
2182712, WS 22/23, 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
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preliminary knowledge 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
Anmeldung per Email bis zum 07.10.2022 an den Dozenten: martin.dienwiebel@kit.edu

Literature
Tafelbilder, Folien, Kopien von Artikeln
Course: Nature-Inspired Optimization Methods [T-WIWI-102679]

**Responsible:** apl. 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

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**Type**
Written examination

**Credits**
4.5

**Grading scale**
Grade to a third

**Recurrence**
Each summer term

**Version**
2

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**Events**

| ST 2022 | 2511106 | Nature-Inspired Optimization Methods | 2 SWS | Lecture / Blended (On-Site/Online) | Shukla |
| ST 2022 | 2511107 | Übungen zu Nature-Inspired Optimization Methods | 1 SWS | Practice / Blended (On-Site/Online) | Shukla |

**Exams**

| ST 2022 | 79AIFB_NOM_C1 | Nature-Inspired Optimization Methods (Registration until 18 July 2022) | Shukla |
| WT 22/23 | 79AIFB_NOM_B6 | Nature-Inspired Optimization Methods | Shukla |

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**Competence Certificate**

The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called “bonus exam”, 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exercises. The bonus exam may be split into several shorter written tests.

The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**
None

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Below you will find excerpts from events related to this course:

**Nature-Inspired Optimization Methods**

2511106, SS 2022, 2 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**
Blended (On-Site/Online)

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**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
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

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Events

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<td>Non- and Semiparametrics</td>
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</table>

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

Below you will find excerpts from events related to this course:

Non- and Semiparametrics
2521300, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content
Learning objectives:
The student
- has profound knowledge of non- and semiparametric estimation methods
- is capable of implementing these methods using statistical software and using them to assess empirical problems

Content:
Kernel density estimation, local constant and local linear regression, bandwidth choice, series and sieve estimators, additive models, semiparametric models

Requirements:
It is recommended to attend the course Applied Econometrics 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
7.280 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

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Prerequisites**
none
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

### Events

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### Exams

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**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:

### Nonlinear Optimization I

2550111, WS 22/23, 2 SWS, Language: German, Open in study portal

**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 conditions
- 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

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
7.282 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

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**Exams**

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**Competence Certificate**
The assessment consists 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:**

**Nonlinear Optimization I**

<table>
<thead>
<tr>
<th>Event</th>
<th>Credits</th>
<th>Type</th>
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<td>Lecture</td>
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**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 conditions
- 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.
Nonlinear Optimization II
2550113, WS 22/23, 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


Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
### 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 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:

#### Nonlinear Optimization II

**2550113, WS 22/23, 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

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
### 7.284 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 |

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#### Exams

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**Legend:** 🛳️ Online, 🛳️ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

written exam, 60 minutes

**Prerequisites**

none

Below you will find excerpts from events related to this course:

### Novel actuators and sensors

2141865, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

Blended (On-Site/Online)

**Literature**

- Vorlesungsskript "Neue Aktoren" und Folienskript "Sensoren"
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
7.285 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

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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, C Cancelled

Competence Certificate
Alternative exam assessment according (interim presentation and final presentation in teams).

Annotation
Please note that only one of the 1.5 ECTS courses can be counted within the module. This course has a restriction on attendance. The Marketing and Sales Research Group typically allows all students to attend a 1.5 credit course in the corresponding module. Under no circumstances can a guarantee be made that a particular course will be attended. An application is required to attend this course. 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.

Below you will find excerpts from events related to this course:

Online concepts for Karlsruhe city retailers
2571184, SS 2022, 1 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 1.5 credit points: approx. 45.0 hours
Attendance time: 8 hours
Preparation and wrap-up of the course: 29.5 hours
Exam and exam preparation: 7.5 hours
### 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

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**Events**

| WT 22/23 | 6241905 | Erdbau | 1 SWS Lecture / 🗣 | Haghsheno, Schwarzweller |

**Exams**

| ST 2022 | 8240101801 | Operation Methods for Earthmoving | Schneider |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.287 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:** Oral examination  
**Credits:** 1.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
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

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<td>Übungen zu OR im Health Care Management</td>
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Legend: Online, Blended (On-Site/Online), 🗣 On-Site, X 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" 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:

Operations Research in Health Care Management
2550495, WS 22/23, 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
### 7.289 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

<table>
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<td>Grade to a third</td>
<td>Irregular</td>
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**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 SCMs 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 7.290 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

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<th>Lecture /</th>
<th>Freude</th>
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<td>2 SWS</td>
<td>Practice /</td>
<td>Freude, N.N.</td>
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Exams

| ST 2022 | 7309460 | Optical Transmitters and Receivers | Freude |

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Prerequisites

none
### 7.291 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

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#### Exams

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</table>

**Prerequisites**

none
### 7.292 Course: Optimization Models and Applications [T-WIWI-110162]

**Responsible:** Dr. Nathan Sudermann-Merx  
**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  

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#### Competence Certificate
The examination will take place for the last time in the winter semester 2020/2021.  
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.  
The prerequisite for participation in the exam is the achievement of a minimum number of points in delivery sheets. Details will be announced at the beginning of the course.

#### Prerequisites
None.

#### Annotation
The course will take place for the last time in the winter semester 20/21.
## 7.293 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

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### Events

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<td>Übungen zu Optimierungsansätze unter Unsicherheit</td>
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<td>Practice 🗤</td>
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**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.
7.294 Course: Optoelectronic Components [T-ETIT-101907]

**Responsible:** Prof. Dr. Wolfgang Freude

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-MACH-101287 - Microsystem Technology

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**Events**

| ST 2022 | 2309486 | Optoelectronic Components | 2 SWS | Lecture / 🗣 | Freude |
| ST 2022 | 2309487 | Optoelectronic Components (Tutorial) | 1 SWS | Practice / 🗣 | Freude |

**Exams**

| ST 2022 | 7309486 | Optoelectronic Components | Freude |

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

none
7.295 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

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**Exams**

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**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Panel Data**

**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**


**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

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**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).
7.297 Course: Personalization and Services [T-WIWI-102848]

**Responsible:** Andreas Sonnenbichler

**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

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<td>see Annotations</td>
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</table>

**Competence Certificate**

The exam is currently not offered.

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 course is currently not offered.
### 7.298 Course: PH APL-ING-TL01 [T-WIWI-106291]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.299 Course: PH APL-ING-TL02 [T-WIWI-106292]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering
7.301 Course: PH APL-ING-TL04 ub [T-WIWI-106294]

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Course: PH APL-ING-TL05 ub [T-WIWI-106295]

7.302 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

| Organisation: | University |
| Part of:       | M-WIWI-101404 - Extracurricular Module in Engineering |

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**Organisation:** University

**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering
### 7.304 Course: PH APL-ING-TL07 [T-WIWI-108384]

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7 COURSES

7.305 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

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Events

WT 22/23 2181612 Physical Basics of Laser Technology 3 SWS Lecture / Practice (VÜ) / Schneider
Exams

ST 2022 76-T-MACH-102102 Physical Basics of Laser Technology 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 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

Below you will find excerpts from events related to this course:

Physical basics of laser technology
2181612, WS 22/23, 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
- safety 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
T. Graf: Laser - Grundlagen der Laserstrahlerzeugung 2015, Springer Vieweg
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
### 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

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<td>Physics for Engineers</td>
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<td>Lecture / Practice (VÜ)</td>
<td>Weygand, Dienwiebel, Nesterov-Müller, Gumbsch</td>
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**Exams**

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<td>Physics for Engineers</td>
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<td>Lecture / Practice (VÜ)</td>
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**Legend:**
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗣 On-Site
- ✗ Cancelled

**Competence Certificate**
- written exam 90 min

**Prerequisites**
- none

Below you will find excerpts from events related to this course:

#### Physics for Engineers
- 2142890, SS 2022, 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 (exercises)
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
   - Harris, Moderne Physik, Pearson Verlag, 2013
Course: Planning and Management of Industrial Plants [T-WIWI-102631]

**Responsible:** Prof. Dr. Frank Schultmann

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101471 - Industrial Production II

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<td>2 SWS</td>
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<td>WT 22/23</td>
<td>Practice / ☑</td>
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**Exams**

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<td>Planning and Management of Industrial Plants</td>
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<td>On-Site</td>
<td>Schultmann</td>
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</table>

**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. 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:

**Planning and Management of Industrial Plants**

2581952, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)

**Content**

Industrial plant management incorporates a complex set of tasks along the entire life cycle of an industrial plant, starting with the initiation and erection up to operating and dismantling. During this course students will get to know special characteristics of industrial plant management. Students will learn important methods to plan, realize and supervise the supply, start-up, maintenance, optimisation and shut-down of industrial plants. Alongside, students will have to handle the inherent question of choosing between technologies and evaluating each of them. This course pays special attention to the specific characteristics of plant engineering, commissioning and investment.

**Literature**

Wird in der Veranstaltung bekannt gegeben.
7 COURSES  
Course: PLM for Product Development in Mechatronics [T-MACH-102181]

7.308 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  
M-MACH-101283 - Virtual Engineering A

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Events

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Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

Competence Certificate
Oral examination 20 min.

Prerequisites
none

Below you will find excerpts from events related to this course:

**PLM for product development in mechatronics**  
2122376, SS 2022, 2 SWS, Language: German, Open in study portal

**Content**
Students are able to

- compare product data management and product lifecycle management.
- describe the components and core functions of a PLM solution
- explain trends from research and practice in the field of PLM form mechatronic product development

**Organizational issues**
Blockveranstaltung, Teilnehmerzahl begrenzt.

**Literature**
Vorlesungsfolien / lecture slides

**PLM for product development in mechatronics**  
2122376, WS 22/23, 2 SWS, Language: German, Open in study portal

**Content**
Students are able to

- compare product data management and product lifecycle management.
- describe the components and core functions of a PLM solution
- explain trends from research and practice in the field of PLM form mechatronic product development

**Organizational issues**
Blockveranstaltung, Zeit und Ort siehe Homepage oder ILIAS zur Lehrveranstaltung.
Literature
Vorlesungsfolien / lecture slides
-course: Plug-and-Play Material Handling [T-MACH-106693]

**7.309 Course: Plug-and-Play Material Handling [T-MACH-106693]**

**Responsible:** Jonathan Auberle  
Prof. Dr.-Ing. Kai Furmans  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-104888 - Advanced Module Logistics  

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**Events**

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<th>Type</th>
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| WT 22/23 | 2117070 | Plug-and-play material handling | 2 | Practical course / Blended (On-Site/Online)  
Furmans, Müller, Enke |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
Presentation of the four steps of the course content (design, implementation, test concept and evaluation)

**Prerequisites**
None

Below you will find excerpts from events related to this course:

**Plug-and-play material handling**
2117070, WS 22/23, 2 SWS, Language: German, Open in study portal  
Practical course (P)  
Blended (On-Site/Online)

**Content**

- Theoretical basics and structure of plug-and-play-capable material handling technology  
- Practical application of the contents in teamwork using various industry-related hardware components  
- Development of a heterogeneous integrated mechatronic system  
- Planning and implementation of a control system using the software framework ROS and the programming language Python  
- Use of a simulation environment for development and transition from simulation to real hardware  
- Use of different sensor systems  
- Presentation of the work results and evaluation of these on the basis of logistical key figures

The students will be able to:

- Name and explain the basics of plug-and-play conveyor technology  
- Expand their knowledge of plug-and-play conveyor technology through independent research  
- Apply the theory they have learned to a practical problem  
- Deal with the software framework ROS (Robot Operating System)  
- Evaluate developed solutions on the basis of logistical key figures

**Organizational issues**
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 behalten.

Das Praktikum findet zwei Wochen in Vollzeit statt. Der genaue Zeitraum wird Anfang Frühjahr 2023 auf der Institutswebsite bekanntgegeben.

Ob die Veranstaltung online stattfinden wird oder eine Durchführung in Präsenz möglich ist, wird mit Veröffentlichung des Veranstaltungszeitraums bekannt gegeben.
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

<table>
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Events

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Exams

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Competence Certificate
Oral exam, about 25 minutes

Prerequisites
none

Below you will find excerpts from events related to this course:

Polymer Engineering I
2173590, WS 22/23, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and 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 electrical properties 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.
## 7.311 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

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<td>Each summer term</td>
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### Events

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<td>Polymerengineering II</td>
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### Competence Certificate

Oral exam, about 25 minutes

### Prerequisites

none

### Recommendation

Knowledge in Polymerengineering I

Below you will find excerpts from events related to this course:

### V Polymer Engineering II

2174596, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V)  
Blended (On-Site/Online)
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:
Polymer engineering I

Workload:
The workload for the lecture Polymer engineering 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.
7.312 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

**Exams**

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**Competence Certificate**

Oral examination

**Prerequisites**

none
7.313 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

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**Exams**

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<td>Polymers in MEMS B: Physics, Microstructuring and Applications</td>
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**Competence Certificate**

Oral examination

**Prerequisites**

none
7.314 Course: Polymers in MEMS C: Biopolymers and Bioplastics [T-MACH-102200]

Responsibility: Dr.-Ing. Bastian Rapp
Dr.-Ing. Matthias Worgull

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101291 - Microfabrication

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Events

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Exams

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Worgull, Rapp

Competence Certificate

Oral examination

Prerequisites

none

Below you will find excerpts from events related to this course:

Polymers in MEMS C - Biopolymers and Bioplastics
2142855, SS 2022, 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.
7.315 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

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**Exams**

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**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:**

**Portfolio and Asset Liability Management**

2520357, SS 2022, 2 SWS, Language: English, Open in study portal

**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, arbitrage pricing 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
7.316 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

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**Exams**

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**Legend:** 🖥 Online, ☑ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

none
# 7.317 Course: Practical Course in Water Technology [T-CIWVT-106840]

**Responsible:** Dr. Gudrun Abbt-Braun  
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

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**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
### 7.318 Course: Practical Course Polymers in MEMS [T-MACH-105556]

**Responsible:** Dr.-Ing. Bastian Rapp  
Dr.-Ing. Matthias Worgull  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101291 - Microfabrication  

**Type**  
Completed coursework  

**Credits**  
3  

**Grading scale**  
pass/fail  

**Recurrence**  
each summer term  

**Version**  
1  

### Events

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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 2022, 2 SWS, Language: German, Open in study portal

### 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
**Course: Practical Course Technical Ceramics [T-MACH-105178]**

**Responsible:** Dr. Günter Schell  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Competence Certificate**
Colloquium and laboratory report for the respective experiments.

**Prerequisites**
none

**Below you will find excerpts from events related to this course:**

**Organizational issues**
Elektronisch über das ILIAS-Portal

**Literature**


Richerson, D. R.: Modern Ceramic Engineering, CRC Taylor & Francis, 2006
7.320 Course: Practical Seminar Digital Service Systems [T-WIWI-106563]

**Responsible:** Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-102808 - Digital Service Systems in Industry

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**Exams**

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**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.

Below you will find excerpts from events related to this course:

**Practical Seminar: Information Systems & Service Design (Master)**
2540554, SS 2022, 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.

**Prerequisites**
Profound skills in software development are required

**Literature**
Further literature will be made available in the seminar.

**Responsible:** Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-103118 - Data Science: Data-Driven User Modeling

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<td>Each term</td>
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**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.
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

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<td>4,5</td>
<td>Grade to a third</td>
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</table>

**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.
7.323 Course: Practical Seminar: Data-Driven Information Systems [T-WIWI-106207]

**Responsible:** Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger
Prof. Dr. Thomas Setzer
Prof. Dr. Christof Weinhardt

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-103117 - Data Science: Data-Driven Information Systems

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</table>

**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.
7 COURSES

Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

7.324 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

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<td>3</td>
<td>Practical course / 🧩</td>
<td>Nickel, Mitarbeiter</td>
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<td>Practical seminar: Health Care Management</td>
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<td>Practical course / 👥</td>
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Exams

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<td>Nickel</td>
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<td>Practical Seminar: Health Care Management (with Case Studies)</td>
<td>Nickel</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 👥 On-Site, ❌ Cancelled

Competence Certificate

Due to a research semester of Professor Nickel in WS 19/20, the courses Location Planning and Strategic SCM and Practice Seminar: Health Care Management do NOT take place in WS 19/20. Please also refer to the information at https://dol.i.or.kit.edu/Lehrveranstaltungen.php for further details.

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 to Operations 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.
# 7.325 Course: Practical Seminar: Information Systems and Service Design [T-WIWI-108437]

**Responsible:** Prof. Dr. Alexander Mädche  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102806 - Service Innovation, Design & Engineering  
M-WIWI-104068 - Information Systems in Organizations  
M-WIWI-104080 - Designing Interactive Information Systems

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### Events

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<tr>
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<td>3 SWS</td>
<td>Practical Seminar: Information Systems &amp; Service Design (Master)</td>
<td>Each term</td>
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### Competence Certificate

The assessment of this course is according to §4(2), 3 SPO 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 (e.g. implementation of a prototype) 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). In the winter terms, the course is only offered as a seminar.

### Prerequisites

None.

### Recommendation

Attending the course „Digital Service Design“ is recommended, but not mandatory.

### Annotation

The course is held in English.

---

Below you will find excerpts from events related to this course:

**Practical Seminar: Information Systems & Service Design (Master)**  
2540554, SS 2022, 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.

### Prerequisites

Profound skills in software development are required.

### Literature

Further literature will be made available in the seminar.
7.326 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

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**Exams**

| ST 2022 | 7900258 | Practical Seminar Service Innovation | Satzger |
| ST 2022 | 7900314 | Service Design Thinking | Satzger |

**Competence Certificate**

The assessment of this course is according to §4(2), 3 SPO 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 of Service Innovation Methods is assumed. Therefore it is recommended 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.
**7.327 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

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<td>2 SWS</td>
<td>Practical course /</td>
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<td>Practical course /</td>
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<td>2 SWS</td>
<td>Practical course /</td>
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**Exams**

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<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Online</th>
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<td>Last</td>
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</tbody>
</table>

**Competence Certificate**
The assessment consists of a written exam.

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Introduction to Microsystem Technology - Practical Course**

*2143875, SS 2022, 2 SWS, Language: German, Open in study portal*

**Content**

In the practical training includes nine experiments:
1. Hot embossing of plastics micro structures
2. Micro electroforming
3. Mikro optics: "LiGA-micro spectrometer"
4. UV-lithography
5. Optical waveguides
6. Capillary electrophoresis on a chip
7. SAW gas sensor
8. Metrology
9. Atomic force microscopy
Each student takes part in only five experiments. 
The experiments are carried out at real workstations at the IMT and coached by IMT-staff.

**Organizational issues**

Teilnahmeanfragen an Frau Nowotny, marie.nowotny@kit.edu
Introduction to Microsystem Technology - Practical Course
2143877, SS 2022, 2 SWS, Language: German, Open in study portal

Content
In the practical training includes nine experiments:
1. Hot embossing of plastics micro structures
2. Micro electroforming
3. Mikro optics: "LiGA-micro spectrometer"
4. UV-lithography
5. Optical waveguides
6. Capillary electrophoresis on a chip
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Organizational issues
Teilnahmeanfragen an Frau Nowotny, marie.nowotny@kit.edu

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung 'Grundlagen der Mikrosystemtechnik'
7.328 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

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Events

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Exams

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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).

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.
**7.329 Course: Predictive Modeling [T-WIWI-110868]**

**Responsible:** TT-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:** Examination of another type  
**Credits:** 4.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

### Events

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<td>Grade to a thirds</td>
<td>Each summer term</td>
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<td>Practice</td>
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### Exams

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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- Cancelled

**Competence Certificate**  
Examination of another type (open book exam, online).

**Prerequisites**  
None

*Below you will find excerpts from events related to this course:*

### Predictive Modeling

2521311, SS 2022, 2 SWS, Language: English, [Open in study portal](#)  
Lecture (V)  
Blended (On-Site/Online)

**Content**

**Contents**

This course presents methods for making and evaluating statistical predictions based on data. We consider various types of predictions (mean, probability, quantile, and full distribution), all of which are practically relevant. In each case, we discuss selected modeling approaches and their implementation using R software. We consider various economic case studies. Furthermore, we present methods for absolute evaluation (assessing whether a given model is compatible with the data) and relative evaluation (comparing the predictive performance of alternative models).

**Learning objectives**

Students have a good conceptual understanding of statistical prediction methods. They are able to implement these methods using statistical software, and can assess which method is suitable in a given situation.

**Prerequisites**

Students should know econometrics on the level of the course ‘Applied Econometrics’ [2520020]

**Literature**

- Weitere Literatur wird in der Vorlesung bekanntgegeben.

### Predictive Modeling (Tutorial)

2521312, SS 2022, 2 SWS, Language: English, [Open in study portal](#)  
Practice (Ü)  
Blended (On-Site/Online)
**7.330 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

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<td>Each summer term</td>
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<td>Price Management</td>
<td>2 SWS</td>
<td>Lecture / Glenn</td>
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<td>ST 2022</td>
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<td>Exercise Price Management</td>
<td>1 SWS</td>
<td>Practice / Glenn</td>
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**Exams**  
ST 2022 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:

**Price Management**  
2540529, SS 2022, 2 SWS, Language: German, Open in study portal

**Literature**  
7.331 Course: Price Negotiation and Sales Presentations [T-WIWI-102891]

**Responsible:** Prof. Dr. Martin Klarmann  
Mark Schröder

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105312 - Marketing and Sales Management

### Events

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<td>Each winter term</td>
<td>3</td>
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**Legend:** Online, Blended (On-Site/Online), On-Site, Cancelled

### Competence Certificate

This alternative exam assessment consists of a presentation with a subsequent discussion totalling 25 minutes. Moreover learning contents are checked by realistic 30-minute price negotiations.

### Prerequisites

None

### Recommendation

None

### Annotation

The course is scheduled to be completed after the first half of the semester. 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 & 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, participation for a specific course can not be guaranteed. For further information, please contact the Marketing and Sales Research Group (marketing.iism.kit.edu).

Please note that only one of the courses from the election block can be attended in the module.

**Below you will find excerpts from events related to this course:**

**Price Negotiation and Sales Presentations**  
2572198, WS 22/23, 1 SWS, Language: German, [Open in study portal](#)

### Content

At first, theoretical knowledge about the behavior in selling contexts is discussed. Then, in a practical part, students will apply this knowledge in their own price negotiations.

Students

- gain a clear impression of the theoretical knowledge about price negotiations and sales presentations
- improve their own negotiation abilities

Non exam assessment (following §4(2), 3 of the examination regulation).

The total workload for this course is approximately 45.0 hours. For further information see German version.

- In order to participate in this course, you need to apply. Applications usually start with the lecture period in the winter term. Detailed information on the application process is provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.
- Please note that only one of the 1.5 ECTS courses 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 in the respective module to all students. Participation in a specific course cannot be guaranteed.

### Organizational issues

Blockseminar: genaue Uhrzeiten und Raum werden noch bekannt gegeben
**7.332 Course: Pricing Excellence [T-WIWI-111246]**

**Responsible:** Dr. Fabian Bill  
Prof. Dr. Martin Klarmann

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-105312 - Marketing and Sales Management

<table>
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<th>Exams</th>
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| ST 2022 | 2571175  
**Pricing Excellence**  
1 SWS |
| Others (sons / 🧩) | Bill |
| ST 2022 | 7900300  
**Pricing Excellence**  
1 SWS |
| Klarmann |

**Legend:** Online, Blended (On-Site/Online), 🧩 On-Site, ⏳ Cancelled

**Competence Certificate**
Alternative exam assessment (team presentation of a case study with a duration of about 25 minutes and a subsequent discussion).

**Prerequisites**
None.

**Annotation**
Please note that only one of the courses in the module’s supplementary offering can be counted. This event has a restriction on participation. The Marketing and Sales Research Group typically allows all students to attend a 1.5 credit course in the corresponding module. A guarantee for the attendance of a certain event cannot be given. An application is required for participation in this event. 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.ism.kit.edu) shortly before the start of the lecture period in the summer semester.

*Below you will find excerpts from events related to this course:*

**Pricing Excellence**
2571175, SS 2022, 1 SWS, Language: English, [Open in study portal]

**Content**
In a theoretical part at the beginning of the course, students are taught the theoretical foundations of pricing. This includes an introduction to (1) price setting of product prices as well as (2) price setting of customer net prices (development of discount systems). Furthermore, theoretical foundations of price implementation and price monitoring are discussed.

Theoretical contents are applied and presented by teams within a case study format.

The learning objectives are as follows:
- Getting to know the theoretical foundations of price setting
- Getting to know the theoretical foundations of price execution and price monitoring
- Application of the acquired knowledge in a case study format
- Concise and structured presentation of the results

Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation (presentation of a case study with subsequent discussion).

Total time required for 1.5 credit points: approx. 45.0 hours

Attendance time: 15 hours

Preparation and wrap-up of the course: 22.5 hours

Exam and exam preparation: 7.5 hours

**Organizational issues**
Blockveranstaltung, Raum 115, Geb. 20.21, Termine werden noch bekannt gegeben
7.333 Course: Principles of Ceramic and Powder Metallurgy Processing [T-MACH-102111]

**Responsible:** Dr. Günter Schell  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Events**

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**Exams**

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**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

**Below you will find excerpts from events related to this course:**

**Basic principles of powder metallurgical and ceramic processing**  
2193010, WS 22/23, 2 SWS, Language: German, [Open in study portal](#)  
Lecture (V)  
Blended (On-Site/Online)

**Literature**

- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005  
7.334 Course: Probabilistic Time Series Forecasting Challenge [T-WIWI-111387]

**Responsible:** TT-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

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**Events**

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<th>Practice / Online</th>
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<tr>
<td>WT 22/23</td>
<td>2500081</td>
<td>Probabilistic Time Series Forecasting Challenge</td>
<td>Project (P) / Online</td>
<td>Krüger, Bracher, Koster, Lerch</td>
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</table>

**Competence Certificate**
Alternative exam assessment. Necessary conditions to pass the course:

1. Weekly submission of statistical forecasts during the semester (excluding the Christmas break).
2. Submission of a final report (10-15 pages) at the end of the semester, describing the forecasting methods and their statistical evaluation.

Grading is based on the final report.

**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.

Below you will find excerpts from events related to this course:

**Probabilistic Time Series Forecasting Challenge**
2500081, WS 22/23, 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 kick-off meeting will take place in mid October. During the semester, there will be a weekly 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 project seminar 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) Submission of a final report (10-15 pages) at the end of the semester, describing the forecasting methods and their statistical evaluation. Grading is based on the final report.
### 7.335 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

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None

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Legend: 📱 Online, 🏨 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
### 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

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled
**7.337 Course: Process Mining [T-WIWI-109799]**

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management

**Type:** Written examination  
**Credits:** 4.5  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 2

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**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:*  

**Process Mining**  
2511204, SS 2022, 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

Weitere Literatur wird in der Vorlesung bekannt gegeben.
### 7.338 Course: Product and Innovation Management [T-WIWI-109864]

**Responsible:** Prof. Dr. Martin Klarmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101510 - Cross-Functional Management Accounting  
- M-WIWI-101514 - Innovation Economics  
- M-WIWI-105312 - Marketing and Sales Management

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#### Events

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<th>Product and Innovation Management</th>
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<th>Lecture / 🗣</th>
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#### Exams

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<th>7900024</th>
<th>Product and Innovation Management</th>
<th>Klarmann</th>
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<tbody>
<tr>
<td>ST 2022</td>
<td>7900204</td>
<td>Product and Innovation Management</td>
<td>Klarmann</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
The assessment of success takes place through a written exam with additional aids in the sense of an open book exam. The written exam will either take place in the lecture hall or online, depending on further pandemic developments. Further details will be announced during the lecture.

**Prerequisites**  
None

**Annotation**  
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

*Below you will find excerpts from events related to this course:*  

#### Product and Innovation Management

| 2571154, SS 2022, 2 SWS, Language: English | Open in study portal | Lecture (V) | On-Site |

Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022
Content
This course addresses topics around the management of new as well as existing products. After the foundations of product management, especially the product choice behavior of customers, students get to know in detail different steps of the innovation process. Another section regards the management of the existing product portfolio.

Students
- know the most important terms of the product and innovation concept
- understand the models of product choice behavior (e.g., the Markov model, the Luce model)
- are familiar with the basics of network theory (e.g. the Triadic Closure concept)
- know the central strategic concepts of innovation management (especially the market driving approach, pioneer and successor, Miles/Snow typology, blockbuster strategy)
- master the most important methods and sources of idea generation (e.g. open innovation, lead user method, crowdsourcing, creativity techniques, voice of the customer, innovation games, conjoint analysis, quality function deployment, online toolkits)
- are capable of defining and evaluating new product concepts and know the associated instruments like focus groups, product testing, speculative sales, test market simulation Assessor, electronic micro test market
- have advanced knowledge about market introduction (e.g. adoption and diffusion models Bass, Fourt/Woodlock, Mansfield)
- understand important connections of the innovation process (cluster formation, innovation culture, teams, stage-gate process)

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

Total effort for 3 credit points: approx. 90 hours
Presence time: 30 hours
Preparation and wrap-up of LV: 45.0 hours
Exam and exam preparation: 15.0 hours

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Organizational issues
Die Veranstaltung findet in Geb. 20.21, Raum 217 statt. Während anstehender Bauarbeiten wird die Veranstaltung in Geb. 10.11, Raum 223 verlegt. Dies wird kurzfristig bekanntgegeben.

Literature
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-101284 - Specialization in Production Engineering
- M-MACH-105455 - Strategic Design of Modern Production Systems

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**Exams**

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

T-MACH-105166 - Materials and Processes for Body Lightweight Construction in the Automotive Industry must not have been started.

*Below you will find excerpts from events related to this course:*

**Product- and Production-Concepts for modern Automobiles**
2149670, WS 22/23, 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.
The lecture is a block course. An application in Ilias is mandatory.

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/).
### 7.340 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

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#### Exams

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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. 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:*

#### Production and Logistics Management

- **Code:** 2581954, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

#### 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 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.
7.341 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-101284 - Specialization in Production Engineering

**Events**

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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Each summer term</td>
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**Exams**

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<td>2150605</td>
<td>Lecture / 🧩</td>
<td>Fleischer</td>
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</table>

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

none

**Below you will find excerpts from events related to this course:**

**Production Technology for E-Mobility**

Lecture (V)  
2150605, SS 2022, 2 SWS, Language: German, Open in study portal  
Blended (On-Site/Online)

**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.

**Learning Outcomes:**

The students are able to:

- describe the structure and function of a fuel cell, an electric traction drive and a battery system.
- 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.

**Workload:**

regular attendance: 42 hours  
self-study: 78 hours

**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/)
### 7.342 Course: Project Development with Case Study [T-BGU-111217]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr.-Ing. Kunibert Lennerts</th>
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<tbody>
<tr>
<td>Organisation</td>
<td>KIT Department of Civil Engineering, Geo and Environmental Sciences</td>
</tr>
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<td>Part of</td>
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**Type** | Oral examination  
**Credits** | 1.5  
**Grading scale** | Grade to a third  
**Recurrence** | Each term  
**Expansion** | 1 terms  
**Version** | 1

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**Competence Certificate**  
oral exam, appr. 20 min.

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
### 7.343 Course: Project Internship Aditive Manufacturing: Development and Production of an Additive Component [T-MACH-110960]

**Responsible:** Dr.-Ing. Frederik Zanger  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering

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### Events

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<td>2 SWS</td>
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### Exams

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**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

Below you will find excerpts from events related to this course:

#### Project Internship Aditive Manufacturing: Development and Production of an Additive Component

2149700, WS 22/23, 2 SWS, Language: German, Open in study portal

**Practical course (P)**  
**Blended (On-Site/Online)**
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 rework

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) and lithography assisted ceramic manufacturing (LCM).
- 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
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
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
7.344 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

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**Events**

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<th>2 SWS</th>
<th>Seminar / Online</th>
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<td>WT 22/23</td>
<td>2512501</td>
<td>Practical Course Cognitive automobiles and robots (Master)</td>
<td>3 SWS</td>
<td>Practical course / Blended</td>
<td>Zöllner, Daaboul</td>
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**Exams**

| WT 22/23 | 7900107 | Advanced Lab Cognitive Automobile and Robots (Master) | Zöllner |

**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

Below you will find excerpts from events related to this course:

**Cognitive Automobiles and Robots**

ST 2022 2513500, SS 2022, 2 SWS, Language: German/English, Open in study portal

**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.
### Practical Course Cognitive automobiles and robots (Master)

<table>
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<td>3 SWS</td>
<td>German/English</td>
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**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 4.5 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.
7.345 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

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Events

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Exams

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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

Below you will find excerpts from events related to this course:

Project Lab Machine Learning
2512500, SS 2022, 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 4.5 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.


7.346 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

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**Events**

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<th>2 SWS</th>
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**Exams**

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<th>ST 2022</th>
<th>7981963</th>
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</tr>
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</table>

**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 (examination of another type, following §4(2), 3 of the examination regulation).

**Prerequisites**
None

**Recommendation**
None

**Below you will find excerpts from events related to this course:**

**Project Management**

2581963, WS 22/23, 2 SWS, Language: English, [Open in study portal]

**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.
### 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

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#### Events

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</table>

**Competence Certificate**  
see German version

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
### 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  
**Part of:** M-BGU-101888 - Project Management in Construction

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**Events**

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**Exams**

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**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
7.349 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

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**Events**

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**Competence Certificate**

Project:
- report, appr. 10 pages, and
- presentation, appr. 10 min.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 7.350 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

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<td>Each summer term</td>
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**Events**

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**Exams**

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**Legend:** 
🖥 Online, 🧱 Blended (On-Site/Online), 🗣 On-Site, ✗Cancelled

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
Course: Project Workshop: Automotive Engineering [T-MACH-102156]

**Responsible:** Dr.-Ing. Michael Frey  
Prof. Dr. Frank Gauterin  
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

**Events**

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<td>Gauterin</td>
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**Competence Certificate**  
Oral examination  
Duration: 30 up to 40 minutes  
Auxiliary means: none

**Prerequisites**  
one

**Below you will find excerpts from events related to this course:**

**Project Workshop: Automotive Engineering**  
2115817, SS 2022, 3 SWS, Language: German, Open in study portal  
Lecture (V)  
Blended (On-Site/Online)

**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

Skripte werden beim Start-up Meeting ausgegeben.

Project Workshop: Automotive Engineering
2115817, WS 22/23, 3 SWS, Language: German, [Open in study portal]

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.

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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 Institut homepage.

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

Skripte werden beim Start-up Meeting ausgegeben.
The scripts will be supplied in the start-up meeting.
7.352 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

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**Events**

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**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 22/23, 3 SWS, Language: German, [Open in study portal](#)

**Literature**

**Weiterführende Literatur:**

# 7.353 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

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<tr>
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<td>Grade to a third</td>
<td>Each summer term</td>
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</table>

## Type
- **Written exam**

## Credits
- 4.5

## Grading scale
- Grade to a third

## Recurrence
- Each summer term

## Version
- 1

### Events

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<th>Location</th>
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### Exams

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### Exam LA (Written Exam)

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### Exam LA (Written Exam)

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### 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:

<table>
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<tr>
<th>Content</th>
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<tbody>
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### 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

7.354 Course: Python Algorithm for Vehicle Technology [T-MACH-110796]

Responsible: Stephan Rhode
Organisation:
Part of: M-MACH-101265 - Vehicle Development
M-MACH-101266 - Automotive Engineering

<table>
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Events

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Exams

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Competence Certificate

Written Examination

Duration: 90 minutes

Prerequisites

none

Below you will find excerpts from events related to this course:

Python Algorithms for Automotive Engineering
2114862, SS 2022, 2 SWS, Language: German, Open in study portal

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
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIlias/

Die Vorlesung findet digital über ILIAS statt. Die Rücksprache Termine finden in Präsenz am Campus Ost, Geb. 70.04, Raum 219 statt.

Termine hierzu werden noch bekannt gegeben.

Literature

- A Whirlwind Tour of Python, Jake VanderPlas, Publisher: O'Reilly Media, Inc. Release Date: August 2016, ISBN: 9781492037859, [link](#)
- Introduction to Machine Learning with Python, Sarah Guido, Andreas C. Müller, Publisher: O'Reilly Media, Inc., Release Date: October 2016, ISBN: 9781449369880, [link](#)
7.355 Course: Quality Management [T-MACH-102107]

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

**Part of:**  
- M-MACH-101284 - Specialization in Production Engineering  
- M-MACH-105455 - Strategic Design of Modern Production Systems

**Type**  
Written examination  

**Credits**  
4

**Grading scale**  
Grade to a third

**Recurrence**  
Each winter term

**Version**  
2

**Events**

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<td>Quality Management</td>
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**Exams**

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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- Cancelled

**Competence Certificate**  
Written Exam (60 min)

**Prerequisites**  
none

---

Below you will find excerpts from events related to this course:

**Quality Management**  
2149667, WS 22/23, 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 definition
- 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
Start: 24.10.2022
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/).
Course: Quantitative Methods in Energy Economics [T-WIWI-107446]

**Responsible:** Dr. Patrick Plötz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101451 - Energy Economics and Energy Markets

**Type:** Oral examination  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 2

<table>
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<td>WT 22/23 2581008 Übung zu Quantitative Methods in Energy Economics 1 SWS Practice//tty Plötz, Dengiz, Yilmaz</td>
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**Competence Certificate**
The assessment consists of an oral (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. 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:

**Quantitative Methods in Energy Economics**
2581007, WS 22/23, 2 SWS, Language: English, Open in study portal

**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.
Course: Quantum Functional Devices and Semiconductor Technology [T-ETIT-100740]

7.357 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

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<td>Each summer term</td>
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Prerequisites
none
### Course: Rail System Technology [T-MACH-102143]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
Prof. Dr.-Ing. Peter Gratzfeld

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101274 - Rail System Technology

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#### Events

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<td>Heckele, Gratzfeld</td>
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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ❌ Cancelled

---

#### Competence Certificate

**Oral examination**

Duration: ca. 45 minutes

No tools or reference materials may be used during the exam.

#### Prerequisites

None

---

Below you will find excerpts from events related to this course:

#### Lecture (V)

**2115919, SS 2022, 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).
## Rail Vehicle Technology [2115996, SS 2022, 2 SWS, Language: German, Open in study portal]

### 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: principles, electric drives (main components, asynchronous traction motor, inverter, with DC supply, with AC supply, without line supply, multi system 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

### Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.
A bibliography is available for download (Ilias-platform).

## Rail System Technology [2115919, WS 22/23, 2 SWS, Language: German, Open in study portal]

### 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
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### Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.
A bibliography is available for download (Ilias-platform).
# 7.359 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 |

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### Exams

| ST 2022 | 7900138 | Recommender Systems | 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

### Recommendation

None
### 7.360 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  

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<td>see Annotations</td>
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**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.
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

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<td>2 SWS</td>
<td>Responsible Artificial Intelligence</td>
<td>Hoffmann, Henni</td>
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</table>

**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)
- The completion of a case study including an oral exam (max. 60 points).

Further details are explained during the lecture.

**Prerequisites**
Readings will be provided to work through before the lecture.
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

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### Events

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<td>Risk Management in Industrial Supply Networks</td>
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### Prerequisites
None

### Recommendation
None

### 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. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

### Content
Students learn methods and tools to manage risks in complex and dynamically evolving supply chain networks. Students learn the key terms and concepts of risk management and decision theory, in particular expected utility theory. Based on the theoretic prerequisites, students are able to determine and analyze risk diversification, risk pooling, insurance mechanisms and get an overview on statistical risk measures and real options. These approaches are adapted to analyze supply chain risks in a network context. In this manner, students gain knowledge in basic notions of network theory, network metrics and network-strategies for supply chain decisions.

- Introduction
- Risks in decisions under uncertainty: Expected Utility Theory & risk preferences
- The newsvendor model; multivariate risks and insurance
- Risk measures & evaluation techniques: Value-at-Risk, Conditional Value at Risk, Monte Carlo and Real Options
- Transparency in complex supply chains
- Network risk: network basics and criticality
- Risk in supply networks: empirical approaches and insights

### Literature
Wird in der Veranstaltung bekannt gegeben.
### 7.363 Course: Roadmapping [T-WIWI-102853]

**Responsible:** Dr. Daniel Jeffrey Koch  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101488 - Entrepreneurship (EnTechnon)  
- M-WIWI-101507 - Innovation Management  
- M-WIWI-101507 - Innovation Management

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**Events**

| ST 2022 | 2545102 | Roadmapping | 2 SWS | Seminar / On-Site | Koch |

**Exams**

| ST 2022 | 7900055 | Roadmapping | Weissnerger-Eibl |

---

**Competence Certificate**


**Prerequisites**

None

**Recommendation**

Prior attendance of the course Innovation Management is recommended.

**Annotation**

See German version.

*Below you will find excerpts from events related to this course:*

**Roadmapping**

2545102, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

**Content**

Technology Assessment can play a role at different points in the innovation process and can be considered as decision support for or against certain technological options. The seminar Technology Assessment will focus on the early phase "fuzzy front end" in innovation management. The technology assessment will take place here under a high degree of uncertainty regarding future technological developments. The evaluation of technologies can be done with methods such as Technology Readiness, Technology Lifecycle Analysis, Portfolio Analysis, etc.. The early evaluation of technologies is particularly important against the background of limited resources in companies and uncertainty about future developments.
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

### Events

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**Lecture (V)**

**On-Site**

**Safety Engineering**

**2117061, WS 22/23, 2 SWS, Language: German, Open in study portal**

**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 ILLIAS.

**Literature**

Defren/Wickert: Sicherheit für den Maschinen- und Anlagenbau, Druckerei und Verlag: H. von Ameln, Ratingen
7.365 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

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**Events**

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**Competence Certificate**
oral exam with 15 minutes

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
# 7.366 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-101472 - Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics

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**Events**

| ST 2022 | 2512403 | Advanced Lab Blockchain Hackathon (Master) | Practical course / 🖥 | Sunyaev, Beyene, Kannengießer |
| ST 2022 | 2513401 | Seminar Selected Issues in Critical Information Infrastructures (Master) | Seminar / 🖥 | Sunyaev, Lins |
| WT 22/23 | 2513401 | Seminar Selected Issues in Critical Information Infrastructures (Master) | Seminar | Sunyaev, Lins |

**Exams**

| ST 2022 | 7900030 | Lab Coding da Vinci - Cultural Heritage Hackathon (Master) | Sack |
| ST 2022 | 7900031 | Seminar Selected Issues in Critical Information Infrastructures (Master) | Sunyaev |
| WT 22/23 | 7900094 | Seminar Selected Issues in Critical Information Infrastructures (Master) | Sunyaev |

**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

**Prerequisites**  
None.

**Annotation**  
T-WIWI-109251 “Selected Issues in Critical Information Infrastructures” serves to credit an extracurricular course in the module “Critical Digital Infrastructures”.

---

Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022  
669
### Course: Selected Legal Issues of Internet Law [T-INFO-108462]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
**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-101287 - Microsystem Technology  
M-MACH-101290 - BioMEMS  
M-MACH-101292 - Microoptics

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<td>Each term</td>
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**Competence Certificate**  
Oral examination

**Prerequisites**  
none
### 7.369 Course: Self-Booking-HOC-SPZ-ZAK-STK-Graded [T-WIWI-111439]

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#### Self service assignment of supplementary studies
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- 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.
### 7.370 Course: Self-Booking-HOC-SPZ-ZAK-STK-Graded [T-WIWI-111438]

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

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**Self service assignment of supplementary studies**  
This course can be used for self service assignment of grade acquired from the following study providers:

- House of Competence  
- Sprachenzentrum  
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale  
- 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.

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

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Self service assignment of supplementary studies
This course can be used for self service assignment of grade acquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- 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.
Course: Self-Booking-HOC-SPZ-ZAK-STK-Ungraded [T-WIWI-111442]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

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Self service assignment of supplementary studies
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- Studienkolleg

Annotation
Placeholder for self-booking of an ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.
7.373 Course: Self-Booking-HOC-SPZ-ZAK-STK-Ungraded [T-WIWI-111443]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

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Self service assignment of supplementary studies
This course can be used for self service assignment of grade aquired from the following study providers:

- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- 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.

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101808 - Seminar Module

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Self service assignment of supplementary studies
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- House of Competence
- Sprachenzentrum
- Zentrum für Angewandte Kulturwissenschaft und Studium Generale
- Studienkolleg

Annotation
Placeholder for self-booking of an ungraded interdisciplinary qualification, which was provided at the House of Competence, the "Sprachenzentrum" or the Center for Applied Cultural Studies and Studium Generale.
7 COURSES

T 7.375 Course: Semantic Web Technologies [T-WIWI-110848]

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<tr>
<th>Responsible:</th>
<th>Dr. Tobias Christof Käfer</th>
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Events

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<th>2 SWS</th>
<th>Lecture / 🗣</th>
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Exams

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<th>Semantic Web Technologies (Registration until 18 July 2022)</th>
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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

2511310, SS 2022, 2 SWS, Language: English, Open in study portal

Lecture (V)  
On-Site
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 preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

**Literature**


**Weitere Literatur**

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


Weitere Literatur

**7.376 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-101284 - Specialization in Production Engineering  
M-MACH-105968 - Artificial Intelligence in Production

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**Competence Certificate**  
Alternative test achievement (graded):  
- Presentation of the results (approx. 20 min) followed by a colloquium (approx. 15 min) with weighting 75%  
- Written processing of the results with weighting 25%

**Prerequisites**  
none
7 COURSES

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 | Completed coursework |
| Credits | 3 |
| Grading scale | pass/fail |
| Recurrence | Each summer term |
| Version | 1 |

| Events |
| ST 2022 | 2311633 | Seminar Creating a Patent Specification | 2 SWS | Seminar / 🗣 | Stork |

| Exams |
| ST 2022 | 7311633 | Seminar Creating a Patent Specification | Stork |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗿 Cancelled

Prerequisites
none
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

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Events

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Exams

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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.

Below you will find excerpts from events related to this course:

Seminar Data Mining in Production
2151643, SS 2022, 2 SWS, Language: German, Open in study portal

Seminar (S)
Blended (On-Site/Online)
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
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

Seminar Data Mining in Production
2151643, WS 22/23, 2 SWS, Language: German, Open in study portal

Blended (On-Site/Online)
Organizational issues

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
### 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

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<td>Current Topics in Digital Transformation Seminar</td>
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<td>Seminar in Finance (Master): Machine Learning Stock Returns with Option Data</td>
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**Exams**

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<td>Erstellen einer Übersicht zu soziokulturellen Anforderungen an die technische Ausrüstung von Bauwerken für den Anwendungsfall „Wohngebäude“</td>
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<td>ST 2022 7900101</td>
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<td>ST 2022 7900127</td>
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<td>ST 2022 7900166</td>
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<td>ST 2022 7900180</td>
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<td>ST 2022 7900190</td>
<td>Current Topics in Digital Transformation Seminar</td>
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<tr>
<td>ST 2022 7900214</td>
<td>Seminar Business Data Analytics</td>
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</table>
## 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.

Below you will find excerpts from events related to this course:

Interactive Analytics Seminar
2400121, SS 2022, 2 SWS, Language: English, Open in study portal

Content
Providing new and innovative ways for interacting with data is becoming increasingly important. In this seminar, an interdisciplinary team of students engineers a running software prototype of an advanced interactive system leveraging state-of-the-art hardware and software focusing on an analytical use case. The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). This seminar follows an interdisciplinary approach. Students the fields of computer science, information systems and industrial engineering work together in teams.

Learning Objectives
- Explore and specify a data-driven interaction challenge
- Suggest and evaluate different design solutions for addressing the identified problem
- Build interactive analytics prototypes using advanced interaction concepts and pervasive computing technologies

Prerequisites
Strong analytic abilities and profound skills in SQL as well as Python and/or R are required.

Literature
Further literature will be made available in the seminar.

Organizational issues
nach Vereinbarung

Advances in Financial Machine Learning
2530372, SS 2022, 2 SWS, Language: English, Open in study portal

Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues
Location: Räume des Lehrstuhls, Blücherstraße 17, E-008

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

Data Science for the Industrial Internet of Things
2540493, SS 2022, SWS, Language: English, Open in study portal
Content

Learning Objectives

1. Gain practical experience in translating a business problem into a data modeling problem
2. Apply solid theoretical foundations from lectures to real-world data
3. Acquire hands-on experience with industrial data science tools
4. Learn how to communicate data science findings to business stakeholders

Course Credits

The practical seminar can be credited as Seminar Betriebswirtschaftslehre A [WIWI-103474] (3 ECTS). Other courses can be credited upon request.

Seminar Description

The Internet of Things is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, internet access, and economical sensors – physical products turn into cyber-physical smart products that create vast amounts of data.

Current airplanes for example have around 6.000 sensors, creating around 1 TB of data per flight. This data is about the size of all tweets in 3 months worldwide. And this number is growing tremendously. But only 3% of potentially useful data is tagged today, end even less is analyzed. Although Internet of Things use cases such as predictive maintenance are projected to help companies save $630 billion by 2025 (McKinsey, 2015), companies struggle to turn sensor data into actionable insights. To solve this challenge, substantive expertise needs to be combined with skills from software engineering and statistics and machine learning to generate valuable insights from machine data.

The practical seminar is held in cooperation with industry partners of the KSRI, which provide some real-word datasets. Students will then work in teams of three in a close and agile collaboration with the industry subject matter experts from around the world, making use of to the CRISP DM methodology (Chapman et al. 2000)

There will be four different topics and datasets, each assigned to a team of three students. The assignment will be done in the kickoff in calendar week 18. The exact date of the kickoff event will be determined when the participating students have been selected. Attendance at the kickoff event in calendar week 18 is mandatory and a prerequisite for participation.

Expertise in Python and Data Science / Machine Learning is strongly recommended.

Contact

Dominik Martin – dominik.martin@kit.edu
Dr. Niklas Kühl – niklas.kuehl@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.
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 (Research Group ISSD, 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.
Content
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 ISSD (Prof. Mädche). The research group "Information Systems & Service Design" (ISSD) 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

Entrepreneurship Research
2545002, SS 2022, 2 SWS, Language: English, Open in study portal

Seminar Human Resource Management (Master)
2573012, SS 2022, 2 SWS, Language: German, Open in study portal

Content
Content
The students independently develop a topic from entrepreneurship research in an international setting as a tandem with a partner. At first, there will be an introduction to the methodologies used such as systematic literature review, design science, qualitative and quantitative data analysis and more. As part of a written elaboration, the seminar topic must be presented scientifically on 15-20 pages. The results of the seminar paper will be presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives
As part of the written elaboration, the basics of independent scientific work (literature research, argumentation + discussion, citing literature sources, application of qualitative, quantitative and simulative methods) are trained. The skills acquired in the seminar are used to prepare for a potential master thesis. The course is therefore particularly aimed at students who want to write their thesis at the Chair for Entrepreneurship and Technology Management.

Registration:
Registration is via the Wiwi portal.

Organizational issues
Termine werden noch bekannt gegeben.

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.

Literature
Wird im Seminar bekannt gegeben.
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

Seminar Human Resources and Organizations (Master)
2573013, SS 2022, 2 SWS, Language: German, Open in study portal

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

Seminar Management Accounting
2579909, SS 2022, 2 SWS, Language: English, Open in study portal
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. You are to a large extent free to select your own topic. The seminar course is concentrated in four 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 of the course is the grade awarded to the paper.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.
Digital Citizen Science
2500019, WS 22/23, 2 SWS, Language: German/English, Open in study portal

Content
Digital Citizen Science is an innovative approach to conduct field research - interactively and in the real world. Especially in times of social distancing measures essential questions about how private lives are changing are investigated. Who is experiencing more stress during HomeOffice hours? Who is flourishing while learning at home because flow is experienced more often? Which formats of digital cooperation are fostering social contacts and bonding? These and other questions that target the main topic: Well-being @Home are focused in these seminar projects.

The seminar theses are supervised by academics from multiple institutes that are working together on the topic of Digital Citizen Science arbeiten. Involved are the research groups of Prof. Mädche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

Data Science in Service Management
2540473, WS 22/23, 2 SWS, Language: German/English, Open in study portal

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

Methoden im Innovationsmanagement
2545107, WS 22/23, 2 SWS, Language: German, Open in study portal

Content
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

Seminar Human Resource Management (Master)
2573012, WS 22/23, 2 SWS, Language: German, Open in study portal

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.
Seminar Human Resources and Organizations (Master)
2573013, WS 22/23, 2 SWS, Language: German, Open in study portal

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

Seminar Management Accounting - Special Topics
2579919, WS 22/23, 2 SWS, Language: English, Open in study portal

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 of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.
Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature
Will be announced in the course.
### 7.380 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

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#### Events

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**Exams**

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| ST 2022 | 7900019 | Master Seminar in Data Science and Machine Learning | Geyer-Schulz |
| ST 2022 | 7900025 | Successful Transformation Through Innovation | Busch |
| ST 2022 | 7900052 | Entrepreneurship Research | Terzidis |
| ST 2022 | 7900055 | Roadmapping | Weissenberger-Eibl |
| ST 2022 | 7900093 | Seminar in Business Administration A | Weinhardt |
| ST 2022 | 7900101 | Seminar Human Resource Management (Master) | Nieken |
| ST 2022 | 7900127 | Seminar in Finance (Master) - Machine Learning Stock Returns with Option Data | Uhrig-Homburg |
| ST 2022 | 7900166 | Home Office Design Seminar: Digital Citizen Science | Mädche |
| ST 2022 | 7900180 | Seminar in Business Administration | Weinhardt |
| ST 2022 | 7900190 | Current Topics in Digital Transformation Seminar | Mädche |
| ST 2022 | 7900214 | Seminar Business Data Analytics | Weinhardt |
| ST 2022 | 7900231 | Seminar Human Resources and Organizations (Master) | Nieken |
| ST 2022 | 7900233 | Seminar in Marketing and Sales (Master) | Klarmann |
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| ST 2022 | 7900261 | Information Systems and Design (ISSD) Seminar | Mädche |</p>
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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.

Below you will find excerpts from events related to this course:

Advances in Financial Machine Learning
2530372, SS 2022, 2 SWS, Language: English, Open in study portal
Course: Seminar in Business Administration B (Master) [T-WIWI-103476]

Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues
Location: Räume des Lehrstuhls, Blücherstraße 17, E-008

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

Data Science for the Industrial Internet of Things
2540493, SS 2022, SWS, Language: English, Open in study portal

Content
Learning Objectives

1. Gain practical experience in translating a business problem into a data modeling problem
2. Apply solid theoretical foundations from lectures to real-world data
3. Acquire hands-on experience with industrial data science tools
4. Learn how to communicate data science findings to business stakeholders

Course Credits
The practical seminar can be credited as Seminar Betriebswirtschaftslehre A [WIWI-103474] (3 ECTS). Other courses can be credited upon request.

Seminar Description
The Internet of Things is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, internet access, and economical sensors – physical products turn into cyber-physical smart products that create vast amounts of data.

Current airplanes for example have around 6.000 sensors, creating around 1 TB of data per flight. This data is about the size of all tweets in 3 months worldwide. And this number is growing tremendously. But only 3% of potentially useful data is tagged today, end even less is analyzed. Although Internet of Things use cases such as predictive maintenance are projected to help companies save $630 billion by 2025 (McKinsey, 2015), companies struggle to turn sensor data into actionable insights. To solve this challenge, substantive expertise needs to be combined with skills from software engineering and statistics and machine learning to generate valuable insights from machine data.

The practical seminar is held in cooperation with industry partners of the KSRI, which provide some real-word datasets. Students will then work in teams of three in a close and agile collaboration with the industry subject matter experts from around the world, making use of the CRISP DM methodology (Chapman et al. 2000)

There will be four different topics and datasets, each assigned to a team of three students. The assignment will be done in the kickoff in calendar week 18. The exact date of the kickoff event will be determined when the participating students have been selected. Attendance at the kickoff event in calendar week 18 is mandatory and a prerequisite for participation.

Expertise in Python and Data Science / Machine Learning is strongly recommended.

Contact
Dominik Martin – dominik.martin@kit.edu
Dr. Niklas Kühl – niklas.kuehl@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.

Master Seminar in Data Science and Machine Learning
2540510, SS 2022, 2 SWS, Language: German/English, Open in study portal

User-Adaptive Systems Seminar
2540553, SS 2022, 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 (Research Group ISSD, 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.
Content
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 ISSD (Prof. Mädche). The research group "Information Systems & Service Design" (ISSD) 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

Entrepreneurship Research
2545002, SS 2022, 2 SWS, Language: English, Open in study portal

Content
The students independently develop a topic from entrepreneurship research in an international setting as a tandem with a partner. At first, there will be an introduction to the methodologies used such as systematic literature review, design science, qualitative and quantitative data analysis and more. As part of a written elaboration, the seminar topic must be presented scientifically on 15-20 pages. The results of the seminar paper will be presented in a block event at the end of the semester (20 min + 10 min open discussion).

Learning Objectives
As part of the written elaboration, the basics of independent scientific work (literature research, argumentation + discussion, citing literature sources, application of qualitative, quantitative and simulative methods) are trained. The skills acquired in the seminar are used to prepare for a potential master thesis. The course is therefore particularly aimed at students who want to write their thesis at the Chair for Entrepreneurship and Technology Management.

Registration:
Registration is via the Wiwi portal.

Organizational issues
Termine werden noch bekannt gegeben.

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.

Literature
Wird im Seminar bekannt gegeben.
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
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. You are to a large extent free to select your own topic. The seminar course is concentrated in four 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 of the course is the grade awarded to the paper.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.
## Digital Citizen Science
**Code:** 2500019, **WS:** 22/23, **SWS:** 2, **Language:** German/English, [Open in study portal](#)

**Seminar (S)**

**Blended (On-Site/Online)**

### Content
Digital Citizen Science is an innovative approach to conduct field research - interactively and in the real world. Especially in times of social distancing measures essential questions about how private lives are changing are investigated. Who is experiencing more stress during HomeOffice hours? Who is flourishing while learning at home because flow is experienced more often? Which formats of digital cooperation are fostering social contacts and bonding? These and other questions that target the main topic: Well-being @Home are focused in these seminar projects.

The seminar theses are supervised by academics from multiple institutes that are working together on the topic of Digital Citizen Science arbeiten. Involved are the research groups of Prof. Mädche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

## Data Science in Service Management
**Code:** 2540473, **WS:** 22/23, **SWS:** 2, **Language:** German/English, [Open in study portal](#)

**Seminar (S)**

**On-Site**

### Content
wird auf deutsch und englisch gehalten

### Organizational issues
Blockveranstaltung, siehe WWW

## Methoden im Innovationsmanagement
**Code:** 2545107, **WS:** 22/23, **SWS:** 2, **Language:** German, [Open in study portal](#)

**Seminar (S)**

**On-Site**

### Content
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

### Literature
Werden in der ersten Veranstaltung bekannt gegeben.

## Seminar Human Resource Management (Master)
**Code:** 2573012, **WS:** 22/23, **SWS:** 2, **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

Seminar Human Resources and Organizations (Master)
2573013, WS 22/23, 2 SWS, Language: German, Open in study portal

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

Seminar Management Accounting - Special Topics
2579919, WS 22/23, 2 SWS, Language: English, Open in study portal

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 of the course is the grade awarded to the paper.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Note:

- Maximum of 16 students.
Organizational issues
Ort und Zeit werden noch bekannt gegeben bzw. über ILIAS

Literature
Will be announced in the course.
7.381 Course: Seminar in Economic Policy [T-WIWI-102789]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101514 - Innovation Economics

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**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.
### 7.382 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

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#### Exams

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<td>WT 22/23</td>
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<td>WT 22/23</td>
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<td>Topics in Econometrics, Seminar in Economics (Bachelor)</td>
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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.

Below you will find excerpts from events related to this course:

Predictive Data Analytics - An Introduction to Machine Learning
2500013, SS 2022, SWS, Language: English, Open in study portal

Content
Modern methods from artificial intelligence and machine learning, in particular deep learning methods based on multi-layered artificial neural networks, provide unprecedented tools for data analysis and prediction. Over the past years, they have transformed many scientific fields and have become ubiquitous in real-world applications from speech recognition to self-driving cars.

This seminar will provide a broad introduction to machine learning from statistical foundations to applications in the sciences, economics and engineering. The focus will be on modern machine learning methods for predictive data analytics such as random forests, gradient boosting machines and neural networks, their trans-disciplinary application to supervised learning tasks, and approaches to gain insight into the ‘black box’ of machine learning models. Lectures on the theoretical background will be accompanied by hands-on programming exercises in Python that will cover practical aspects of implementing machine learning methods for analyzing scientific and real-world datasets.

Organizational issues
The seminar consists of three parts:

1. A 3-day block course of lectures and hands-on programming exercises will take place on April 11-13, 2022, either online or in person at Campus South, depending on the Covid-19 situation and regulations. Participation is mandatory. Some familiarity with basic concepts of probability theory and statistics is expected, as well as basic programming skills in Python. For the programming exercises, participants are expected to bring their own laptop with Python and relevant libraries installed.

2. Afterwards, all students will conduct a project for which they will choose a dataset from a list of scientific and real-world datasets and apply what they have learned in the course. Exemplary tasks include predictions of AirBnB prices, wine ratings, salaries, air quality, electricity prices or wildfires. The (potentially preliminary) results will be presented in a meeting during the semester (0.5 days, date to be determined, either online or in person), in a presentation of max. 15 minutes. Participation is mandatory.

3. A final report on the project of 10-20 pages and the code has to be submitted by September 30, 2022. The final grade will be based on the active participation in the seminar (10%), the presentation (30%) and the final report (60%).

Advanced Topics in Econometrics
2521310, SS 2022, 2 SWS, Language: German/English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben
### Shaping AI and Digitization for Society - Seminar Morals and Social Behavior (Master)

**Seminar (S)**  
Blended (On-Site/Online)

| 2560552, SS 2022, 2 SWS, Language: English, [Open in study portal](http://polit.econ.kit.edu) |

**Content**  
Participation will be limited to 12 students.

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](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](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 8–10 pages are to be handed in.

Students’ grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by 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**  
**Blockveranstaltung:**

- Introductory Meeting April 20 (online)
- Seminar Presentations June 3 (Präsenz or online)

### Bounded Rationality - Theory and Experiments, Seminar on Topics in Political Economy (Bachelor)

**Seminar (S)**  
Blended (On-Site/Online)

| 2560555, SS 2022, 2 SWS, Language: English, [Open in study portal](http://polit.econ.kit.edu) |

**Content**  
For Bachelor 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](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](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 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**  
**Blockveranstaltung:**

- Introductory Meeting April 19 (online)
- Seminar Presentations May 30 (Präsenz or online)

### Topics in Econometrics

**Seminar (S)**

| 2521310, WS 22/23, 2 SWS, Language: German, [Open in study portal](https://portal.wiwi.kit.edu/Seminare) |

**Organizational issues**  
**Blockveranstaltung:**  
Termine werden auf Homepage und über Ilias bekannt gegeben

### Moral Wiggle Room and Info Avoidance - Topics in Political Economy (Master)

**Seminar (S)**  
Blended (On-Site/Online)

| 2560142, WS 22/23, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/Seminare) |
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

Overcoming the Corona Crisis - Morals & Social Behavior (Master)
2560143, WS 22/23, 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
## 7.383 Course: Seminar in Economics B (Master) [T-WIWI-103477]

**Responsible:** Professorenchaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 04/10/2022  
714
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.

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Prerequisites
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Recommendation
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2500013, SS 2022, SWS, Language: English, Open in study portal

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Advanced Topics in Econometrics
2521310, SS 2022. 2 SWS, Language: German/English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben
Shaping AI and Digitization for Society - Seminar Morals and Social Behavior (Master)
2560552, SS 2022, 2 SWS, Language: English, Open in study portal

**Content**
Participation will be limited to 12 students.
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](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](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 8–10 pages are to be handed in.

Students’ grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally, students will have to hand in two abstracts with different lengths (20%). Students can improve their grades by 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**
Blockveranstaltung:
Introductory Meeting April 20 (online)
Seminar Presentations June 3 (Präsenz or online)

Bounded Rationality - Theory and Experiments, Seminar on Topics in Political Economy (Bachelor)
2560555, SS 2022, 2 SWS, Language: English, Open in study portal

**Content**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.
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**Organizational issues**
Blockveranstaltung:
Introductory Meeting April 19 (online)
Seminar Presentations May 30 (Präsenz or online)

Topics in Econometrics
2521310, WS 22/23, 2 SWS, Language: German, Open in study portal

**Organizational issues**
Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

Moral Wiggle Room and Info Avoidance - Topics in Political Economy (Master)
2560142, WS 22/23, 2 SWS, Language: English, Open in study portal
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
### 7.384 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

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**Competence Certificate**  
See German version.

**Prerequisites**  
See module description.

**Recommendation**  
None
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

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Below you will find excerpts from events related to this course:

Seminar Advanced Topics in Petri Net Modeling (Master)
2513219, SS 2022, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu)

Content
A system should be correct and efficient. We specify discrete event systems by Petri nets to apply formal analysis techniques based on graph theory and linear algebra to prove correctness. Extended models, such as colored Petri nets, are applied to implement performance evaluation via simulation. We start from case studies using the modeling system Tina and its facilities of model checking for verification of communication protocols. Then we apply Petri nets for the control of robotic manufacturing and consider the sharing of resources in automated manufacturing. Colored Petri nets allow more precise specification of systems, which also leads to reduced abilities for applying formal techniques. So the basic method of investigation is simulation. Our case study concerns modern technology of networking and models are supplied with measuring components which compute statistical characteristics directly in the process of simulation. Finally, a review of modern theory of infinite Petri nets and Sleptsov net computing are provided with a view on cybersecurity of intelligent grids and clouds and hyper-performance concurrent computations.

Organizational issues
Die Veranstaltung findet auf Englisch statt. Die Bewerbung erfolgt über das Wiwi-Portal: [https://portal.wiwi.kit.edu/ys/6074](https://portal.wiwi.kit.edu/ys/6074)
Seminar Knowledge Discovery and Data Mining (Master)
2513309, SS 2022, 3 SWS, Language: English, Open in study portal

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](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/](https://portal.wiwi.kit.edu/).

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligen Themen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B. aus den folgenden Lehrbüchern:

- Mitchell, T.: Machine Learning

Seminar Data Science & Real-time Big Data Analytics (Master)
2513311, SS 2022, 2 SWS, Language: English, Open in study portal

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](http://seminar-cep.fzi.de)

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Further information as well as the registration form can be found under the following link:
[http://seminar-cep.fzi.de](http://seminar-cep.fzi.de)

Questions are answered via the e-mail address sem-ep@fzi.de.

Literature
Tools:
CPN Tools [https://cpntools.org/](https://cpntools.org/)

References:
Recent developments in papers on [http://daze.ho.ua](http://daze.ho.ua/)
Cognitive Automobiles and Robots
2513500, SS 2022, 2 SWS, Language: German/English, Open in study portal

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.

Seminar E-Voting (Master)
2513553, SS 2022, 2 SWS, Language: German/English, Open in study portal

Content
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 Sonntag 03.04.2022, 23:59 Uhr, über die Seite https://portal.wiwi.kit.edu/ys/5915 möglich.

Security and Privacy Awareness
2400125, WS 22/23, 2 SWS, Open in study portal

Content
This seminar can be credited for the KASTEL certificate.

Organizational issues
Announcement and further information: https://portal.wiwi.kit.edu/ys/5915
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.

Note: The link to enrol is for every student, regardless of the study background!

Dates:
- Kick-Off: 22.10.21, 14:00 o'clock
- Final version: 23.01.2022
- Presentation: 04.02.2022, 13:00 o'clock

Topics will be assigned after the enrolment deadline, before the Kick-Off.

Consider that legal focused topics require you to speak and understand German legal texts.

Topics:
- Phishing for Difference: How Does Phishing Impact Visually-Impaired Users?
- Wann wird Marketing im Security-Kontext ethisch bedenken?
- Untersuchung der Wahrnehmung von (technischen) Backdoors zur Strafverfolgung.
- Data-Governance-Act – Fluch oder Segen für den Datenschutz?
- Würde lieber kein Thema anbieten, notfalls "Was ist der Wert von Privatheit?"
- Massenüberwachung von Kommunikationsknotenpunkten und Chilling Effects -- Eine rechtliche und ethische Auseinandersetzung
- Verletzt algorithmische Analyse von personenbezogenen Daten durch KI Privatheit -- und wenn ja, wie schlimm ist das?

ATTENTION: The seminar is only for MASTER students!

Seminar Verification of Software (Master)
2513220, WS 22/23, 2 SWS, Language: English, Open in study portal

Content
The course presents a balance of theory and practice of software verification, including verification of parallel and distributed programs. These methods are the basis for the development of reliable (secure) software. Most information about the reliability of modern programs is based on testing methods that guarantee a certain probability of the program performing a given function. Formal proof of software correctness is the next step in improving the reliability of software for special applications in real-time systems, as well as in vital areas.

The goal of course is to form knowledge of basic terms and concepts of mathematical techniques and software verification; to study theoretical and practical foundations, principles and basic methods of software verification; as well as acquisition of practical skills to prove the correctness of applied algorithms, acquisition of skills which are necessary for further scientific and professional activities.

Topic 1. Tools for verification of serial and parallel programs written on algorithmic languages.
Topic 2. Verification of parallel software by Petri nets (PN).
Topic 3. Algebra and calculus of processes as verification technique of distributed programs.

Organizational issues

Literature
Laboratory work uses Tina modeling system, mCRL2 (http://projects.laas.fr/tina, https://www.mcrl2.org), modern open source software and models located in the GitHub.

Seminar Linked Data and the Semantic Web (Master)
2513313, WS 22/23, 3 SWS, Language: German/English, Open in study portal
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.

Seminar Real-World Challenges in Data Science and Analytics (Bachelor)
2513314, WS 22/23, 3 SWS, Language: German/English, Open in study portal

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.

Seminar Real-World Challenges in Data Science and Analytics (Master)
2513315, WS 22/23, 3 SWS, Language: German/English, Open in study portal

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.
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.
## 7.386 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

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<td>Seminar Selected Issues in Critical Information Infrastructures (Master)</td>
<td>Sunyaev</td>
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<tr>
<td>ST 2022</td>
<td>7900088</td>
<td>Seminar Business Information Systems (Master)</td>
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<td>Seminar Emerging Trends in Internet Technologies (Master)</td>
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<td>ST 2022</td>
<td>7900146</td>
<td>Seminar Emerging Trends in Digital Health (Master)</td>
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<td>ST 2022</td>
<td>7900147</td>
<td>Cognitive Automobiles and Robots</td>
<td>Zöllner</td>
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<tr>
<td>ST 2022</td>
<td>7900198</td>
<td>Seminar Data Science &amp; Real-time Big Data Analytics (Master)</td>
<td>Färber</td>
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<td>7900200</td>
<td>Seminar E-Voting (Master)</td>
<td>Volkamer</td>
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<tr>
<td>ST 2022</td>
<td>7900202</td>
<td>Seminar Knowledge Discovery and Data Mining (Master)</td>
<td>Sure-Vetter</td>
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</table>
### 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.

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**Below you will find excerpts from events related to this course:**

#### Seminar Advanced Topics in Petri Net Modeling (Master)

<table>
<thead>
<tr>
<th>Content</th>
<th>Open in study portal</th>
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</thead>
<tbody>
<tr>
<td>A system should be correct and efficient. We specify discrete event systems by Petri nets to apply formal analysis techniques based on graph theory and linear algebra to prove correctness. Extended models, such as colored Petri nets, are applied to implement performance evaluation via simulation. We start from case studies using the modeling system Tina and its facilities of model checking for verification of communication protocols. Then we apply Petri nets for the control of robotic manufacturing and consider the sharing of resources in automated manufacturing. Colored Petri nets allow more precise specification of systems, which also leads to reduced abilities for applying formal techniques. So the basic method of investigation is simulation. Our case study concerns modern technology of networking and models are supplied with measuring components which compute statistical characteristics directly in the process of simulation. Finally, a review of modern theory of infinite Petri nets and Sleptsov net computing are provided with a view on cybersecurity of intelligent grids and clouds and hyper-performance concurrent computations.</td>
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<td>Seminar (S)</td>
<td>Blended (On-Site/Online)</td>
</tr>
</tbody>
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**Organizational issues**

Die Veranstaltung findet auf Englisch statt. Die Bewerbung erfolgt über das Wiwi-Portal: https://portal.wiwi.kit.edu/ys/6074
**Literature**

Tools:
- CPN Tools [https://cpntools.org/](https://cpntools.org/)

References:
- Recent developments in papers on [http://daze.ho.ua](http://daze.ho.ua/)

**Seminar Knowledge Discovery and Data Mining (Master)**

<table>
<thead>
<tr>
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<th>Duration</th>
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<th>Language</th>
<th>Access</th>
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<td>2513309</td>
<td>SS 2022</td>
<td>3 SWS</td>
<td>English</td>
<td>Open in study portal</td>
</tr>
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</table>

**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](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/](https://portal.wiwi.kit.edu/).

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.

**Literature**

Detaillierte Referenzen werden zusammen mit den jeweiligen Themen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B. aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning

**Seminar Data Science & Real-time Big Data Analytics (Master)**

<table>
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<td>SS 2022</td>
<td>2 SWS</td>
<td>English</td>
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</table>

**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**

Further information as well as the registration form can be found under the following link:

http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

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Industrial Engineering and Management M.Sc.
Module Handbook as of 04/10/2022

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Cognitive Automobiles and Robots
2513500, SS 2022, 2 SWS, Language: German/English, Open in study portal

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.

Seminar E-Voting (Master)
2513553, SS 2022, 2 SWS, Language: German/English, Open in study portal

Content
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 Sonntag 03.04.2022, 23:59 Uhr, über die Seite https://portal.wiwi.kit.edu/ys/5915 möglich.

Security and Privacy Awareness
2400125, WS 22/23, 2 SWS, Open in study portal
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.

Note: The link to enrol is for every student, regardless of the study background!

Dates:
- Kick-Off: 22.10.21, 14:00 o'clock
- Final version: 23.01.2022
- Presentation: 04.02.2022, 13:00 o'clock

Topics will be assigned after the enrolment deadline, before the Kick-Off.

Consider that legal focused topics require you to speak and understand German legal texts.

Topics:
- Phishing for Difference: How Does Phishing Impact Visually-Impaired Users?
- Wann wird Marketing im Security-Kontext ethisch bedenklich?
- Untersuchung der Wahrnehmung von (technischen) Backdoors zur Strafverfolgung.
- Data-Governance-Act – Fluch oder Segen für den Datenschutz?
- Verletzt algorithmische Analyse von personenbezogenen Daten durch KI Privatheit – und wenn ja, wie schlimm ist das?
- Auseinandersetzung Massenüberwachung von Kommunikationsknotenpunkten und Chilling Effects -- Eine rechtliche und ethische Auseinandersetzung
- Würde lieber kein Thema anbieten, notfalls "Was ist der Wert von Privatheit?"
- Untersuchung der Wahrnehmung von (technischen) Backdoors zur Strafverfolgung.
- Wann wird Marketing im Security-Kontext ethisch bedenklich?
- Verletzt algorithmische Analyse von personenbezogenen Daten durch KI Privatheit – und wenn ja, wie schlimm ist das?

ATTENTION: The seminar is only for MASTER students!

Seminar Verification of Software (Master)
2513220, WS 22/23, 2 SWS, Language: English, Open in study portal
Blended (On-Site/Online)

Content
The course presents a balance of theory and practice of software verification, including verification of parallel and distributed programs. These methods are the basis for the development of reliable (secure) software. Most information about the reliability of modern programs is based on testing methods that guarantee a certain probability of the program performing a given function. Formal proof of software correctness is the next step in improving the reliability of software for special applications in real-time systems, as well as in vital areas.

The goal of course is to form knowledge of basic terms and concepts of mathematical techniques and software verification; to study theoretical and practical foundations, principles and basic methods of software verification; as well as acquisition of practical skills to prove the correctness of applied algorithms, acquisition of skills which are necessary for further scientific and professional activities.

Topic 1. Tools for verification of serial and parallel programs written on algorithmic languages.
Topic 2. Verification of parallel software by Petri nets (PN).
Topic 3. Algebra and calculus of processes as verification technique of distributed programs.

Organizational issues

Literature
Laboratory work uses Tina modeling system, mCRL2 (http://projects.laas.fr/tina, https://www.mcrl2.org), modern open source software and models located in the GitHub.

Seminar Linked Data and the Semantic Web (Master)
2513313, WS 22/23, 3 SWS, Language: German/English, Open in study portal
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.

Seminar Real-World Challenges in Data Science and Analytics (Bachelor)
2513314, WS 22/23, 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.

Seminar Real-World Challenges in Data Science and Analytics (Master)
2513315, WS 22/23, 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.

Seminar Cognitive Automobiles and Robots (Master)
2513500, WS 22/23, 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.
7.387 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

<table>
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**Events**

| ST 2022 | 2550132 | Seminar on Mathematical Optimization (MA) | 2 SWS | Seminar / 🗣 | Stein, Beck, Schwarze |
| ST 2022 | 2550473 | Seminar on Power Systems Optimization (Master) | 2 SWS | Seminar / �平均每堂 | Rebennack, Warwicker |
| ST 2022 | 2550491 | Seminar: Modern OR and Innovative Logistics | 2 SWS | Seminar / 🧩 | Nickel, Mitarbeiter |
| WT 22/23 | 2550131 | Seminar on Methodical Foundations of Operations Research (B) | 2 SWS | Seminar / 🗣 | Stein, Beck, Schwarze |
| WT 22/23 | 2550473 | Seminar on Power Systems Optimization (Master) | 2 SWS | Seminar / 🧩 | Rebennack, Warwicker |
| WT 22/23 | 2550491 | Seminar: Modern OR and Innovative Logistics | 2 SWS | Seminar / 🧩 | Nickel, Mitarbeiter |

**Exams**

| ST 2022 | 7900018_SS2022 | Seminar in Operations Research A (Master) |  | Stein |
| ST 2022 | 7900199 | Digitization in the Steel Industry |  | Nicki |
| ST 2022 | 7900243 | Seminar: Modern OR and Innovative Logistics |  | Nicki |
| ST 2022 | 7900348 | Seminar on Power Systems Optimization (Master) |  | Rebennack |
| ST 2022 | 7900349 | Seminar Recent Topics in Optimization (Master) |  | Rebennack |
| WT 22/23 | 7900011_WS2223 | Seminar in Operations Research B (Bachelor) |  | Stein |

**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.

*Below you will find excerpts from events related to this course:*
Seminar: Modern OR and Innovative Logistics
2550491, SS 2022, 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.

Seminar on Methodical Foundations of Operations Research (B)
2550131, WS 22/23, 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 students 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 scientific reasoning. Also rhetorical 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 Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

<table>
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<th>Seminar: Modern OR and Innovative Logistics</th>
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<tr>
<td>2550491, WS 22/23, 2 SWS, Language: German</td>
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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 rhetorical skills.

Organizational issues
wird auf der Homepage bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
7.388 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

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<td>Seminar on Mathematical Optimization (MA)</td>
<td>Stein, Beck, Schwarz</td>
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<tr>
<td>ST 2022 2550473</td>
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<td>Seminar on Power Systems Optimization (Master)</td>
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<td>Seminar in Operations Research B (Bachelor)</td>
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**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**
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**Below you will find excerpts from events related to this course:**

**Seminar: Modern OR and Innovative Logistics**
2550491, SS 2022, 2 SWS, Language: German, Open in study portal
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.io.r.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

Seminar on Methodical Foundations of Operations Research (B)
2550131, WS 22/23, 2 SWS, Language: German, Open in study portal

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 students 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 scientific reasoning. Also rhetoric 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 Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbereitung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

Seminar: Modern OR and Innovative Logistics
2550491, WS 22/23, 2 SWS, Language: German, Open in study portal

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
wird auf der Homepage bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
7.389 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

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**Events**

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**Exams**

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**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.

*Below you will find excerpts from events related to this course:*

**Predictive Data Analytics - An Introduction to Machine Learning**

2500013, SS 2022, SWS, Language: English, [Open in study portal](https://campus.kit.edu/)

**Seminar (S)**  
Blended (On-Site/Online)
Content
Modern methods from artificial intelligence and machine learning, in particular deep learning methods based on multi-layered artificial neural networks, provide unprecedented tools for data analysis and prediction. Over the past years, they have transformed many scientific fields and have become ubiquitous in real-world applications from speech recognition to self-driving cars.

This seminar will provide a broad introduction to machine learning from statistical foundations to applications in the sciences, economics and engineering. The focus will be on modern machine learning methods for predictive data analytics such as random forests, gradient boosting machines and neural networks, their trans-disciplinary application to supervised learning tasks, and approaches to gain insight into the 'black box' of machine learning models. Lectures on the theoretical background will be accompanied by hands-on programming exercises in Python that will cover practical aspects of implementing machine learning methods for analyzing scientific and real-world datasets.

Organizational issues
The seminar consists of three parts:

1. A 3-day block course of lectures and hands-on programming exercises will take place on April 11-13, 2022, either online or in person at Campus South, depending on the Covid-19 situation and regulations. Participation is mandatory. Some familiarity with basic concepts of probability theory and statistics is expected, as well as basic programming skills in Python. For the programming exercises, participants are expected to bring their own laptop with Python and relevant libraries installed.

2. Afterwards, all students will conduct a project for which they will choose a dataset from a list of scientific and real-world datasets and apply what they have learned in the course. Exemplary tasks include predictions of AirBnB prices, wine ratings, salaries, air quality, electricity prices or wildfires. The (potentially preliminary) results will be presented in a meeting during the semester (0.5 days, date to be determined, either online or in person), in a presentation of max. 15 minutes. Participation is mandatory.

3. A final report on the project of 10-20 pages and the code has to be submitted by September 30, 2022. The final grade will be based on the active participation in the seminar (10%), the presentation (30%) and the final report (60%).
7.390 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

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Exams

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### 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.

### Below you will find excerpts from events related to this course:

#### Predictive Data Analytics - An Introduction to Machine Learning
2500013, SS 2022, SWS, Language: English, Open in study portal

Seminar (S)
Blended (On-Site/Online)
Content
Modern methods from artificial intelligence and machine learning, in particular deep learning methods based on multi-layered artificial neural networks, provide unprecedented tools for data analysis and prediction. Over the past years, they have transformed many scientific fields and have become ubiquitous in real-world applications from speech recognition to self-driving cars.

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3. A final report on the project of 10-20 pages and the code has to be submitted by September 30, 2022. The final grade will be based on the active participation in the seminar (10%), the presentation (30%) and the final report (60%).

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben.
7.391 Course: Seminar in Transportation [T-BGU-100014]

**Responsible:** Dr.-Ing. Bastian Chlond
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

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**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
Course: Seminar Methods along the Innovation process [T-WIWI-110987]

7.392 Course: Seminar Methods along the Innovation process [T-WIWI-110987]

**Responsible:** Dr. Daniela Beyer

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

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**Competence Certificate**
Alternative exam assessment.

**Recommendation**
Prior attendance of the course Innovation Management [2545015] is recommended.
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

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**Events**

| WT 22/23 | 6232907 | Seminar Modellierung und Simulation im Verkehrswesen | 2 SWS | Seminar / 🧩 | Vortisch, Kagerbauer, Mitarbeiter/innen |

**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
## 7.394 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  

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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.

*Below you will find excerpts from events related to this course:*
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
### 7.395 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

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**Legend:** 🗣️ Online, 🥑 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled
### 7.396 Course: Seminar: Commercial and Corporate Law in the IT Industry [T-INFO-111405]

**Responsible:** Prof. Dr. Thomas Dreier  
Dr. Georg Nolte  

**Organisation:** KIT Department of Informatics  

**Part of:** M-INFO-101216 - Private Business Law  

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, x Cancelled
7 COURSES

T 7.397 Course: Seminar: IT- Security Law [T-INFO-111404]

Responsible: Martin Schallbruch
Organisation: KIT Department of Informatics
Part of: M-INFO-101217 - Public Business Law

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Events

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<td>WT 22/23</td>
<td>7500182</td>
<td>Seminar: Legal Studies II</td>
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<td>Dreier, Boehm, Raabe</td>
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Industrial Engineering and Management M.Sc.
Module Handbook as of 04/10/2022
7 COURSES

Course: Seminar: Legal Studies I [T-INFO-101997]

Responsible: Prof. Dr. Thomas Dreier
Organisation: KIT Department of Informatics
Part of: M-WIWI-101808 - Seminar Module

<table>
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Events

| ST 2022 | 2400005 | Governance, Risk & Compliance | 2 SWS | Seminar / 🗣 | Herzig |
| ST 2022 | 2400061 | Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung | 2 SWS | Seminar / 🗣 | Bless, Boehm, Hartenstein, Mädche, Zitterbart, Volkamer |
| ST 2022 | 2400078 | Die Bedeutung von ISMS im Datensicherheitsrecht | 2 SWS | Seminar / 🗣 | Raabe |
| ST 2022 | 2400168 | „Vom Original zur Kopie und vom Analogzen zum Digitalen“ | 2 SWS | Seminar / 🗣 | Dreier, Jehle |
| ST 2022 | 2400240 | Grundlagen Ethik und IT | 2 SWS | Seminar / 🗣 | Dreier |
| ST 2022 | 24820 | Current Issues in Patent Law | 2 SWS | Seminar / Blended | Melullis |
| WT 22/23 | 2400142 | Seminar Urheberrecht | 2 SWS | Seminar / 🗣 | Dreier |
| WT 22/23 | 2513214 | Seminar Information security and Data protection (Bachelor) | 2 SWS | Seminar / Blended | Oberweis, Volkamer, Boehm, Alpers, Dügün, Schiefer, Veit, Ballreich, Gottschalk |

Exams

| ST 2022 | 7500106 | Title not available | Bless, Hartenstein, Mädche, Zitterbart, Boehm, Sunyaev |
| ST 2022 | 7500140 | Seminar: Legal Studies I | Dreier, Boehm, Melullis, Matz |
| WT 22/23 | 7500182 | Seminar: Legal Studies II | Dreier, Boehm, Raabe |
| WT 22/23 | 7500232 | Seminar Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection | Reussner |

Legend: 🖥 Online, Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Below you will find excerpts from events related to this course:

Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung
2400061, SS 2022, 2 SWS, Open in study portal

Content

- Registration via https://portal.wiwi.kit.edu/ys/5877

Organizational issues

nach Vereinbarung
### 7.399 Course: Seminar: Legal Studies II [T-INFO-105945]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-WIWI-101808 - Seminar Module

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#### Exams

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Legend:  🖥 Online,  🧩 Blended (On-Site/Online),  🗣 On-Site,  ❎ Cancelled

Below you will find excerpts from events related to this course:

### Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung

2400061, SS 2022, 2 SWS, Open in study portal  
**Seminar (S) On-Site**

**Content**

- Registration via [https://portal.wiwi.kit.edu/ys/5877](https://portal.wiwi.kit.edu/ys/5877)

**Organizational issues**

nach Vereinbarung

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### Security and Privacy Awareness

2400125, WS 22/23, 2 SWS, 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.

Note: The link to enrol is for every student, regardless of the study background!

Dates:
- Kick-Off: 22.10.21, 14:00 o'clock
- Final version: 23.01.2022
- Presentation: 04.02.2022, 13:00 o'clock

Topics will be assigned after the enrolment deadline, before the Kick-Off.

Consider that legal focused topics require you to speak and understand german legal texts.

Topics:
- Phishing for Difference: How Does Phishing Impact Visually-Impaired Users?
- Wann wird Marketing im Security-Kontext ethisch bedenklich?
- Untersuchung der Wahrnehmung von (technischen) Backdoors zur Strafverfolgung.
- Data-Governance-Act – Fluch oder Segen für den Datenschutz?
- Würde lieber kein Thema anbieten, notfalls "Was ist der Wert von Privatheit?"
- Massenüberwachung von Kommunikationsknotenpunkten und Chilling Effects -- Eine rechtliche und ethische Auseinandersetzung
- Verletzt algorithmische Analyse von personenbezogenen Daten durch KI Privatheit -- und wenn ja, wie schlimm ist das?

ATTENTION: The seminar is only for MASTER students!
### 7.400 Course: Seminar: Patent Law [T-INFO-111403]

**Responsible:** Markus Dammler  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔍 On-Site, ✗ Cancelled
7 COURSES

Course: Sensors [T-ETIT-101911]

7.401 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

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Legend: 🖥 Online, 🏠 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
Course: Service Design Thinking [T-WIWI-102849]

**Responsible:** Prof. Dr. Gerhard Satzger

**Organisation:** KIT Department of Economics and Management

**Part of:** M-WIWI-101503 - Service Design Thinking

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**Exams**

| ST 2022 | 7900258 | Practical Seminar Service Innovation | Satzger |
| ST 2022 | 7900314 | Service Design Thinking | Satzger |

**Competence Certificate**

Alternative exam assessment.

**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 (http://sdt-karlsruhe.de).

Furthermore, the KSRI conducts an information event for applicants every year in May.

This module is part of the KSRI Teaching Program „Digital Service Systems“. For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.
7.403 Course: Service Innovation [T-WIWI-102641]

**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

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ❌ Cancelled

**Competence Certificate**

Note: 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.

The assessment consists of a written exam (60 min.). A bonus can be acquired through successful participation in the exercise. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by one grade (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

None

**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.

Below you will find excerpts from events related to this course:

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Industrial Engineering and Management M.Sc.
Module Handbook as of 04/10/2022
Content
Continuous innovation is a prerequisite for firms to stay competitive. While innovation in manufacturing or agriculture can build on a considerable body of research, experience and best practices, innovation in services has not reached the same level of maturity. This course takes a close look at the topic of service innovation. We will lay the foundations with an initial overview of service innovation including the basic concepts, challenges and innovation processes. We will compare product and service innovation and understand how innovation diffusion works.

The second part focuses on applicable methods and tools for service innovation: we will cover possible sources of innovations, ways to identify opportunities for innovations and the potential of service innovations built on data. For example, open and closed innovation approaches will be contrasted, the benefits of leveraging user communities to drive innovation will be explored and the human-centric innovation approach (Service) Design Thinking will be introduced. We will also look into the opportunities that technology offers for service innovation.

The last part of the lecture covers the management of service innovation and insights from practice. You will understand obstacles and enablers, and learn how to manage, incentivize and foster service innovation.

Please note: 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-centred innovation methods) will remain. New content will cover topics such as digital platforms and ecosystems, IoT and smart service innovation, and business models.

Literature
7.404 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

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**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
7.405 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

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**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
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

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**Events**

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**Exams**

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**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:*

**Simulation Game in Energy Economics**

| 2581025, SS 2022, 3 SWS, Language: German, Open in study portal |

**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 and markets are advantageous.

**Organizational issues**

CIP-Pool West, Raum 102, Geb. 06.41 - siehe Institutsaushang

**Literature**

*Weiterführende Literatur:*

7.407 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

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<td>2114095 Simulation of Coupled Systems</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
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**Exams**

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</table>

**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 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.

**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 knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- 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 hydraulics 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

Below you will find excerpts from events related to this course:
Simulation of Coupled Systems

2114095, SS 2022, 2 SWS, Language: German, Open in study portal

Lecture (V) On-Site

Content

- Knowledge of the basics of multi-body and hydraulic simulation programs
- Possibilities of coupled simulations
- Development of a simulation model by using the example of a wheel loader
- Documentation of the result in a short report

It is recommended to have:

- Knowledge of ProE (ideally in current version)
- Basic knowledge of Matlab/Simulink
- Basic knowledge of dynamics of machines
- Basic knowledge of hydraulics

- regular attendance: 21 hours
- total self-study: 92 hours

Literature

Weiterführende Literatur:

- Diverse Handbücher zu den Softwaretools in PDF-Form
- Informationen zum verwendeten Radlader
7.408 Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

**Responsible:** Prof. Dr.-Ing. Marcus Geimer  
Yusheng Xiang

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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<td>76-T-MACH-108888</td>
<td>Simulation of Coupled Systems - Advance</td>
<td>Geimer</td>
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</table>

**Competence Certificate**

Preparation of semester report

**Prerequisites**

none
7.409 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

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<td>Grade to a third</td>
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Events

| ST 2022 | 6241801 | Site Management | 1 SWS | Lecture / Practice ( / ) | N.N. |

Exams

| ST 2022 | 8240103427 | Site Management | Haghsheno |

Legend:  🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None
### 7.410 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

<table>
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**Events**

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<tr>
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<td>(Smart) Energy Infrastructure</td>
<td>2 SWS</td>
<td>Lecture / 🔴</td>
<td>Ardone, Pustisek</td>
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**Exams**

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<th>Course</th>
<th>Type</th>
<th>Instructor(s)</th>
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<td>ST 2022</td>
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<td>Lecture (V)</td>
<td>Fichtner</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Canceled

**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.

**Prerequisites**

None.

**Below you will find excerpts from events related to this course:**

#### (Smart) Energy Infrastructure

2581023, WS 22/23, 2 SWS, Language: German, Open in study portal

**Content**

- Basic terms and concepts
- Meaning of infrastructure
- Excursus: regulation of infrastructure
- Natural gas transportation
- Natural gas storage
- Electricity transmission
- (Overview) Crude oil and oil product transportation

**Organizational issues**

Blockveranstaltung, Termine s. Aushang
7.411 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

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</table>

**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**
The lecture will be read for the first time in winter term 2018/19.
7.412 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

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**Events**

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<td>Social Choice Theory</td>
<td>Lecture</td>
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<td>Müller, Kretz</td>
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<td>Practice</td>
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<td>Social Choice Theory (Make-up Date)</td>
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**Exams**

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<td>Social Choice Theory (Make-up Date)</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), ☭ On-Site, ☑ Cancelled

**Competence Certificate**
The assessment consists of an alternative exam assessment (open book exam). The exam takes place in every summer semester.

**Prerequisites**
None

**Below you will find excerpts from events related to this course:**

**Social Choice Theory**
2520537, SS 2022, 2 SWS, Language: English, [Open in study portal]

**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 proving the Gibbard-Satterthwaite theorem.

**Literature**
Main texts:

Secondary texts:
Course: Sociotechnical Information Systems Development [T-WIWI-109249]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management

**Type**  | **Credits** | **Grading scale** | **Recurrence** | **Version**
---|---|---|---|---
Examination of another type | 4,5 | Grade to a third | Each term | 2

**Events**

| ST 2022 | 2512400 | Advanced Lab Development of Sociotechnical Information Systems (Bachelor) | 3 SWS | Practical course / Online | Sunyaev, Pandl, Goram  
| ST 2022 | 2512401 | Development of Sociotechnical Information Systems (Master) | 3 SWS | Practical course / Online | Sunyaev, Pandl, Goram

**Exams**

| ST 2022 | 7900173 | Advanced Lab Development of Sociotechnical Information Systems (Master) | Sunyaev  
| WT 22/23 | 7900080 | Advanced Lab Development of Sociotechnical Information Systems (Bachelor) | Sunyaev  
| WT 22/23 | 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 an implementation and a final thesis documenting the development and use of the application.

**Prerequisites**
None.

Below you will find excerpts from events related to this course:

**Advanced Lab Development of Sociotechnical Information Systems (Bachelor)**  
2512400, SS 2022, 3 SWS, Language: German/English, [Open in study portal](#)  
Practical course (P)  
Online

**Content**
The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

**Development of Sociotechnical Information Systems (Master)**  
2512401, SS 2022, 3 SWS, Language: German/English, [Open in study portal](#)  
Practical course (P)  
Online

**Content**
The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.
7.414 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

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### Events

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<th>Software Quality Management</th>
<th>2 SWS</th>
<th>Lecture</th>
<th>Alpers</th>
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<td>2511209</td>
<td>Übungen zu Software-Qualitätsmanagement</td>
<td>1 SWS</td>
<td>Practice</td>
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### Exams

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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:

### Software Quality Management

2511208, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

#### Lecture (V)

- **On-Site**

**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 software 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

- 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.
7.415 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-101496 - Growth and Agglomeration  
- M-WIWI-101497 - Agglomeration and Innovation

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**Events**

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<td>Spatial Economics</td>
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<td>Lecture / 🗣</td>
<td>Ott</td>
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<td>Practice</td>
<td>WT 22/23 2561261</td>
<td>Exercise for Spatial Economics</td>
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**Exams**

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**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. The attendance of the course "Introduction to economic policy" [2560280] is recommended.

**Annotation**  
Due to the research semester of Prof. Dr. Ingrid Ott, the course will not be offered in the winter semester 2021/22. The exam will take place. Preparation materials can be found in ILIAS.

*Below you will find excerpts from events related to this course:*

**Spatial Economics**  
2561260, WS 22/23, 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

Weitere Literatur wird in der Vorlesung bekanntgegeben.
(Further literature will be announced in the lecture.)
7.416 Course: Special Topics in Highway Engineering and Environmental Impact Assessment [T-BGU-101860]

**Responsible:** Prof. Dr.-Ing. Ralf Roos  
**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences  
**Part of:** M-BGU-100999 - Highway Engineering

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### Events

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<th>1 SWS</th>
<th>Lecture / 🗣</th>
<th>Roos</th>
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<td>6233807</td>
<td>Besondere Kapitel im Straßenwesen</td>
<td>1 SWS</td>
<td>Lecture / 🗣</td>
<td>Roos</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**  
oral exam with 15 minutes

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
Course: Special Topics in Information Systems [T-WIWI-109940]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management

Part of:
- M-WIWI-101410 - Business & Service Engineering
- M-WIWI-101411 - Information Engineering
- M-WIWI-101506 - Service Analytics
- M-WIWI-103720 - eEnergy: Markets, Services and Systems

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Exams

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<tr>
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<td>7900224</td>
<td>Special Topics in Information Systems</td>
<td>Weinhardt</td>
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<td>ST 2022</td>
<td>7900286</td>
<td>Sustainability through Digitalization: Development of a Low-cost Do-it-Yourself Smart Meter Infrastructure together with an Energy App</td>
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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.
7.418 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)

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<td>4 SWS</td>
<td>Seminar / 🗣</td>
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<td>Terzidis</td>
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</table>

**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.

*Below you will find excerpts from events related to this course:*

**Startup Experience**  
2545004, SS 2022, 4 SWS, Language: English, [Open in study portal](#)
Content

From the conception of an idea to the final pitch, experience the life of a founder yourself through the seminar Startup X. Challenge yourself to experience the life of an entrepreneur and learn how to attain resources to realize your vision.

Go through the different districts with us to let your idea become a validated business model. You will start your entrepreneurial journey in the Opportunity district, where you will open your eyes to the world's needs and discover your core values and competencies. In the Problem and Solution districts, you will find out the pains of your customers and how you can design, build, and test a solution for them. In the Market district, you will identify the competitors and learn how to reach your customers. The Company district will enable you to set up your own organization, including the core people, core assets, and key activities. Your ability to express your business idea to investors and stakeholders will be developed in the Communication district. Prototyping, business model development, and pitching are part of the seminar.

Learning Objectives

The pedagogical approach is that of action learning. In a team, you will experience typical challenges and processes related to setting up a new business and develop the corresponding entrepreneurial competences.

After completing this course, the course participants will be able to:

- Describe why personal and team core values are essential for team formation and how they can affect startup projects
- Develop a sound value proposition for a target customer
- Recognize Business Opportunities
- Build a Prototype
- Create concrete Business Model
- Pitch their Business Ideas to potential investors

Organizational issues

Please note that this seminar will be held in presence at the current planning stage. Further information will be announced via ILIAS.
Content

In the Startup Experience course, you develop entrepreneurial competences that enable you to develop a new venture. In an entrepreneurial project, you have three main goals:

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 provide value for them? How can you use specific resources, including technology to develop a solution?
3. How can you conceive and set up a viable organization? Which business model do you suggest to create, deliver, and capture value?

After the teams are formed, a teambuilding session follows so that the team members get to know each other better and establish the cornerstones for working together. In this way, they create a basis for their joint project.

The focus of the seminar is on technology-based venturing. In this context, we will use the TAS (Technology-Application-Selection) approach developed at the EnTechnon. By default, we start from KIT patents (but you can also ‘bring with you’ other new technologies). We analyze the technology and use creativity techniques to find potential applications. Among other approaches, we will systematically explore applications around the UN sustainable development goals. Prototyping, business model development, and pitching are part of the seminar.

Learning Objectives

You will be able to explore deep technology venturing opportunities and create new products and services. The pedagogical approach is that of action learning. In a team, you will experience typical challenges and processes related to setting up a new business and develop the corresponding entrepreneurial competences.

After completing this course, the course participants will be able to:

- Characterize the core process of Deep Tech Venturing.
- Work effectively in a cohesive team,
- Use a technology characterization canvas to extract the core characteristics of a technology,
- Apply creativity techniques to ideate potential applications,
- Use utility analysis approaches to select a promising technology application,
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method,
- Use approaches of technology impact assessment to implement responsible innovation processes,
- Apply advanced business modeling methods to develop a sound business concept,
- Develop and deliver a concise presentation (“pitch”) to communicate your project.

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. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.
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

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**Events**

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<td>2 SWS</td>
<td>Lecture</td>
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**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:*

**Statistical Modeling of Generalized Regression Models**
2521350, WS 22/23, 2 SWS, [Open in study portal]

**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
7.420 Course: Steuerung mobiler Arbeitsmaschinen [T-MACH-111821]

**Responsible:** Simon Becker  
Prof. Dr.-Ing. Marcus Geimer  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101267 - Mobile Machines  

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<td>Control of mobile machines</td>
<td>Becker, Geimer</td>
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</table>

**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. The preexamination with the code T-MACH-111820 must be passed.
7 COURSES

Course: Steuerung mobiler Arbeitsmaschinen-Vorleistung [T-MACH-111820]

7.421 Course: Steuerung mobiler Arbeitsmaschinen-Vorleistung [T-MACH-111820]

Responsible: Simon Becker
Prof. Dr.-Ing. Marcus Geimer

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101267 - Mobile Machines

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Exams

| ST 2022   | 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
7 COURSES

7.422 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

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<td>Each winter term</td>
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Events

WT 22/23 2521331 Stochastic Calculus and Finance 2 SWS Lecture 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 22/23, 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:


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

- Stochastic Finance: An Introduction in Discrete Time by H. Föllmer, A. Schied, de Gruyter, 2011
- Introduction to Stochastic Calculus Applied to Finance by D. Lamberton, B. Lapeyre, Chapman&Hall, 1996
7.423 Course: Strategic Finance and Technology Change [T-WIWI-110511]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

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</table>

Exams

| ST 2022 | 7900268 | Strategic Finance and Technology Change | Ruckes |

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. 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.

Prerequisites

None

Recommendation

Attending the lecture “Financial Management” is strongly recommended.
### 7.424 Course: Strategic Foresight China [T-WIWI-110986]

**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

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**Competence Certificate**  
Alternative exam assessment.

**Recommendation**  
Prior attendance of the course Innovation Management [2545015] is recommended.

**Annotation**  
The course can no longer be taken as of winter semester 2022/2023.
7.425 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

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**Exams**

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.426 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

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Canceled

**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.

Below you will find excerpts from events related to this course:

**Strategy and Management Theory: Developments and "Classics" (Master)**
2577921, WS 22/23, 2 SWS, Language: German, Open in study portal
Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
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 final meeting. Details on the design of the success control will be announced during the lecture.

Note:
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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
siehe Homepage
7.427 Course: Structural and Phase Analysis [T-MACH-102170]

Responsible: Dr. Manuel Hinterstein  
Dr.-Ing. Susanne Wagner

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

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Events

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<td>2 SWS</td>
<td>Lecture / 🗣</td>
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Competence Certificate

Oral examination

Prerequisites

none

Below you will find excerpts from events related to this course:

Structural and phase analysis

2125763, WS 22/23, 2 SWS, Language: German, Open in study portal

Literature

1. Moderne Röntgenbeugung - Röntgendiffraktometrie für Materialwissenschaftler, Physiker und Chemiker, Spieß, Lothar / Schwarzer, Robert / Behnken, Herfried / Teichert, Gerd B.G. Teubner Verlag 2005
# 7.428 Course: Structural Ceramics [T-MACH-102179]

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Exams**

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<td>Structural Ceramics</td>
<td>Oral examination</td>
<td>Hoffmann, Wagner, Schell</td>
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</table>

**Competence Certificate**  
Oral examination, 20 min

**Prerequisites**

none

below you will find excerpts from events related to this course:

**Structural Ceramics**

2126775, SS 2022, 2 SWS, Language: German, Open in study portal  
Lecture (V) On-Site

**Literature**

Course: Successful Transformation Through Innovation [T-WIWI-111823]

7.429

**Responsible:** Malte Busch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

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**Exam**

| ST 2022 | 7900025 | Successful Transformation Through Innovation | Busch |

**Competence Certificate**

Alternative exam assessments. The grade consists of a presentation of the results (50%) and a seminar paper (50%).

**Recommendation**

Prior attendance of the course Innovation Management [2545015] is recommended.
7.430 Course: Superhard Thin Film Materials [T-MACH-102103]

**Responsible:** apl. Prof. Dr. Sven Ulrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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**Competence Certificate**

oral examination (ca. 30 Minuten)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Superhard Thin Film Materials**

2177618, WS 22/23, 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
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 Boronitride
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 24.10.22.
Den entsprechenden MS Teams Link erhalten Sie dann per E-Mail am 26.10.22.

Literature
G. Kienel (Herausgeber): Vakuumbeschichtung 1 - 5, VDI Verlag, Düsseldorf, 1994

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed
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<tr>
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<th>Prof. Dr. Andreas Oberweis</th>
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<td>M-WIWI-101472 - Informatics</td>
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**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.
### 7.432 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

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**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.
7.433 Course: Supply Chain Management in the Automotive Industry [T-WIWI-102828]

**Responsible:** Tilman Heupel  
Hendrik Lang

**Organisation:** KIT Department of Economics and Management

**Part of:**  
M-WIWI-101412 - Industrial Production III  
M-WIWI-101471 - Industrial Production II

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**Exams**

| ST 2022 | 7981957 | Supply Chain Management in the Automotive Industry | Schultmann |

**Competition 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. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The lecture will be offered for the next time in the summer semester 2023.
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

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Exams

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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. 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:

Supply Chain Management with Advanced Planning Systems

2581961, SS 2022, 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
   3.4. 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
7 COURSES

Course: Sustainability in Mobility Systems [T-BGU-111057]

7.435 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

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Events
WT 22/23 6232906 Sustainability in Mobility Systems 2 SWS Lecture / 🗣 Kagerbauer, Plötz, Gnann

Exams
ST 2022 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
7.436 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

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ⌚ Cancelled

**Competence Certificate**

oral exam (20 minutes)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Sustainable Vehicle Drivetrains**

2133132, WS 22/23, 2 SWS, Open in study portal

**Content**

Sustainability  
Environmental balance  
Legislation  
Alternative fuels  
BEV  
Fuel cell  
Hybrid drives
7 COURSES

Course: Systematic Materials Selection [T-MACH-100531]

### 7.437 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

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Legends:
🖥 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).

Below you will find excerpts from events related to this course:

**Systematic Materials Selection**
2174576, SS 2022, 3 SWS, Language: German, Open in study portal

Lecture (V)  
Blended (On-Site/Online)
Content
Important aspects and criteria of materials selection are examined and guidelines for a systematic approach to materials selection are developed. 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:
Wiling SPO 2007 (B.Sc.)
The course Material Science I [21760] has to be completed beforehand.

Wiling (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

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
### 7.438 Course: Tax Law [T-INFO-111437]

**Responsible:** Detlef Dietrich  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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#### Exams

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<th>Tax Law</th>
<th>Dreier, Matz</th>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
Course: Technologies for Innovation Management [T-WIWI-102854]

**Responsible:** Dr. Daniel Jeffrey Koch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

**Type:** Examination of another type

**Credits:** 3

**Grading scale:** Grade to a third

**Recurrence:** Each winter term

**Version:** 2

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**Exams**

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**Competence Certificate**
Presentation and individual paper (ca. 15 pages) as alternative exam assessment.

**Prerequisites**
None

**Recommendation**
Prior attendance of the course Innovationsmanagement: Konzepte, Strategien und Methoden is recommended.

*Below you will find excerpts from events related to this course:*

**Technologies for Innovation Management**
2545106, WS 22/23, 2 SWS, Language: German, Open in study portal

**Content**
The seminar “Technologies for Innovation Management” will focus on the early phase or fuzzy front end in innovation management. Technologies can be of great importance here, above all in the supply of information. In globally distributed R & D organizations, it is necessary to collect as much information as possible on new technological developments in the early phase of the innovation process. Information and communication technologies can be supported.

**Literature**
Werden in der ersten Veranstaltung bekannt gegeben.
7.440 Course: Technology Assessment [T-WIWI-102858]

**Responsible:** Dr. Daniel Jeffrey Koch

**Organisation:** KIT Department of Economics and Management

**Part of:**
- M-WIWI-101507 - Innovation Management
- M-WIWI-101507 - Innovation Management

**Type**
- Examination of another type

**Credits**
- 3

**Grading scale**
- Grade to a third

**Recurrence**
- see Annotations

**Version**
- 1

**Competence Certificate**
Alternative exam assessment.

**Prerequisites**
None

**Recommendation**
Prior attendance of the course Innovation Management is recommended.

**Annotation**
See German version.
### Course: Telecommunication and Internet Economics [T-WIWI-102713]

**Responsible:** Prof. Dr. Kay Mitusch  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101406 - Network Economics  
- M-WIWI-101409 - Electronic Markets

<table>
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<td>Grade to a third</td>
<td>Each winter term</td>
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**Events**

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<th>Code</th>
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**Exams**

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**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

Basic knowledge and skills of microeconomics from undergraduate studies (bachelor’s degree) are expected.

Particularly helpful but not necessary: Industrial Economics. Prior attendance of the lecture „Competition in Networks“ [26240] or "Industrial Organisation" is helpful in any case but not considered a formal precondition. The english taught course "Communications Economics" is complementary and recommendet for anyone interested in the sector.

### Annotation

Due to the research semester of Prof. Mitusch the course for partial performance will not be offered in the winter semester 2020/2021. An examination will be offered in each semester.

**Below you will find excerpts from events related to this course:**

### Literature

Weitere Literatur wird in den einzelnen Veranstaltungen angegeben
### Course: Telecommunications Law [T-INFO-101309]

**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

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**Events**

| ST 2022 | 24632 | Telekommunikationsrecht | 2 SWS | Lecture / 🗣 | Döveling |

**Exams**

| ST 2022 | 7500085 | Telecommunications Law | Dreier |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 7.443 Course: Tendering, Planning and Financing in Public Transport [T-BGU-101005]

**Responsibility:** 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

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**Events**

| ST 2022 | 6232807 | Wettbewerb, Planung und Finanzierung im ÖPNV | 2 SWS | Lecture / 🗣 | Pischon |

**Exams**

| ST 2022 | 8245101005 | Tendering, Planning and Financing in Public Transport | Vortisch |

**Legends:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

oral exam, appr. 20 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
Course: The negotiation of open innovation [T-WIWI-110867]

Responsible: Dr. Daniela Beyer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management

Competence Certificate
Non exam assessment.
The following aspects are included in the evaluation:

- Exposé of the seminar paper (15%)
- Preparation of the methodology (15%) (interview guide, quantitative survey, etc.)
- informed participation and preparation of the simulation game (20%)
- written elaboration (50%).

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.

Annotation
The course will be discontinued in the winter semester 2022/23.
7.445 Course: Tires and Wheel Development for Passenger Cars [T-MACH-102207]

**Responsible:** Hon.-Prof. Dr. Günter Leister

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

**Type**: Oral examination

**Credits**: 3

**Grading scale**: Grade to a third

**Recurrence**: Each summer term

**Version**: 1

**Events**

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**Exams**

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**Legend:** 🖥 Online, ⚡ Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

**Competence Certificate**

**Oral Examination**

Duration: 30 up to 40 minutes

Auxiliary means: none

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**Tires and Wheel Development for Passenger Cars**

2114845, SS 2022, 2 SWS, Language: German, Open in study portal

**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 including Design and manufacturing methods, Wheel testing
7. Tire pressure: 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
7.446 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

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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.
### 7.447 Course: Topics in Stochastic Optimization [T-WIWI-112109]

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<td>M-WIWI-102832 - Operations Research in Supply Chain Management</td>
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<td>M-WIWI-103289 - Stochastic Optimization</td>
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<td>Each winter term</td>
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</table>

**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.
### 7.448 Course: Trademark and Unfair Competition Law [T-INFO-101313]

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<td>Each term</td>
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**Responsible:** Dr. Yvonne Matz  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

**Events**

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<td>2 SWS</td>
<td>Lecture / 🗣</td>
<td>Matz</td>
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</table>

**Exams**

| ST 2022 | 7500051 | Trademark and Unfair Competition Law | Dreier, Matz |

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
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

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Events

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Exams

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Prerequisites
None

Recommendation
None

Annotation
None

Below you will find excerpts from events related to this course:

**Straßenverkehrstechnik**
6232703, WS 22/23, 2 SWS, 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
7.450 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

<table>
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### Events

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

### Prerequisites
None

### Recommendation
None

### Annotation
None

Below you will find excerpts from events related to this course:

**Simulation von Verkehr**
6232804, SS 2022, 2 SWS, Language: German, [Open in study portal]

**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:** Weyland, Claude
### Course: Traffic Management and Transport Telematics [T-BGU-101799]

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**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:** Oral examination  
- **Credits:** 3  
- **Grading scale:** Grade to a third  
- **Recurrence:** Each summer term  
- **Version:** 1

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None

**Exams**  
- ST 2022  
  - 8240101799  
  - Traffic Management and Transport Telematics  
  - Vortisch

**Legend:**  
- 🖥 Online  
- 🧩 Blended (On-Site/Online)  
- 🗣 On-Site  
- ✗ Cancelled
7.452 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

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**Exams**

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**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:

**Transport Economics**

**2560230, SS 2022, 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 logistics 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**

### 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

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), ☀ On-Site, ✗ Cancelled
Course: Transportation Systems [T-BGU-106610]

7.454

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

**Organisation:** KIT Department of Civil Engineering, Geo and Environmental Sciences

**Part of:** M-BGU-101064 - Fundamentals of Transportation

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None

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Legend: 🖥 Online, ⏳ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
# 7.455 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

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
7.456 Course: Turnkey Construction [T-BGU-111921]

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled

Competence Certificate
written exam, 60 min.

Prerequisites
none

Recommendation
none

Annotation
none
**Course: Tutorial Global Production [T-MACH-110981]**

**Responsible:** Prof. Dr.-Ing. Gisela Lanza  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101282 - Global Production and Logistics  
- M-MACH-101284 - Specialization in Production Engineering  
- M-MACH-105455 - Strategic Design of Modern Production Systems

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled

**Competence Certificate**  
Alternative achievement (ungraded). Successful completion of the case studies required. Further information will be announced in the course Global Production.

*Below you will find excerpts from events related to this course:*

**Tutorial Global Production**  
2149611, WS 22/23, 1 SWS, Language: German, Open in study portal  
Practice (Ü)  
Blended (On-Site/Online)
Content
The exercise serves as a supplement to the lecture Global Production and deals with the practical implementation of the management of global production networks of manufacturing companies. The contents conveyed in the lecture are put into practice in the exercise and supplemented by lectures from industry and research. The exercise initially builds on a basic understanding of the influencing factors and challenges of global production. Common methods and procedures for planning, designing and managing global production networks are applied in online case studies based on the restructuring of a fictitious company.

According to the lecture, the exercise is divided into three aspects: production strategy, network configuration and network management.

First of all, the exercise shows the connections between the company strategy and the production strategy and highlights the tasks necessary to define a production strategy. Subsequently, in the context of the design of global production networks, methods for site selection, site-specific adaptation of product design and production technology as well as for the establishment of a new production site and the adaptation of existing production networks to changing conditions are taught. With regard to the management of global production networks, the exercise primarily addresses the topic of procurement and supplier management in greater depth.

The topics in detail are:

- Production strategies for global production Networks
- From corporate strategy to production strategy
- Tasks of the production strategy (product portfolio management, recycling management, vertical integration planning, production-related research and development)
- Design of global production Networks
- Ideal-typical network structures
- Planning process for designing the network structure
- Adaptation of the network structure
- Choice of Location
- Production adjustment to suit the Location
- Management of global production Networks
- Coordination in global production Networks
- Procurement process

Learning Outcomes
The students ...

- are able to apply defined procedures for site selection and evaluate a site decision with the help of different Methods.
- are capable of selecting adequate design options for site-specific production and product design on a case-specific basis.
- can explain the central elements of the planning process when setting up a new production site.
- are capable of applying the methods for the design and layout of global production networks to individual Company problems.
- are able to show the challenges and potentials of the corporate divisions sales, procurement and research and development on a global level.

Workload:

e-Learning: ~ 20 h
regular attendance: ~ 10 h
self-study: covered in the course of the lecture.

Organizational issues
Start in der dritten Vorlesungswoche.
Termine werden vom Institut bekannt gegeben.
458 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-105597 - Facility Management in Hospitals

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**Competence Certificate**

written exam, 60 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
7.459 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

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**Competence Certificate**
oral exam, appr. 30 min.

**Prerequisites**
none

**Recommendation**
none

**Annotation**
none
### 7.460 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

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**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

Below you will find excerpts from events related to this course:

**Valuation**

- WT 22/23, 2530212, 2 SWS, Language: English, Open in study portal
- Lecture (V) Online

**Literature**

**Weiterführende Literatur**

Course: Vehicle Comfort and Acoustics I [T-MACH-105154]

**Responsible:** Prof. Dr. Frank Gauterin  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

**Type:** Oral examination  
**Credits:** 3  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

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**Competence Certificate**  
**Oral Examination**

**Duration:** approx. 30 to 40 minutes

**Auxiliary means:** none

**Prerequisites**  
Can not be combined with lecture T-MACH-102206

*Below you will find excerpts from events related to this course:*

**Vehicle Ride Comfort & Acoustics I**  
2114856, SS 2022, 2 SWS, Language: English, *Open in study portal*  
Lecture (V)  
Blended (On-Site/Online)

**Content**

1. Perception of noise and vibrations
2. Fundamentals of acoustics and vibrations
3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations
4. The relevance of tire and chassis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

An excursion will give insights in the development practice of a car manufacturer or a system supplier.

**Learning Objectives:**

The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chassis regarding driving comfort and acoustic under consideration of goal conflicts.
Organizational issues
You will find the lecture material on ILIAS. Please refer to https://fast-web-01.fast.kit.edu/PasswoerterIlias/ to get the ILIAS password
Kann nicht mit der Veranstaltung [2113806] kombiniert werden.
Can not be combined with lecture [2113806]
Genaue Termine entnehmen Sie bitte der Institushomepage.
Scheduled dates:
see homepage of the institute.
Classroom attendance depends on the development of the pandemic situation.

Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt

Vehicle Comfort and Acoustics I
2113806, WS 22/23, 2 SWS, Language: German, Open in study portal

Content
1. Perception of noise and vibrations
3. Fundamentals of acoustics and vibrations
3. Tools and methods for measurement, computing, simulation and analysis of noise and vibrations
4. The relevance of tire and chassis for the acoustic and mechanical driving comfort: phenomena, influencing parameters, types of construction, optimization of components and systems, conflict of goals, methods of development

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The students know what noises and vibrations mean, how they are generated, and how they are perceived by human beings. They have knowledge about the requirements given by users and the public. They know which components of the vehicle are participating in which way on noise and vibration phenomenon and how they could be improved. They are ready to apply different tools and methods to analyze relations and to judge them. They are able to develop the chassis regarding driving comfort and acoustic under consideration of goal conflicts.

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 [2114856] kombiniert werden.
Can not be combined with lecture [2114856]

Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt
Course: Vehicle Comfort and Acoustics II [T-MACH-105155]

**Responsible:** Prof. Dr. Frank Gauterin

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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<td>Vehicle Comfort and Acoustics II</td>
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</tbody>
</table>

**Competence Certificate**

**Oral Examination**

Duration: approx. 30 to 40 minutes

Auxiliary means: none

**Prerequisites**

Can not be combined with lecture T-MACH-102205

Below you will find excerpts from events related to this course:

**Vehicle Comfort and Acoustics II**

2114825, SS 2022, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V) Blended (On-Site/Online)
Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
   - phenomena
   - influencing parameters
   - types of construction
   - optimization of components and systems
   - conflicts of goals
   - methods of development

3. Noise emission of motor vehicles
   - noise stress
   - sound sources and influencing parameters
   - legal restraints
   - optimization of components and systems
   - conflict of goals
   - methods of development

Learning Objectives:
The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved. They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods. They are ready to analyze, to judge and to optimize the vehicle with its single components regarding acoustic and vibration phenomena. They are also able to contribute competently to the development of a vehicle regarding the noise emission.

Organizational issues
Das Vorlesungsmaterial wird auf ILIAS bereitgestellt. Das ILIAS-Passwort erhalten Sie unter https://fast-web-01.fast.kit.edu/PasswoerterIIias/
Kann nicht mit der Veranstaltung [2114857] kombiniert werden.
Can not be combined with lecture [2114857]
Je nach Pandemie Lage wird evtl. kurzfristig auf "Online Veranstaltung" geändert.

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.
Content
1. Summary of the fundamentals of acoustics and vibrations

2. The relevance of road surface, wheel imperfections, springs, dampers, brakes, bearings and bushings, suspensions, engines and drive train for the acoustic and mechanical driving comfort:
   - phenomena
   - influencing parameters
   - types of construction
   - optimization of components and systems
   - conflicts of goals
   - methods of development

3. Noise emission of motor vehicles
   - noise stress
   - sound sources and influencing parameters
   - legal restraints
   - optimization of components and systems
   - conflict of goals
   - methods of development

Learning Objectives:
The students have knowledge about the noise and vibration properties of the chassis components and the drive train. They know what kind of noise and vibration phenomena do exist, what are the generation mechanisms behind, which components of the vehicle participate in which way and how could they be improved. They have knowledge in the subject area of noise emission of automobiles: Noise impact, legal requirements, sources and influencing parameters, component and system optimization, target conflicts and development methods. They are ready to analyze, to judge and to optimize the vehicle with its single components regarding acoustic and vibration phenomena. They are also able to contribute competently to the development of a vehicle regarding the noise emission.

Organizational issues
You will find the lecture material on ILIAS. Please refer to https://fast-web-01.fast.kit.edu/PasswoerterIlias/ to get the ILIAS password
Genau Termine entnehmen Sie bitte der Institushomepage.
Kann nicht mit der Veranstaltung [2114825] kombiniert werden.
Scheduled dates:
see homepage of the institute.
Can not be combined with lecture [2114825].
Classroom attendance depends on the development of the pandemic situation

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.
The script will be supplied in the lectures.
7.463 Course: Virtual Engineering I [T-MACH-102123]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101283 - Virtual Engineering A

<table>
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<tr>
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<th>Type</th>
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<th>Recurrence</th>
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<td>Practice</td>
<td>Ovtcharova, Mitarbeiter</td>
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<td>Virtual Engineering I</td>
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<td>Practice</td>
<td>Ovtcharova</td>
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**Competence Certificate**  
Written examination 90 min.

**Prerequisites**  
None

Below you will find excerpts from events related to this course:

**Virtual Engineering I**  
2121352, WS 22/23, 2 SWS, Language: English, Open in study portal

**Content**  
The course includes:

- Conception of the product (system approaches, requirements, definitions, structure)
- Generation of domain-specific product data (CAD, ECAD, software, ...) and AI methods
- Validation of product properties and production processes through simulation
- Digital twin for optimization of products and processes using AI methods

After successful attendance of the course, students can:

- Conceptualize complex systems with the methods of virtual engineering and continue the product development in different domains
- Model the digital product with regard to planning, design, manufacturing, assembly and maintenance.
- Use validation systems to validate product and production in an exemplary manner.
- Describe AI methods along the product creation process.

**Literature**  
Vorlesungsfolien / Lecture slides

**Exercises Virtual Engineering I**  
2121353, WS 22/23, 2 SWS, Language: English, Open in study portal

**Content**  
The theoretical concepts and contents of the lecture will be trained within practical relevance by basic functionalities of VE System solutions.
Organizational issues
Practice dates will probably be offered on different afternoons (14:00 - 17:15) in two-week intervals at the IMI in Kriegsstrasse 77 / Übungstermine werden voraussichtlich an unterschiedlichen Nachmittagen (14:00 - 17:15) in zweiwöchigem Rhythmus am IMI in der Kriegsstrasse 77 angeboten.

Literature
Exercise script / Übungsskript
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

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<td>Virtual Engineering II</td>
<td>2/1</td>
<td>Lecture / Practice (VÜ)</td>
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**Exams**

| ST 2022 | 76-T-MACH-102124 | Virtual Engineering II | 76-T-MACH-102124 | Virtual Engineering II | Ovtcharova, Häfner | Ovtcharova |

**Competence Certificate**

Written examination 90 min.

**Prerequisites**

None

Below you will find excerpts from events related to this course:

**Virtual Engineering II**

2122378, SS 2022, 2/1 SWS, Language: English, Open in study portal

**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 Vorlesungsbeginn bekannt gegeben / Additional practice times (1 SWS) will be announced at the beginning of the lecture.

**Literature**

Vorlesungsfolien / Lecture slides
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
M-MACH-101283 - Virtual Engineering A

Type
Examination of another type

Credits
4

Grading scale
Grade to a third

Recurrence
Each term

Version
1

Events
ST 2022  2123350  Virtual Engineering Lab  3 SWS  Project (P / 🗣)  Ovtcharova, Hafner
WT 22/23  2123350  Virtual Engineering Lab  3 SWS  Project (P / 🗣)  Ovtcharova, Hafner

Exams
ST 2022  76-T-MACH-106740  Virtual Engineering Lab  Ovtcharova, Hafner

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:

Virtual Engineering Lab
2123350, SS 2022, 3 SWS, Language: German/English, Open in study portal

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

Virtual Engineering Lab
2123350, WS 22/23, 3 SWS, Language: German/English, Open in study portal

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 Homepage zur Lehrveranstaltung

Literature
Keine / None
7.466 Course: Virtual Solution Methods and Processes [T-MACH-111285]

**Responsible:** Dipl.-Ing. Thomas Maier
Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101281 - Virtual Engineering B
- M-MACH-101283 - Virtual Engineering A

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<td>Ovtcharova, Maier</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**Competence Certificate**
Graded examination performance of another type weighted according to: 30% project documentation, 30% colloquium and 40% successfully completed project task.

**Prerequisites**
None

**Recommendation**
None

*Below you will find excerpts from events related to this course:*

### Virtual Solution Methods and Processes

**2121003, SS 2022, 4 SWS, Language: German/English, Open in study portal**

**Project (PRO)**
On-Site

**Content**
Requirements, SysML, Modelica, high performance computing, process modeling, Virtual Twin

Students can:
- Collect requirements for large technical systems (e.g.: Helmholtz large-scale device KATRIN).
- Describe physical systems across domains with the modeling language Modelica and simulate the systems behavior.
- Generate complex FE meshes for simulations of structural mechanics, electrodynamics or fluid mechanics.
- Perform advanced simulations on mainframe computers and prepare and explain results in a self-explanatory manner.
- Individually design a small project and carry it out independently.

### Virtual Solution Methods and Processes

**2121003, WS 22/23, 4 SWS, Language: German/English, Open in study portal**

**Project (PRO)**
On-Site

**Content**
Requirements, SysML, Modelica, high performance computing, process modeling, Virtual Twin

Students can:
- Collect requirements for large technical systems (e.g.: Helmholtz large-scale device KATRIN).
- Describe physical systems across domains with the modeling language Modelica and simulate the systems behavior.
- Generate complex FE meshes for simulations of structural mechanics, electrodynamics or fluid mechanics.
- Perform advanced simulations on mainframe computers and prepare and explain results in a self-explanatory manner.
- Individually design a small project and carry it out independently.
7.467 Course: Virtual Training Factory 4.X [T-MACH-106741]

Responsible: Prof. Dr.-Ing. Jivka Ovtcharova
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101281 - Virtual Engineering B
         M-MACH-101283 - Virtual Engineering A

<table>
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<td>/ 🧩</td>
<td>Ovtcharova, Mitarbeiter</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Canceled

Competence Certificate
Assessment of another type (graded), Group project (project work, final presentation) for the modeling of production plants in VR

Prerequisites
none

Below you will find excerpts from events related to this course:

Virtual training factory 4.X
2123351, SS 2022, 3 SWS, Language: German, Open in study portal
Project (PRO)
Blended (On-Site/Online)

Content
In interdisciplinary teams, the creation of a product is implemented in the style of a start-up. The event is carried out across universities in cooperation with the HsKA.

Organizational issues
Siehe ILIAS

Literature
Keine / None

Virtual training factory 4.X
2123351, WS 22/23, SWS, Language: German, Open in study portal
On-Site

Content
In interdisciplinary teams, the creation of a product is implemented in the style of a start-up. The event is carried out across universities in cooperation with the HsKA.

Organizational issues
Siehe ILIAS zur Lehrveranstaltung

Literature
Keine / None
Course: Warehousing and Distribution Systems [T-MACH-105174]

**7.468 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

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**Events**

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<td>2 SWS</td>
<td>Furmans</td>
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**Exams**

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<td>Warehousing and Distribution Systems</td>
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**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

Below you will find excerpts from events related to this course:

**Warehousing and distribution systems**

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<td>Lecture (V)</td>
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</table>

**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
  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
- WISSE, 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
7.469 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

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Exams

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Competence Certificate
The examination is an oral examination with a duration of about 30 minutes (section 4 subsection 2 number 2 SPO).

Prerequisites
None
### 7.470 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

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<td>Horn, und Mitarbeiter</td>
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**Legend:** 🖥 Online, 📠 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

**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:** Written examination

**Credits:** 4.5

**Grading scale:** Grade to a third

**Recurrence:** Once

**Version:** 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.
7.472 Course: Welding Technology [T-MACH-105170]

**Responsible:** Dr. Majid Farajian  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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<td>Each winter term</td>
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**Exams**

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**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.

*Below you will find excerpts from events related to this course:*

**Welding Technology**

2173571, WS 22/23, 2 SWS, Language: German, Open in study portal

Block (B)  
Blended (On-Site/Online)
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
Blockveranstaltung im Januar und Februar. Zur Teilnahme an der Vorlesung ist eine Anmeldung beim Dozenten per E-Mail an Farajian@sv-duisburg.de erforderlich. Vorlesungstermine und Hörsaal werden den angemeldeten Teilnehmern Anfang des Jahres mitgeteilt.

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.
### 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

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**Events**

| ST 2022 | 2577922 | Workshop Business Wargaming - Analyse strategischer Interaktionen (Master) | 2 SWS | Seminar / 🗣 | Lindstädt |

**Exams**

| ST 2022 | 7900071 | 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.

**Below you will find excerpts from events related to this course:**

**Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)**

| 2577922, SS 2022, 2 SWS, Language: German, Open in study portal |

Seminar (S)  
On-Site
Content
In this lecture, current economic trends will be discussed from a perspective of competition analysis and corporate strategies. Using appropriate frameworks, the students will be able to analyze collectively selected case studies and derive business strategies.

Learning Objectives:
Students

- are able to analyze business strategies and derive recommendations for the management
- learn to express their position through compelling reasoning in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the success control will be announced during the lecture.

Note:
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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.
7 COURSES

Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]

7.474 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

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Exams

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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.

Below you will find excerpts from events related to this course:

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Workshop aktuelle Themen Strategie und Management (Master)

2577923, SS 2022, 2 SWS, Language: German, [Open in study portal](#)
Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module “Strategy and Organization” is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The assessment of performance is made through active participation in the discussion rounds; adequate preparation is expressed here and a clear understanding of the topic and framework becomes evident. Further details on the design of the success control will be announced during the lecture.

Note:
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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

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Workshop aktuelle Themen Strategie und Management (Master)
2577923, WS 22/23, 2 SWS, Language: German, Open in study portal

Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module “Strategy and Organization” is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The assessment of performance is made through active participation in the discussion rounds; adequate preparation is expressed here and a clear understanding of the topic and framework becomes evident. Further details on the design of the success control will be announced during the lecture.

Note:
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. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.
7.475 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

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**Competence Certificate**

oral exam (about 20 min)

**Prerequisites**

none

Below you will find excerpts from events related to this course:

**X-ray optics**  
2141007, SS 2022, 2 SWS, Language: English, Open in study portal

**Content**

see Institute homepage  
If you are interested, please contact arndt.last@kit.edu by 30.5.2022 to make an appointment.

**Organizational issues**

Viertägiger Blockkurs im Juni oder Juli 2022. Interessenten melden sich bitte zur Terminabsprache bis zum 30.5.2022 bei arndt.last@kit.edu

**X-ray Optics**  
2141007, WS 22/23, 2 SWS, Language: English, Open in study portal

**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