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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 consists 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 exam 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

Principally, 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 loosing the examination claim. A counseling interview is mandatory.

For further information see [http://www.wiwi.kit.edu/hinweiseZweitwdh.php](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](http://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](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](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](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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Anabela Relvas  
Telefon +49 721 608-43768  
E-Mail: pruefungssekretariat@wiwi.kit.edu

Editorial responsibility:

Dr. André Wiesner  
Telefon: +49 721 608-44061  
Email: modul@wiwi.kit.edu
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.

<table>
<thead>
<tr>
<th>Term</th>
<th>Credits</th>
<th>Business Administration</th>
<th>Economics</th>
<th>Informatics</th>
<th>Operations Research</th>
<th>Engineering</th>
<th>Electives</th>
<th>Master Thesis</th>
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<td>BUS 9 CP</td>
<td>ECON 9 CP</td>
<td>INFO 9 CP</td>
<td>OR 9 CP</td>
<td>ENG 9 CP</td>
<td>Seminar Module 9 CP</td>
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<td>2</td>
<td>29</td>
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<td>32</td>
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<td>4</td>
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<td></td>
<td>Master Thesis 30 CP</td>
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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

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>
<thead>
<tr>
<th>Mandatory</th>
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<td>Business Administration</td>
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<td>Economics</td>
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<tr>
<td>Informatics</td>
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<tr>
<td>Operations Research</td>
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<td>Engineering Sciences</td>
<td>18 CR</td>
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<td>Compulsory Elective Modules</td>
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### 5.1 Master Thesis

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### 5.2 Business Administration

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<td>Advanced Machine Learning and Data Science</td>
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<tr>
<td>M-WIWI-101410</td>
<td>Business &amp; Service Engineering</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101498</td>
<td>Management Accounting</td>
<td>9 CR</td>
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<td>M-WIWI-101510</td>
<td>Cross-Functional Management Accounting</td>
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<tr>
<td>M-WIWI-103117</td>
<td>Data Science: Data-Driven Information Systems</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-103118</td>
<td>Data Science: Data-Driven User Modeling</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-101647</td>
<td>Data Science: Evidence-based Marketing</td>
<td>9 CR</td>
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<tr>
<td>M-WIWI-105661</td>
<td>Data Science: Intelligent, Adaptive, and Learning Information Services</td>
<td>9 CR</td>
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<td>M-WIWI-104080</td>
<td>Designing Interactive Information Systems</td>
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<td>M-WIWI-103720</td>
<td>eEnergy: Markets, Services and Systems</td>
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<td>M-WIWI-101409</td>
<td>Electronic Markets</td>
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<td>M-WIWI-101452</td>
<td>Energy Economics and Technology</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 two elective modules. Both elective modules can be chosen from Business Administration, Economics, Informatics, Operations Research, Engineering Sciences, Statistics, Law or Sociology. In principle, both elective modules can also be completed in one subject. However, the subjects Law and Sociology may only have one module in total.
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### 5 FIELD OF STUDY STRUCTURE

#### Compulsory Elective Modules

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<td>9 CR</td>
</tr>
<tr>
<td>M-BGU-100999</td>
<td>Highway Engineering</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-105455</td>
<td>Strategic Design of Modern Production Systems</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101279</td>
<td>Technical Logistics</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-BGU-104448</td>
<td>Urban Water Technologies</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101275</td>
<td>Combustion Engines I</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101303</td>
<td>Combustion Engines II</td>
<td>9 CR</td>
</tr>
<tr>
<td>Module Code</td>
<td>Module Title</td>
<td>Credits</td>
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<tr>
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<tr>
<td>M-BGU-101110</td>
<td>Process Engineering in Construction</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-BGU-101065</td>
<td>Transportation Modelling and Traffic Management</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101284</td>
<td>Specialization in Production Engineering</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-CIWVT-101119</td>
<td>Specialization in Food Process Engineering</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-104888</td>
<td>Advanced Module Logistics</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101283</td>
<td>Virtual Engineering A</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101281</td>
<td>Virtual Engineering B</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-CIWVT-101121</td>
<td>Water Chemistry and Water Technology I</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-CIWVT-101122</td>
<td>Water Chemistry and Water Technology II</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-MACH-101286</td>
<td>Machine Tools and Industrial Handling</td>
<td>9 CR</td>
</tr>
<tr>
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<td><strong>Election block: Statistics (at most 18 credits)</strong></td>
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</tr>
<tr>
<td>M-WIWI-101637</td>
<td>Analytics and Statistics</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101638</td>
<td>Econometrics and Statistics I</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-WIWI-101639</td>
<td>Econometrics and Statistics II</td>
<td>9 CR</td>
</tr>
<tr>
<td></td>
<td><strong>Election block: Law or Sociology (at most 9 credits)</strong></td>
<td></td>
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<tr>
<td>M-INFO-101242</td>
<td>Governance, Risk &amp; Compliance</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-INFO-101217</td>
<td>Public Business Law</td>
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</tr>
<tr>
<td>M-INFO-101215</td>
<td>Intellectual Property Law</td>
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</tr>
<tr>
<td>M-INFO-101216</td>
<td>Private Business Law</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-GEISTSOZ-101169</td>
<td>Sociology</td>
<td>9 CR</td>
</tr>
<tr>
<td>M-INFO-101191</td>
<td>Commercial Law</td>
<td>9 CR</td>
</tr>
</tbody>
</table>
6 Modules

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

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

<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>9</td>
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<td>Each term</td>
<td>1 term</td>
<td>English</td>
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Mandatory

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

Competence Certificate
The assessment is carried out in form of a written thesis based on the course “Advanced Machine Learning and Data Science”.

Competence Goal
Students with good technological knowledge and an affinity for IT applications solve a data science problem using modern machine learning methods. Students learn to organize themselves in a team in a goal-oriented manner and to bring an extensive software project in the field of data science and machine learning to success. In addition, students deepen their data science and machine learning skills. Students of this module are particularly well prepared for management tasks in various data science and machine learning projects.

Prerequisites
see T-WIWI-106193 “Advanced Machine Learning and Data Science”.

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.

Recommendation
None

Workload
Total effort for 9 credit points: approx. 270 hours. The total workload for this module is approx. 270 hours (9 credit points). The total number of hours results from the effort for attending the internship events and the independent creation of the software solution, 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.
# 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)

### Credits  
9

### Grading scale  
Grade to a tenth

### Recurrence  
Each term

### Duration  
1 term

### Language  
German

### Level  
4

### Version  
4

<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-102160</td>
<td>Selected Applications of Technical Logistics</td>
<td>4 CR</td>
<td>Milushev, Mittwollen</td>
</tr>
<tr>
<td>T-MACH-108945</td>
<td>Selected Applications of Technical Logistics - Project</td>
<td>2 CR</td>
<td>Milushev, Mittwollen</td>
</tr>
<tr>
<td>T-MACH-105230</td>
<td>Decentrally Controlled Intralogistic Systems</td>
<td>4 CR</td>
<td>Furmans, Hochstein</td>
</tr>
<tr>
<td>T-MACH-102159</td>
<td>Elements and Systems of Technical Logistics</td>
<td>4 CR</td>
<td>Fischer, Mittwollen</td>
</tr>
<tr>
<td>T-MACH-108946</td>
<td>Elements and Systems of Technical Logistics - Project</td>
<td>2 CR</td>
<td>Fischer, Mittwollen</td>
</tr>
<tr>
<td>T-MACH-105151</td>
<td>Energy Efficient Intralogistic Systems</td>
<td>4 CR</td>
<td>Braun, Schönung</td>
</tr>
<tr>
<td>T-MACH-111003</td>
<td>Global Logistics</td>
<td>4 CR</td>
<td>Furmans</td>
</tr>
<tr>
<td>T-MACH-102128</td>
<td>Information Systems and Supply Chain Management</td>
<td>3 CR</td>
<td>Kilger</td>
</tr>
<tr>
<td>T-MACH-105187</td>
<td>IT-Fundamentals of Logistics</td>
<td>4 CR</td>
<td>Thomas</td>
</tr>
<tr>
<td>T-MACH-105174</td>
<td>Warehousing and Distribution Systems</td>
<td>3 CR</td>
<td>Furmans</td>
</tr>
<tr>
<td>T-MACH-105175</td>
<td>Airport Logistics</td>
<td>3 CR</td>
<td>Richter</td>
</tr>
<tr>
<td>T-MACH-106693</td>
<td>Plug-and-Play Material Handling</td>
<td>4 CR</td>
<td>Auberle, Furmans</td>
</tr>
<tr>
<td>T-MACH-105171</td>
<td>Safety Engineering</td>
<td>4 CR</td>
<td>Kany</td>
</tr>
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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.

**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.

**Prerequisites**  
One of the modules M-MACH-101279, M-MACH-101277, M-MACH-101280 or M-MACH-105298 must be completed.

**Workload**  
270 hours

**Learning type**  
Lecture, tutorial.
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)

<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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Election block: Electives (between 1 and 2 items)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4.5 CR</td>
</tr>
<tr>
<td>T-WIWI-102740</td>
<td>Public Management</td>
<td>4.5 CR</td>
</tr>
</tbody>
</table>

Election block: Supplementary Courses (between 4.5 and 5 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-111304</td>
<td>Fundamentals of National and International Group Taxation</td>
<td>4.5 CR</td>
</tr>
<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4.5 CR</td>
</tr>
</tbody>
</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.

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.

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.

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.

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

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.
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>
<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>
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**Election block: Compulsory Elective Courses (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-WIWI-106188</td>
<td>Workshop Current Topics in Strategy and Management</td>
<td>3 CR</td>
<td>Lindstädt</td>
</tr>
<tr>
<td>T-WIWI-106189</td>
<td>Workshop Business Wargaming – Analyzing Strategic Interactions</td>
<td>3 CR</td>
<td>Lindstädt</td>
</tr>
<tr>
<td>T-WIWI-106190</td>
<td>Strategy and Management Theory: Developments and “Classics”</td>
<td>3 CR</td>
<td>Lindstädt</td>
</tr>
</tbody>
</table>

**Competition 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.

**Competition 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

**Prerequisites**

None

**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.

**Recommendation**

None

**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.
6.5 Module: Agglomeration and Innovation [M-WIWI-101497]

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

<table>
<thead>
<tr>
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<th>Grade scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Level</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
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**Election block: Compulsory Elective Courses (9 credits)**

<table>
<thead>
<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Grading</th>
<th>Professor</th>
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<tbody>
<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4.5 CR</td>
<td>Mitusch</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-109194</td>
<td>Dynamic Macroeconomics</td>
<td>4.5 CR</td>
<td>Brumm</td>
<td></td>
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<tr>
<td>T-WIWI-102840</td>
<td>Innovation Theory and Policy</td>
<td>4.5 CR</td>
<td>Ott</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4.5 CR</td>
<td>Ott</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.

**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

**Prerequisites**
None

**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.

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

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Analytics and Statistics [M-WIWI-101637]

**Responsible:** Prof. Dr. Oliver Grothe

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

**Part of:** Compulsory Elective Modules (Statistics)

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

### Mandatory

<table>
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<tr>
<th>Course Code</th>
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<th>Credits</th>
<th>Grade to a tenth</th>
<th>Responsible</th>
</tr>
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<tbody>
<tr>
<td>T-WIWI-103123</td>
<td>Advanced Statistics</td>
<td>4,5 CR</td>
<td>Grothe</td>
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</table>

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade to a tenth</th>
<th>Responsible</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods</td>
<td>4,5 CR</td>
<td>Zöllner</td>
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</tr>
<tr>
<td>T-WIWI-111247</td>
<td>Mathematics for High Dimensional Statistics</td>
<td>4,5 CR</td>
<td>Grothe</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4,5 CR</td>
<td>Grothe</td>
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</tr>
</tbody>
</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 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.

**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.

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

**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.
6.7 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)**

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

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<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<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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</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Instructor</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-102613</td>
<td>Auction Theory</td>
<td>4,5 CR</td>
<td>Ehrhart</td>
<td></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-102622</td>
<td>Corporate Financial Policy</td>
<td>4,5 CR</td>
<td>Ruckes</td>
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<td>T-WIWI-102623</td>
<td>Financial Intermediation</td>
<td>4,5 CR</td>
<td>Ruckes</td>
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</tr>
<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-102862</td>
<td>Predictive Mechanism and Market Design</td>
<td>4,5 CR</td>
<td>Reiß</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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</tr>
</tbody>
</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.

**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.

**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.

**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.

**Recommendation**

Basic knowledge in game theory is assumed.

**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.
**M 6.8 Module: Automated Manufacturing Systems [M-MACH-101298]**

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

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

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

**Mandatory**

| T-MACH-102162 Automated Manufacturing Systems | 9 CR Fleischer |

**Competence Certificate**  
written exam (120 minutes)

**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.

**Prerequisites**  
none

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

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences
- Compulsory Elective Modules (Engineering Sciences)
- Module Handbook as of 09/04/2021

### Election block: Automotive Engineering (at least 9 credits)

<table>
<thead>
<tr>
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<th>Module Name</th>
<th>Credits</th>
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<th>Recurrence Each term</th>
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<th>Language German/English</th>
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<tr>
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<td>6 CR</td>
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<td>T-MACH-102117</td>
<td>Automotive Engineering II</td>
<td>3 CR</td>
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<td>Project Workshop: Automotive Engineering</td>
<td>4.5 CR</td>
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<td>Fundamentals for Design of Motor-Vehicle Bodies I</td>
<td>1.5 CR</td>
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<td>Fundamentals for Design of Motor-Vehicle Bodies II</td>
<td>1.5 CR</td>
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<td>5 CR</td>
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<td>T-MACH-102150</td>
<td>BUS-Controls</td>
<td>3 CR</td>
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<td>Python Algorithm for Vehicle Technology</td>
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</table>

**Competence Certificate**

The assessment is carried out as partial exams.

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

**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.

**Prerequisites**

None

**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.

**Recommendation**

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

**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.
Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
### 6.10 Module: BioMEMS [M-MACH-101290]

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

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

<table>
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<tr>
<td>T-MACH-100966</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</td>
<td>3 CR</td>
<td>Guber</td>
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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>
<td>Guber</td>
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<tr>
<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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<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<tr>
<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-102176</td>
<td>Current Topics on BioMEMS</td>
<td>4 CR</td>
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</table>

#### Election block: BioMEMS (at least 6 credits)

<table>
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<tbody>
<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-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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</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.

#### Competence Goal

The student

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

#### Prerequisites

none

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

Responsible:  Prof. Dr. Christof Weinhardt
Organisation:  KIT Department of Economics and Management
Part of:  Business Administration

Compulsory Elective Modules (Business Administration)

<table>
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<tr>
<th>Credits</th>
<th>Grade to a tenth</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<td>Each term</td>
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Election block: Compulsory Elective Courses (9 credits)

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<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Instructor</th>
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<tbody>
<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-102848</td>
<td>Personalization and Services</td>
<td>4,5 CR</td>
<td>Sonnenbichler</td>
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<tr>
<td>T-WIWI-110887</td>
<td>Practical Seminar: Service Innovation</td>
<td>4,5 CR</td>
<td>Satzger</td>
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<tr>
<td>T-WIWI-102847</td>
<td>Recommender Systems</td>
<td>4,5 CR</td>
<td>Geyer-Schulz</td>
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<td>T-WIWI-102641</td>
<td>Service Innovation</td>
<td>4,5 CR</td>
<td>Satzger</td>
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<tr>
<td>T-WIWI-109940</td>
<td>Special Topics in Information Systems</td>
<td>4,5 CR</td>
<td>Weinhardt</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 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 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

Prerequisites
None

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.

Recommendation
None

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.

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

**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>
<th>Version</th>
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**Election block: Compulsory Elective Courses (C)**

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<tr>
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<th>Course Title</th>
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<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102859</td>
<td>Social Choice Theory</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.

**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.

**Prerequisites**

None

**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.
6.13 Module: Combustion Engines I [M-MACH-101275]

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

**Organisation:** KIT Department of Mechanical Engineering

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

<table>
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<th>Credits</th>
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**Credits**

**Grading scale**
Grade to a tenth

**Recurrence**
Each winter term

**Duration**
1 term

**Level**
4

**Version**
4

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

| T-MACH-102194 | Combustion Engines I | 5 CR | Koch, Kubach |
| T-MACH-105564 | Energy Conversion and Increased Efficiency in Internal Combustion Engines | 4 CR | Koch, Kubach |

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

**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.

**Prerequisites**
None

**Content**
Working Principle og ICE  
Characteristic Parameters  
Characteristic parameters  
Engine parts  
Crank drive  
Fuels  
Gasolien engine operation modes  
Diesel engine operation modes  
Emissions  
Fundamentals of ICE combustion  
Thermodynamics of ICE  
Flow field  
Wall heat losses  
Combustion in Gasoline and Diesel engines  
Heat release calculation  
Waste heat recovery

**Workload**
regular attendance: 62 hours  
self-study: 208 hours
### Module: Combustion Engines II [M-MACH-101303]

**Responsible:** Dr.-Ing. Heiko Kubach  
**Organisation:** KIT Department of Mechanical Engineering

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

<table>
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<td>1 term</td>
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#### Mandatory

- **T-MACH-104609** Combustion Engines II  
  5 CR  
  Koch, Kubach

#### Election block: Verbrennungsmotoren II (at least 4 credits)

- **T-MACH-105044** Fundamentals of Catalytic Exhaust Gas Aftertreatment  
  4 CR  
  Deutschmann, Grunwaldt, Kubach, Lox

- **T-MACH-105173** Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines  
  4 CR  
  Gohl

- **T-MACH-105184** Fuels and Lubricants for Combustion Engines  
  4 CR  
  Kehrwald, Kubach

- **T-MACH-105167** Analysis Tools for Combustion Diagnostics  
  4 CR  
  Pfeil

- **T-MACH-105169** Engine Measurement Techniques  
  4 CR  
  Bernhardt

- **T-MACH-110817** Development of hybrid drivetrains  
  4 CR  
  Koch

- **T-MACH-110816** Großdiesel- und -gasmotoren für Schiffsantriebe  
  4 CR  
  Kubach

- **T-MACH-105649** Boosting of Combustion Engines  
  4 CR  
  Kech, Kubach

- **T-MACH-105985** Ignition Systems  
  4 CR  
  Toedter

#### Competence Certificate

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

#### Competence Goal

See courses.

#### Prerequisites

None

#### 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]

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

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021
6.16 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)

<table>
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<th>Grading scale</th>
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<th>Duration</th>
<th>Level</th>
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<td>Each term</td>
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**Mandatory**

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<tr>
<td>T-ETIT-100981</td>
<td>Automation of Discrete Event and Hybrid Systems</td>
<td>3 CR</td>
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<td>T-ETIT-100666</td>
<td>Control of Linear Multivariable Systems</td>
<td>6 CR</td>
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**Competence Certificate**

The assessment is carried out as partial written exams of the single courses of this module (T-ETIT-100981 and T-ETIT-100666). 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

- have deeper knowledge in the field of control theory and system dynamics,
- are able to analyze multivariable systems in state space and frequency domain and are familiar with adequate methods for the control design,
- know the basics of modelling, simulation, analyses and control of discrete-event and hybrid systems.

**Prerequisites**

none

**Content**

This module broadens the basic knowledge of system dynamics of the students to the multivariable case. Both I/O-models in frequency domain and mainly state space models are regarded, for which several methods for the analysis and the control design with different goals (decoupling, robustness) and constraints (disturbances, sensor failures) are presented. Above that, the basics of modelling, simulation, analysis and control of discrete-event and hybrid systems are discussed.

**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 (2303155) which is recommended to have been attended beforehand.

**Workload**

See German version.
6.17 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)**

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<th>Credits</th>
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**Mandatory**

- T-WIWI-102885 Advanced Management Accounting 4,5 CR Wouters

**Election block: Supplementary Courses (4,5 credits)**

- T-WIWI-110179 Advanced Management Accounting 2 4,5 CR Wounters
- T-WIWI-105777 Business Intelligence Systems 4,5 CR Mädche, Nadj, Toreini
- T-WIWI-105781 Incentives in Organizations 4,5 CR Nieken
- T-WIWI-102835 Marketing Strategy Business Game 1,5 CR Klarmann
- T-WIWI-107720 Market Research 4,5 CR Klarmann
- T-WIWI-109864 Product and Innovation Management 3 CR Klarmann
- T-WIWI-102621 Valuation 4,5 CR Ruckes
- T-WIWI-108651 Extraordinary additional course in the module Cross-Functional Management Accounting 4,5 CR Wouters

**Competence Certificate**

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

**Competence Goal**

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

**Prerequisites**

The course "Advanced Management Accounting" is compulsory.

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

**Content**

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

**Recommendation**

None

**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.
6.18 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

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

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

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

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**Election block: Compulsory Elective Courses ()

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<td>T-WIWI-108715</td>
<td>Artificial Intelligence in Service Systems</td>
<td>4,5 CR</td>
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<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-109863</td>
<td>Business Data Analytics: Application and Tools</td>
<td>4,5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-106187</td>
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<td>T-WIWI-105777</td>
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<td>Mädche, Nadj, Toreini</td>
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<td>T-WIWI-110918</td>
<td>Introduction to Bayesian Statistics for Analyzing Data</td>
<td>3 CR</td>
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<td>T-WIWI-106207</td>
<td>Practical Seminar: Data-Driven Information Systems</td>
<td>4,5 CR</td>
<td>Mädche, Satzger, Setzer, Weinhardt</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.

**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.

**Prerequisites**
None.
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.

Texteintrag

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

Annotation
The course „Business Data Strategy“ can be chosen from winter term 2016 on.
6.19 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)

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

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<td>Business Data Analytics: Application and Tools</td>
<td>4,5 CR</td>
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<td>Experimental Economics</td>
<td>4,5 CR</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>Modeling and Analyzing Consumer Behavior with R</td>
<td>4,5 CR</td>
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<td>Practical Seminar: Advanced Analytics</td>
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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.

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

Prerequisites
None

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.
6.20 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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Election block: Compulsory Elective Courses (9 credits)

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<tr>
<td>T-WIWI-107720</td>
<td>Market Research</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.

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

Prerequisites
Keine.

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".

Recommendation
None

Workload
The total workload for this module is approximately 270 hours.
6.21 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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**Election block: Compulsory Elective Courses (9 credits)**

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<td>Artificial Intelligence in Service Systems - Applications in Computer Vision</td>
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<td>4,5 CR</td>
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<td>T-WIWI-110915</td>
<td>Intelligent Agents and Decision Theory</td>
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<td>T-WIWI-102848</td>
<td>Personalization and Services</td>
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<td>Recommender 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 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.

**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.

**Prerequisites**
None

**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.

**Recommendation**
None

**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.

**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)

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<tr>
<td>T-BGU-106613</td>
<td>Design Basics in Highway Engineering</td>
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<tr>
<td>T-BGU-106300</td>
<td>Infrastructure Management</td>
<td>6</td>
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**Competence Goal**  
See German version.

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

**Recommendation**  
None

**Annotation**  
None

**Workload**  
See German version.
6.23 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)

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<td>Engineering Interactive Systems</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-108437</td>
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<td>4.5 CR</td>
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**Election block: Supplementary Courses (at most 4.5 credits)**

**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.

**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

**Prerequisites**
The course "Interactive Information Systems" is compulsory and must be examined.

**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)

<table>
<thead>
<tr>
<th>Credits</th>
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<th>Duration</th>
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Election block: Compulsory Elective Courses (9 credits)

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<tr>
<td>T-WIWI-102872</td>
<td>Challenges in Supply Chain Management</td>
<td>4.5</td>
<td>CR</td>
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<td>T-WIWI-110280</td>
<td>Digital Services: Business Models and Transformation</td>
<td>4.5</td>
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<td>T-WIWI-107043</td>
<td>Liberalised Power Markets</td>
<td>3</td>
<td>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</td>
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<tr>
<td>T-WIWI-106563</td>
<td>Practical Seminar Digital Service Systems</td>
<td>4.5</td>
<td>CR</td>
<td>Mädche, Satzger</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
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.

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

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.

Recommendation
None

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.
6.25 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)**

<table>
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**Mandatory**

- T-BGU-108941 Digitalization in Facility and Real Estate Management 6 CR Lennerts

**Election block: Compulsory Elective (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-111210 Turnkey Construction II 3 CR Haghsheno

**Competence Certificate**

- 'Teilleistung' T-BGU-108941 with examination of other type according to § 4 Par. 2 No. 3
- '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-111210 with oral examination according to § 4 Par. 2 No. 2

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

**Competence Goal**

see German version

**Module grade calculation**

Grade of the module is CP weighted average of grades of the partial exams

**Prerequisites**

none

**Content**

see German version

**Recommendation**

none

**Annotation**

none
Workload
contact hours (1 HpW = 1 h x 15 weeks):

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

according to selected courses or examinations respectively:

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

total: 270 h
### Module: Econometrics and Statistics I [M-WIWI-101638]

**Responsible:** Prof. Dr. Melanie Schienle

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

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

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German

**Level:** 4

**Version:** 4

**Mandatory**

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<tr>
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**Elective Courses (between 4,5 and 5 credits)**

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<tbody>
<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications</td>
<td>4,5 CR</td>
<td>Nakhaeizadeh</td>
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<td>Financial Econometrics</td>
<td>4,5 CR</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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<tr>
<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-110868</td>
<td>Predictive Modeling</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>Financial Econometrics II</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 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.

**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.

**Prerequisites**

The course "Advanced Statistics" [2520020] is compulsory and must be examined.

**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.
6.27 Module: Econometrics and Statistics II [M-WIWI-101639]

**Responsibility:** Prof. Dr. Melanie Schienle

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

**Part of:** Compulsory Elective Modules (Statistics)

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

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<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications</td>
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<td>Nakhaeizadeh</td>
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<td>T-WIWI-103064</td>
<td>Financial Econometrics</td>
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<td>Schienle</td>
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<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods</td>
<td>4.5</td>
<td>Grothe</td>
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<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics</td>
<td>4.5</td>
<td>Schienle</td>
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<td>T-WIWI-103127</td>
<td>Panel Data</td>
<td>4.5</td>
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<td>T-WIWI-103128</td>
<td>Portfolio and Asset Liability Management</td>
<td>4.5</td>
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<td>T-WIWI-110868</td>
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<td>T-WIWI-103065</td>
<td>Statistical Modeling of Generalized Regression Models</td>
<td>4.5</td>
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<td>T-WIWI-103129</td>
<td>Stochastic Calculus and Finance</td>
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<td>Financial Econometrics II</td>
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<td>Schienle</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.

**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.

**Prerequisites**

This module can only be passed if the module “Econometrics and Statistics I” has been finished successfully before.

**Content**

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

**Workload**

The total workload for this module is approximately 270 hours.
Module: Economic Theory and its Application in Finance [M-WIWI-101502]

**Responsible:** Prof. Dr. Kay Mitusch

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

**Part of:** Economics

### Compulsory Elective Modules (Economics)

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

#### Election block: Compulsory Elective Courses (1 item)

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<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
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<td>T-WIWI-102861</td>
<td>Advanced Game Theory</td>
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#### Election block: Supplementary Courses (1 item)

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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4,5</td>
<td>Ruckes, Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
<td>4,5</td>
<td>Ruckes</td>
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<td>T-WIWI-109050</td>
<td>Corporate Risk Management</td>
<td>4,5</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.

### 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

### Prerequisites

One of the courses T-WIWI-102861 “Advanced Game Theory” and T-WIWI-102609 “Advanced Topics in Economic Theory” is compulsory.

### 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.

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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<th>Credits</th>
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<th>Language</th>
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Election block: Compulsory Elective Courses (at least 9 credits)

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<td>Energy Networks and Regulation</td>
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<td>Smart Grid Applications</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-109940</td>
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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.

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.

Prerequisites
None.

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.
### 6.30 Module: Electives in Informatics [M-WIWI-101630]

**Responsible:**
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Harald Sack
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- Prof. Dr. Melanie Volkamer
- Prof. Dr.-Ing. Johann Marius Zöllner

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

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

<table>
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<tr>
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#### Election block: Compulsory Elective Area ()

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<tr>
<td>T-WIWI-102680</td>
<td>Computational Economics</td>
<td>4,5 CR</td>
<td>Shukla</td>
</tr>
<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109246</td>
<td>Digital Health</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<tr>
<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
<td>4,5 CR</td>
<td>Oberweis</td>
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<td>T-WIWI-110346</td>
<td>Supplement Enterprise Information Systems</td>
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<td>Supplement Software- and Systemsengineering</td>
<td>4,5 CR</td>
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<td>Information Service Engineering</td>
<td>4,5 CR</td>
<td>Sack</td>
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<td>T-WIWI-102666</td>
<td>Knowledge Discovery</td>
<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>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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#### Election block: Seminars and Advanced Labs ()

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<td>4,5 CR</td>
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<td>T-WIWI-111126</td>
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<td>Advanced Lab Sociotechnical Information Systems Development (Master)</td>
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<td>T-WIWI-109985</td>
<td>Project Lab Cognitive Automobiles and Robots</td>
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<td>Selected Issues in Critical Information Infrastructures</td>
<td>4,5 CR</td>
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</table>
**Competence Certificate**

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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.

**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.

**Prerequisites**

None.

**Content**

The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

**Annotation**

Detailed information on the recognition of examinations in the field of Informatics can be found at [http://www.aifb.kit.edu/web/Auslandsaufenthalt](http://www.aifb.kit.edu/web/Auslandsaufenthalt).

**Workload**

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

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<th>Language</th>
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**Election block: Compulsory Elective Courses (at least 9 credits)**

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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 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.

**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.

**Prerequisites**

None

**Content**

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

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

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

Topics include:
- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control
Recommendation
None

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# Module: Emphasis in Informatics [M-WIWI-101628]

## Responsible
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Harald Sack
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- Prof. Dr. Melanie Volkamer
- Prof. Dr.-Ing. Johann Marius Zöllner

## Organisation
- KIT Department of Economics and Management

## Credits
- 9

## Grading scale
- Grade to a tenth

## Recurrence
- Each term

## Duration
- 1 term

## Level
- 4

## Version
- 14

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

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### Election block: Seminars and Advanced Labs ()

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**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.

**Prerequisites**
None.

**Content**
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

**Annotation**
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
6.33 Module: Energy and Process Technology I [M-MACH-101296]

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

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

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

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

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

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

Prerequisites
None

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

Annotation
All lectures and exams are hold in German only.
6.34 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**

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

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

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

**Prerequisites**
None

**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 held in German only.

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

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

**Part of:** Business Administration

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German/English

**Level:** 4

**Version:** 7

### Mandatory

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### Election block: Supplementary Courses (at least 6 credits)

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<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 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.

### 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.

### Prerequisites

The lecture Liberalised Power Markets has to be examined.

### 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

### 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.

### Workload

The total workload for this module is approximately 270 hours.
## 6.36 Module: Energy Economics and Technology [M-WIWI-101452]

### Responsible
Prof. Dr. Wolf Fichtner

### Organisation
KIT Department of Economics and Management

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

### Credits
9

### Grade to a tenth
German/English

### Recurrence
Each term

### Duration
1 term

### Level
4

### Version
4

### Election block: Compulsory Elective Courses (at least 9 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<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>T-WIWI-102793</td>
<td>Efficient Energy Systems and Electric Mobility</td>
<td>3.5 CR</td>
<td>Jochem</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
<td>4</td>
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<tr>
<td>T-WIWI-102650</td>
<td>Energy and Environment</td>
<td>4.5 CR</td>
<td>Karl</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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<tr>
<td>T-WIWI-102830</td>
<td>Energy Systems Analysis</td>
<td>3 CR</td>
<td>Ardone, Fichtner</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-107464</td>
<td>Smart Energy Infrastructure</td>
<td>3 CR</td>
<td>Ardone, Pustisek</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-102695</td>
<td>Heat Economy</td>
<td>3 CR</td>
<td>Fichtner</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</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 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.

### 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.

### Prerequisites
None

### 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:** emissions 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.
## 6.37 Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

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

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

**Part of:** Business Administration

**Compulsory Elective Modules (Business Administration)**

<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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### Election block: Mandatory part (1 item)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-102864</td>
<td>Entrepreneurship</td>
<td>3 CR</td>
<td>Terzidis</td>
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### Election block: Compulsory Elective Courses (1 item)

<table>
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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>T-WIWI-102865</td>
<td>Business Planning</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-102866</td>
<td>Design Thinking</td>
<td>3 CR</td>
<td>Terzidis</td>
</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-102894</td>
<td>Entrepreneurship Research</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
<tr>
<td>T-WIWI-110985</td>
<td>International Business Development and Sales</td>
<td>6 CR</td>
<td>Casenave, Klarmann, Terzidis</td>
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### Election block: Supplementary Courses (1 item)

<table>
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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>T-WIWI-102866</td>
<td>Design Thinking</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
<tr>
<td>T-WIWI-102851</td>
<td>Developing Business Models for the Semantic Web</td>
<td>3 CR</td>
<td>Sure-Vetter</td>
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<tr>
<td>T-WIWI-102833</td>
<td>Entrepreneurial Leadership &amp; Innovation Management</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-102894</td>
<td>Entrepreneurship Research</td>
<td>3 CR</td>
<td>Terzidis</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-102639</td>
<td>Business Models in the Internet: Planning and Implementation</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
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<td>T-WIWI-102865</td>
<td>Business Planning</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-110374</td>
<td>Firm creation in IT security</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-102893</td>
<td>Innovation Management: Concepts, Strategies and Methods</td>
<td>3 CR</td>
<td>Weissenberger-Eibl</td>
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<td>T-WIWI-109064</td>
<td>Joint Entrepreneurship Summer School</td>
<td>6 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-102612</td>
<td>Managing New Technologies</td>
<td>3 CR</td>
<td>Reiß</td>
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<tr>
<td>T-WIWI-102853</td>
<td>Roadmapping</td>
<td>3 CR</td>
<td>Koch</td>
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<td>T-WIWI-110985</td>
<td>International Business Development and Sales</td>
<td>6 CR</td>
<td>Casenave, Klarmann, Terzidis</td>
</tr>
</tbody>
</table>

**Competence Certificate**
See German version.

**Competence Goal**
See German version.

**Prerequisites**
None

**Recommendation**
None

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
6.38 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)

<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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Election block: Compulsory Elective Courses (at least 9 credits)

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<th>Course Name</th>
<th>Credits (CR)</th>
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<tr>
<td>T-WIWI-102650</td>
<td>Energy and Environment</td>
<td>4.5 Karl</td>
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<td>T-WIWI-100007</td>
<td>Transport Economics</td>
<td>4.5 Mitusch,Szimba</td>
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<tr>
<td>T-WIWI-102615</td>
<td>Environmental Economics and Sustainability</td>
<td>3 Walz</td>
</tr>
<tr>
<td>T-WIWI-102616</td>
<td>Environmental and Resource Policy</td>
<td>4 Walz</td>
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<tr>
<td>T-BGU-111102</td>
<td>Environmental Law</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 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.

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

Prerequisites
None

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.

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

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

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

<table>
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<th>Credits</th>
<th>Grading scale</th>
<th>Instructor</th>
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<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-105781</td>
<td>Incentives in Organizations</td>
<td>4,5 CR</td>
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<td>T-WIWI-102862</td>
<td>Predictive Mechanism and Market Design</td>
<td>4,5 CR</td>
<td>Reiß</td>
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<tr>
<td>T-WIWI-102863</td>
<td>Topics in Experimental Economics</td>
<td>4,5 CR</td>
<td>Reiß</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.

**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.

**Prerequisites**

None.

**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.

**Recommendation**

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

**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.
6.40 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)

<table>
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<th>Credits</th>
<th>Grade to a tenth</th>
<th>Recurrence</th>
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**Election block: Compulsory Elective Courses (between 9 and 12 credits)**

<table>
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<td>3 CR</td>
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<td>T-WIWI-106292</td>
<td>PH APL-ING-TL02</td>
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<td>T-WIWI-106293</td>
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<tr>
<td>T-WIWI-108384</td>
<td>PH APL-ING-TL07</td>
<td>3 CR</td>
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</table>

**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 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.

**Competence Goal**

See German version.

**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.

**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.
6.41 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>
<thead>
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<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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<tbody>
<tr>
<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
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Mandatory

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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer(s)</th>
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<tbody>
<tr>
<td>T-BGU-108004</td>
<td>Facility Management in Hospitals</td>
<td>4.5 CR</td>
<td>Lennerts</td>
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Election block: Compulsory Elective (at most 3 items as well as at least 4.5 credits)

<table>
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<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer(s)</th>
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<tbody>
<tr>
<td>T-BGU-111218</td>
<td>Upgrading of Existing Buildings</td>
<td>3 CR</td>
<td>Lennerts</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-111212</td>
<td>Facility and Real Estate Management II</td>
<td>1.5 CR</td>
<td>Lennerts</td>
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<tr>
<td>T-BGU-111217</td>
<td>Project Development with Case Study</td>
<td>1.5 CR</td>
<td>Lennerts</td>
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</tbody>
</table>

Competence Certificate
- ‘Teilleistung’ T-BGU-108004 with examination of other type according to § 4 Par. 2 No. 3 according to selected course:
- ‘Teilleistung’ T-BGU-111218 with written examination according to § 4 Par. 2 No. 1
- ‘Teilleistung’ T-BGU-111211 with oral examination according to § 4 Par. 2 No. 2
- ‘Teilleistung’ T-BGU-111212 with oral examination according to § 4 Par. 2 No. 2
- ‘Teilleistung’ T-BGU-111217 with oral examination according to § 4 Par. 2 No. 2

details about the learning controls see at the respective ‘Teilleistung’

Competence Goal
see German version

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

Prerequisites
none

Content
see German version

Recommendation
none

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

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

Organisation: KIT Department of Economics and Management

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

<table>
<thead>
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<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>1 term</td>
<td>German/English</td>
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**Election block: Compulsory Elective Courses (9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Responsible</th>
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<tbody>
<tr>
<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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<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4,5 CR</td>
<td>Ruckes, Uhrig-Homburg</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 module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**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

**Prerequisites**
None

**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.
6.43 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)

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

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<tr>
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<td>Advanced Empirical Asset Pricing</td>
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<td>Thimme</td>
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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
<td>4,5 CR</td>
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</tr>
<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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<tr>
<td>T-WIWI-110995</td>
<td>Bond Markets</td>
<td>4,5 CR</td>
<td>Uhrig-Homburg</td>
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<tr>
<td>T-WIWI-110997</td>
<td>Bond Markets - Models &amp; Derivatives</td>
<td>3 CR</td>
<td>Uhrig-Homburg</td>
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<td>Derivatives</td>
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<td>eFinance: Information Systems for Securities Trading</td>
<td>4,5 CR</td>
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<td>Fixed Income Securities</td>
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<td>Web App Programming for Finance</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.

**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.

**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.

**Content**

The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.
Annotation
The courses eFinance: Information Engineering and Management for Securities Trading [2540454] and Financial Analysis [2530205] can be chosen from summer term 2015 on.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
6.44 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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**Election block: Compulsory Elective Courses (at least 9 credits)**

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<tr>
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<td>Advanced Empirical Asset Pricing</td>
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<td>T-WIWI-108880</td>
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<td>Web App Programming for Finance</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 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.

**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.

**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.

**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 the German version.
# 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)**  

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

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

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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>
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<td>T-BGU-100014</td>
<td>Seminar in Transportation</td>
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<td>T-WIWI-103174</td>
<td>Seminar Mobility Services (Master)</td>
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<td>Mobility Services and new Forms of Mobility</td>
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<td>T-BGU-103426</td>
<td>Strategic Transport Planning</td>
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<td>Waßmuth</td>
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<td>T-BGU-106608</td>
<td>Information Management for Public Mobility Services</td>
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<td>T-BGU-111057</td>
<td>Sustainability in Mobility Systems</td>
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</table>

**Competence Goal**  
See German version.

**Prerequisites**  
None

**Recommendation**  
None
6.46 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)

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**Election block: compulsory optional subject (at least 9 credits)**

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<td>T-ETIT-101941</td>
<td>Power Transmission and Power Network Control</td>
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<td>T-ETIT-101915</td>
<td>High-Voltage Test Technique</td>
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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.

**Prerequisites**

None

**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.
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>
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<th>Credits</th>
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Mandatory

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<td>T-MACH-111003</td>
<td>Global Logistics</td>
<td>4 CR</td>
<td>Furmans</td>
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<td>T-MACH-110981</td>
<td>Tutorial Global Production</td>
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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.

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.

Prerequisites

None

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
### Module: Governance, Risk & Compliance [M-INFO-101242]

**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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**Election block: Governance, Risk & Compliance (at least 1 item as well as at least 6 credits)**

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<td>Law of Contracts</td>
<td>3 CR</td>
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<td>T-INFO-108405</td>
<td>Data Protection by Design</td>
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<td>T-INFO-102047</td>
<td>Seminar: Governance, Risk &amp; Compliance</td>
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<td>T-INFO-109910</td>
<td>IT-Security Law</td>
<td>3 CR</td>
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<td>T-INFO-101307</td>
<td>Internet Law</td>
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Prof. Dr. Thomas Dreier  
KIT Department of Informatics  
Compulsory Elective Modules (Law or Sociology)
6.49 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)

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German/English

**Level:** 4

**Version:** 4

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

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<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
<td>4.5 CR</td>
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<td>T-WIWI-111318</td>
<td>Growth and Development</td>
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**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.

**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

**Prerequisites**

None

**Content**

The module includes the contents of the lectures *Endogenous Growth Theory* [2561503], *Spatial Economics* [2561260] and *International Economic Policy* [2560254]. While the first two lectures have a more formal-analytic focus, the third lecture approaches fundamental ideas and problems from the field of international economic policy from a more verbal perspective.

The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

**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.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
### Module: Handling Characteristics of Motor Vehicles [M-MACH-101264]

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

<table>
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**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.

**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.

**Prerequisites**  
None

**Content**  
See courses.

**Recommendation**  

**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.
### 6.51 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>
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<th>Duration</th>
<th>Level</th>
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**Mandatory**

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<td>T-ETIT-100723</td>
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<td>Each term</td>
<td>2 terms</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**Competence Goal**

The student must:

- have wide knowledge of electrical power engineering,
- be 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.
**6.52 Module: Highway Engineering [M-BGU-100999]**

**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>
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<td>3 CR</td>
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**Competition Goal**  
See German version.

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

**Recommendation**  
None

**Annotation**  
None

**Workload**  
See German version.
# 6.53 Module: Industrial Production II [M-WIWI-101471]

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

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### Mandatory

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<tr>
<td>T-WIWI-102631</td>
<td>Planning and Management of Industrial Plants</td>
<td>5.5 CR</td>
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### Election block: Supplementary Courses (at most 1 item)

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<tbody>
<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, Wiens</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>
<td>T-WIWI-103134</td>
<td>Project Management</td>
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### Election block: Supplementary Courses (at most 1 item)

<table>
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<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-WIWI-102634</td>
<td>Emissions into the Environment</td>
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<tr>
<td>T-WIWI-102882</td>
<td>International Management in Engineering and Production</td>
<td>3.5 CR</td>
<td>Sasse</td>
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<tr>
<td>T-WIWI-110512</td>
<td>Life Cycle Assessment</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.

### 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.

### Prerequisites

The course Planning and Managing of Industrial Plants [2581952] and at least one additional activity are compulsory and must be examined.

### 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>
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<td>9</td>
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<td>CR</td>
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**Election block:** Supplementary Courses from Module Industrial Production II (at most 1 item)

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<tr>
<td>T-WIWI-102634</td>
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<td>CR</td>
<td>Karl</td>
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<tr>
<td>T-WIWI-102882</td>
<td>International Management in Engineering and Production</td>
<td>3.5</td>
<td>CR</td>
<td>Sasse</td>
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<tr>
<td>T-WIWI-110512</td>
<td>Life Cycle Assessment</td>
<td>3.5</td>
<td>CR</td>
<td>Schultmann</td>
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**Election block:** Supplementary Courses (at most 1 item)

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<tr>
<td>T-WIWI-102763</td>
<td>Supply Chain Management with Advanced Planning Systems</td>
<td>3.5</td>
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<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</td>
<td>CR</td>
<td>Schultmann, Wiens</td>
</tr>
<tr>
<td>T-WIWI-102828</td>
<td>Supply Chain Management in the Automotive Industry</td>
<td>3.5</td>
<td>CR</td>
<td>Heupel, Lang</td>
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<tr>
<td>T-WIWI-103134</td>
<td>Project Management</td>
<td>3.5</td>
<td>CR</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 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.

**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.

**Prerequisites**

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

**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:**
- Prof. Dr. Andreas Oberweis
- Prof. Dr. Harald Sack
- Prof. Dr. Ali Sunyaev
- Prof. Dr. York Sure-Vetter
- 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:** 14

**Election block: Compulsory Elective Area ()**

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<td>4,5 CR</td>
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<tr>
<td>T-WIWI-109248</td>
<td>Critical Information Infrastructures</td>
<td>4,5 CR</td>
<td>Sunyaev</td>
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<td>T-WIWI-109246</td>
<td>Digital Health</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-109270</td>
<td>Human Factors in Security and Privacy</td>
<td>4,5 CR</td>
<td>Volkamer</td>
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<tr>
<td>T-WIWI-102661</td>
<td>Database Systems and XML</td>
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<td>T-WIWI-110346</td>
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<tr>
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<td>Information Service Engineering</td>
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<td>Knowledge Discovery</td>
<td>4,5 CR</td>
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<td>Management of IT-Projects</td>
<td>4,5 CR</td>
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<td>Nature-Inspired Optimization Methods</td>
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<td>Process Mining</td>
<td>4,5 CR</td>
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<td>T-WIWI-110848</td>
<td>Semantic Web Technologies</td>
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<td>Web Science</td>
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**Election block: Seminars and Advanced Labs (between 0 and 1 items)**

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<td>T-WIWI-110143</td>
<td>Emerging Trends in Internet Technologies</td>
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<td>Sociotechnical Information Systems Development</td>
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<tr>
<td>T-WIWI-111126</td>
<td>Advanced Lab Blockchain Hackathon (Master)</td>
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<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 Cognitive Automobiles and Robots</td>
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<td>Project Lab Machine Learning</td>
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<td>Zöllner</td>
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<tr>
<td>T-WIWI-109251</td>
<td>Selected Issues in Critical Information Infrastructures</td>
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<td>Sunyaev</td>
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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.

Please note the following information about the module component exams of Prof. Dr. H. Schmeck:


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.

Prerequisites
It is only allowed to choose one lab.

Content
The thematic focus will be based on the choice of courses in the areas of Effiziente Algorithmen, Betriebliche Informations- und Kommunikationssysteme, Wissensmanagement, Komplexitätsmanagement and Software- und Systems Engineering.

Annotation
Detailed information on the recognition of examinations in the field of Informatics can be found at http://www.aifb.kit.edu/web/Auslandsaufenthalt.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
6.56 Module: Information Engineering [M-WIWI-101411]

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

Credits 9  Grade to a tenth  Recurrence Each term  Duration 1 term  Level 4  Version 7

Election block: Supplementary Courses ()

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

Content
In the courses of the module the student can deepen his knowledge on the one hand on the design and operation of markets and on the other hand on the impact of digital goods in network industries regarding the pricing policies, business strategies and regulation issues. If 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.
### 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>
<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>9</td>
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<td>Each term</td>
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#### Election block: Compulsory Elective Courses (at least 9 credits)

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Title</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Lecturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-105777</td>
<td>Business Intelligence Systems</td>
<td>4,5</td>
<td>CR</td>
<td>Mädche, Nadj, Toreini</td>
</tr>
<tr>
<td>T-WIWI-110851</td>
<td>Designing Interactive Systems</td>
<td>4,5</td>
<td>CR</td>
<td>Mädche</td>
</tr>
<tr>
<td>T-WIWI-108437</td>
<td>Practical Seminar: Information Systems and Service Design</td>
<td>4,5</td>
<td>CR</td>
<td>Mädche</td>
</tr>
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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.

#### 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

#### Prerequisites

None

#### 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.
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)

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

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

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Exam Type</th>
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<tbody>
<tr>
<td>T-WIWI-109194</td>
<td>Dynamic Macroeconomics</td>
<td>4.5 CR</td>
<td>Brumm</td>
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<tr>
<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-111318</td>
<td>Growth and Development</td>
<td>4.5 CR</td>
<td>Ott</td>
<td></td>
</tr>
</tbody>
</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 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.

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

Prerequisites
None

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.

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

Workload
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.
### 6.59 Module: Innovation Economics [M-WIWI-101514]

**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>
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<th>Duration</th>
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<td></td>
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<td>2 terms</td>
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**Election block: Compulsory Elective Courses (between 9 and 10 credits)**

<table>
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<tr>
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<th>Course Title</th>
<th>CR</th>
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<tbody>
<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-102906</td>
<td>Methods in Economic Dynamics</td>
<td>1.5</td>
<td>Ott</td>
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<tr>
<td>T-WIWI-109864</td>
<td>Product and Innovation Management</td>
<td>3</td>
<td>Klarmann</td>
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<tr>
<td>T-WIWI-102789</td>
<td>Seminar in Economic Policy</td>
<td>3</td>
<td>Ott</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 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.

**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

**Prerequisites**

None

**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.

**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.

**Workload**

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

<table>
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<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
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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/English</td>
<td>4</td>
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</table>

**Mandatory**


**Election block: Compulsory Elective Courses (1 item)**

- T-WIWI-102873 Current Issues in Innovation Management 3 CR Weissenberger-Eibl
- T-WIWI-110867 The negotiation of open innovation 3 CR Beyer
- T-WIWI-108875 Digital Transformation and Business Models 3 CR Koch
- T-WIWI-102852 Case Studies Seminar: Innovation Management 3 CR Weissenberger-Eibl
- T-WIWI-108774 Analyzing and Evaluating Innovation Processes 3 CR Beyer
- T-WIWI-110234 Innovation Processes Live 3 CR Beyer
- T-WIWI-110263 Methods in Innovation Management 3 CR Koch
- T-WIWI-102853 Roadmapping 3 CR Koch
- T-WIWI-110987 Seminar Methods along the Innovation process 3 CR Beyer
- T-WIWI-110986 Strategic Foresight China 3 CR Weissenberger-Eibl
- T-WIWI-109932 A Closer Look at Social Innovation 3 CR Beyer
- T-WIWI-102858 Technology Assessment 3 CR Koch
- T-WIWI-102854 Technologies for Innovation Management 3 CR Koch

**Election block: Supplementary Courses (1 item)**

- T-WIWI-102873 Current Issues in Innovation Management 3 CR Weissenberger-Eibl
- T-WIWI-102866 Design Thinking 3 CR Terzidis
- T-WIWI-110867 The negotiation of open innovation 3 CR Beyer
- T-WIWI-108875 Digital Transformation and Business Models 3 CR Koch
- T-WIWI-102833 Entrepreneurial Leadership & Innovation Management 3 CR Terzidis
- T-WIWI-102864 Entrepreneurship 3 CR Terzidis
- T-WIWI-102852 Case Studies Seminar: Innovation Management 3 CR Weissenberger-Eibl
- T-WIWI-108774 Analyzing and Evaluating Innovation Processes 3 CR Beyer
- T-WIWI-110234 Innovation Processes Live 3 CR Beyer
- T-WIWI-110263 Methods in Innovation Management 3 CR Koch
- T-WIWI-102853 Roadmapping 3 CR Koch
- T-WIWI-110987 Seminar Methods along the Innovation process 3 CR Beyer
- T-WIWI-110986 Strategic Foresight China 3 CR Weissenberger-Eibl
- T-WIWI-109932 A Closer Look at Social Innovation 3 CR Beyer
- T-WIWI-102854 Technologies for Innovation Management 3 CR Koch
- T-WIWI-102858 Technology Assessment 3 CR Koch

**Competence Certificate**

See German version.
**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.

**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.

**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.

**Recommendation**
None

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
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>
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<tbody>
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<td>Grade to a tenth</td>
<td>Each summer term</td>
<td>1 term</td>
<td>German</td>
<td>4</td>
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</table>

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

Competence Certificate
Written Exam (120 min)

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.

Prerequisites
none

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

**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>
<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>
<td>German</td>
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**Election block: Intellectual Property Law (at least 1 item as well as at least 9 credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Tutor(s)</th>
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<tr>
<td>T-INFO-102036</td>
<td>Computer Contract Law</td>
<td>3 CR</td>
<td>Bartsch</td>
</tr>
<tr>
<td>T-INFO-101308</td>
<td>Copyright</td>
<td>3 CR</td>
<td>Dreier</td>
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<tr>
<td>T-INFO-101310</td>
<td>Patent Law</td>
<td>3 CR</td>
<td>Hössle, Koch</td>
</tr>
<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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<tr>
<td>T-INFO-108462</td>
<td>Selected Legal Issues of Internet Law</td>
<td>3 CR</td>
<td>Dreier</td>
</tr>
</tbody>
</table>

**Prerequisites**

None
6.63 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>
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<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>
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<td>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>German</td>
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<td>3</td>
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</table>

**Mandatory**

- **T-BGU-108000** Lean Construction 4,5 CR Haghsheno
- **T-BGU-101007** Project Paper Lean Construction 1,5 CR Haghsheno

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

- **T-BGU-111313** Turnkey Construction I 1,5 CR Haghsheno
- **T-BGU-111210** Turnkey Construction II 3 CR Haghsheno
- **T-BGU-103427** Site Management 1,5 CR Haghsheno
- **T-BGU-103429** Building Laws 3 CR Haghsheno
- **T-BGU-103432** Project Management in Construction and Real Estate Industry I 3 CR Haghsheno
- **T-BGU-103433** Project Management in Construction and Real Estate Industry II 3 CR Haghsheno

**Competence Certificate**

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.

The exam must be repeated at the latest 2 semesters after the first try. The exam will be based on the content of the latest lecture.

The exam of the course Lean Construction consists of a preparatory and oral assessment. The preparatory assessment is a group work and consists of an assignment with presentation. The preparatory assessment is precondition to attend the oral examination (30 min) of the course Lean Construction. The grade of the exam Lean Construction is defined by weighted average of grades for oral examination (75 %) and preparatory assignment (25 %).

Examination of courses Projektmanagement in der Bau- und Immobilienwirtschaft I, Projektmanagement in der Bau- und Immobilienwirtschaft II, and Baurecht are carried out written. Combinations of courses Schlüsselfertiges Bauen I, Schlüsselfertiges Bauen II, Bauleitung, and Nachtragsmanagement are examined orally.

**Competence Goal**

see German version

**Module grade calculation**

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

**Prerequisites**

The course Lean Construction is compulsory and must be examined.

**Content**

see German version

**Recommendation**

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

**Annotation**

none

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Literature
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>
<th>Version</th>
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<td>Each summer term</td>
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<td>German/English</td>
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**Mandatory**

<table>
<thead>
<tr>
<th>T-MACH-110771</th>
<th>Logistics and Supply Chain Management</th>
<th>9 CR</th>
<th>Furmans</th>
</tr>
</thead>
</table>

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

**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.

**Prerequisites**
None

**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.

**Learning type**
Lectures, tutorials, case studies.

**Literature**
Dieter Arnold et. al.: Handbuch Logistik, 2008
Marc Goetschalkx: Supply Chain Engineering, 2011
6.65 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 | 4 |

Mandatory

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

Competence Certificate
Written exam (120 minutes)

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.

Prerequisites
None

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.

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

**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>
<th>Recurrence</th>
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**Mandatory**

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<th>Albers, Albers Assistenten</th>
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<td>T-MACH-105401</td>
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</tbody>
</table>

**Competence Certificate**

oral examination (60 minutes)

**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.

**Prerequisites**

None

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

**Responsible:** Prof. Dr. Marcus Wouters

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

**Part of:** Business Administration

Compulsory Elective Modules (Business Administration)

<table>
<thead>
<tr>
<th>Credits</th>
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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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<tr>
<td>T-WIWI-102800</td>
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<td>4,5 CR</td>
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<td>Management Accounting 2</td>
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<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.

**Competence Goal**

Students

- are familiar with various management accounting methods,
- can apply these methods for cost estimation, profitability analysis, and product costing,
- are able to analyze short-term and long-decisions with these methods,
- have the capacity to devise instruments for organizational control.

**Prerequisites**
None

**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.
6.68 Module: Manufacturing Technology [M-MACH-101276]

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

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

<table>
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<th>Credits</th>
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<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>1 term</td>
<td>German</td>
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</table>

Mandatory
T-MACH-102105 Manufacturing Technology 9 CR Schulze, Zanger

Competence Certificate
Written Exam (180 min)

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.

Prerequisites
None

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
Module: Market Engineering [M-WIWI-101446]

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

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

**Part of:** Business Administration

**Compulsory Elective Modules (Business Administration)**

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German/English

**Level:** 4

**Version:** 7

**Mandatory**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
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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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**Election block: Supplementary Courses (4.5 credits)**

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<tr>
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<th>Grading Scale</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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<tr>
<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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<tr>
<td>T-WIWI-107501</td>
<td>Energy Market Engineering</td>
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<tr>
<td>T-WIWI-107503</td>
<td>Energy Networks and Regulation</td>
<td>4.5 CR</td>
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<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>
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<tr>
<td>T-WIWI-107504</td>
<td>Smart Grid Applications</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.

**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.

**Prerequisites**

The course *Market Engineering: Information in Institutions* [2540460] is compulsory and must be examined.

**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 a systematic analysis are explained in the mandatory course *Market Engineering* [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

**Recommendation**

None

**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.
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)

<table>
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<tr>
<th>Credits</th>
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<td>Each summer term</td>
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**Election block: Compulsory Elective Courses (at least 1 item)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-WIWI-111100</td>
<td>Current Directions in Consumer Psychology</td>
<td>3 CR</td>
<td>Scheibehenne</td>
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<tr>
<td>T-WIWI-111099</td>
<td>Judgment 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>
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<td>Klarmann</td>
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<tr>
<td>T-WIWI-109864</td>
<td>Product and Innovation Management</td>
<td>3 CR</td>
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**Election block: Supplementary Courses (at most 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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</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>
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<tr>
<td>T-WIWI-110985</td>
<td>International Business Development and Sales</td>
<td>6 CR</td>
<td>Casenave, Klarmann, Terzidis</td>
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<tr>
<td>T-WIWI-102835</td>
<td>Marketing Strategy Business Game</td>
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<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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<tr>
<td>T-WIWI-111315</td>
<td>Psychological Processes in Individual Decisions</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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</table>

**Competition 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 single 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.

**Competition 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

**Prerequisites**

None

**Content**

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

**Annotation**

Please note that none of the listed 1.5-ECTS courses will take place in the winter semester 2020/21 due to a research semester. The courses concerned will probably be offered again from WS21/22 onwards.

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.

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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<td>Each winter term</td>
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</table>

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.

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.

Prerequisites
none

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.
Module: Material Flow in Networked Logistic Systems [M-MACH-101278]

Responsibility: Prof. Dr.-Ing. Kai Furmans

Organisation: KIT Department of Mechanical Engineering

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

Mandatory

<table>
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<th>Recurrence</th>
<th>Duration</th>
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<td>Mathematical Models and Methods for Production Systems</td>
<td>6 CR</td>
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Election block: Material flow in interconnected logistics systems

<table>
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<th>Course Title</th>
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<tbody>
<tr>
<td>T-MACH-105151</td>
<td>Energy Efficient Intralogistic Systems</td>
<td>4 CR</td>
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<td>Each term</td>
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<tr>
<td>T-MACH-111003</td>
<td>Global Logistics</td>
<td>4 CR</td>
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<td>T-MACH-105187</td>
<td>IT-Fundamentals of Logistics</td>
<td>4 CR</td>
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<td>T-MACH-105174</td>
<td>Warehousing and Distribution Systems</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.

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.

Prerequisites

none

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.

Recommendation

It is recommended to successfully complete the course "Material Flow in Logistics Systems" [T-MACH-102151] before starting the module.

Workload

Regular attendance: 270 hours (9 credits). Lectures with 180 hours attendance 6 credits. Lectures with 120 hours 4 credits.

Learning type

Lecture, tutorial.
Module: Mathematical Programming [M-WIWI-101473]

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

<table>
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<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>Grade to a tenth</td>
<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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Election block: Compulsory Elective Courses (at most 2 items)

- T-WIWI-102719 Mixed Integer Programming I
- T-WIWI-102726 Global Optimization I
- T-WIWI-103638 Global Optimization I and II
- T-WIWI-102856 Convex Analysis
- T-WIWI-102724 Nonlinear Optimization I
- T-WIWI-103637 Nonlinear Optimization I and II
- T-WIWI-102855 Parametric Optimization

Election block: Supplementary Courses (at most 2 items)

- T-WIWI-106548 Advanced Stochastic Optimization
- T-WIWI-102720 Mixed Integer Programming II
- T-WIWI-102727 Global Optimization II
- T-WIWI-102723 Graph Theory and Advanced Location Models
- T-WIWI-106549 Large-scale Optimization
- T-WIWI-111247 Mathematics for High Dimensional Statistics
- T-WIWI-103124 Multivariate Statistical Methods
- T-WIWI-102725 Nonlinear Optimization II
- T-WIWI-102715 Operations Research in Supply Chain Management
- T-WIWI-110162 Optimization Models and Applications

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.

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 make suggestions to adapt them to practical problems.

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.
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.
Module: Microeconomic Theory [M-WIWI-101500]

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

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

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

<table>
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<tr>
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<td>Ehrhart, Puppe, Reiß</td>
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<td>Puppe</td>
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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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<td>T-WIWI-105781</td>
<td>Incentives in Organizations</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 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.

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?

Prerequisites
None

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.
6.75 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>
<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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<tbody>
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<td>9</td>
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<td>Each term</td>
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Mandatory

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<thead>
<tr>
<th>Course Code</th>
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<th>Recurrence</th>
<th>Language</th>
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<tbody>
<tr>
<td>T-MACH-102166</td>
<td>Fabrication Processes in Microsystem Technology</td>
<td>3 CR</td>
<td>Bade</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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<tr>
<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-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>3 CR</td>
<td>Dienwiebel, Hölscher</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>
<td>Worgull</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>T-MACH-102200</td>
<td>Polymers in MEMS C: Biopolymers and Bioplastics</td>
<td>3 CR</td>
<td>Rapp, Worgull</td>
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<tr>
<td>T-MACH-105556</td>
<td>Practical Course Polymers in MEMS</td>
<td>3 CR</td>
<td>Rapp, Worgull</td>
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<tr>
<td>T-MACH-109122</td>
<td>X-ray Optics</td>
<td>4 CR</td>
<td>Last</td>
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</tbody>
</table>

Election block: Mikrofertigung (Ergänzungsbereich) (at least 6 credits)

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

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

Competence Goal
The 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.

Prerequisites
none

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
6.76 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>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Each term</td>
<td>1 term</td>
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</table>

**Election block: Mikrooptik (at least 9 credits)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
<td>Last</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
<td>4</td>
<td>2</td>
</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>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
<td>Each term</td>
<td>1 term</td>
<td>German</td>
<td>4</td>
<td>2</td>
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<tr>
<td>T-ETIT-100741</td>
<td>Laser Physics</td>
<td>4 CR</td>
<td>Eichhorn</td>
<td>Each term</td>
<td>1 term</td>
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<tr>
<td>T-ETIT-101945</td>
<td>Optical Waveguides and Fibers</td>
<td>4 CR</td>
<td>Koos</td>
<td>Each term</td>
<td>1 term</td>
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<tr>
<td>T-MACH-109122</td>
<td>X-ray Optics</td>
<td>4 CR</td>
<td>Last</td>
<td>Each term</td>
<td>1 term</td>
<td>German</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.

**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

**Prerequisites**

none

**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
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>
<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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<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 block: Mikrosystemtechnik (at least 9 credits)**

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

**Competence Certificate**

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

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

**Competence Goal**

Construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

**Prerequisites**

None

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

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

<table>
<thead>
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<th>Credits</th>
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<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
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<tr>
<td>T-MACH-110959</td>
<td>Basics of Mobile Working Machines</td>
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<tr>
<td>Credits</td>
<td>9 CR</td>
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**Competence Certificate**
The assessment is carried out as a general oral exam of the single courses of this module. The overall grade of the module is the grade of the oral examination.

**Competence Goal**
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 student is able to

- apply and evaluate the physical principles of hydrostatics,
- name common components and explain how they work,
- calculate hydrostatic systems,
- describe mobile working machines,
- characterize fields of application of the machines,
- describe the construction of the machine.

After a successful participation:

- the student can name the wide range of mobile working machines
- the student knows the possible applications and processes of the most important mobile working machines
- the student can describe selected subsystems and components

**Content**
In the module of Mobile Machines [WI4INGMB15] the students will learn the structure of the machines and basics of hydraulics. The module is practically orientated and supported by industry partners.

**Workload**
270 hours

**Learning type**
- Research-oriented teaching
- lectures
- exercises
6.79 Module: Module Master Thesis [M-WIWI-101650]

**Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

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

**Part of:** Master Thesis

<table>
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**Mandatory**

| T-WIWI-103142 | Master Thesis | 30 CR |

**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 month. 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.

**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.

**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.

**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.
### 6.80 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>
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<th>Grading scale</th>
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<th>Duration</th>
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<td>Each term</td>
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<tr>
<td>T-MACH-105180</td>
<td>Nanotechnology for Engineers and Natural Scientists</td>
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</table>

#### Election block: Nanotechnologie (Ergänzungsbereich) (at least 5 credits)

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<td>T-MACH-102080</td>
<td>Nanotechnology with Clusterbeams</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
</tr>
<tr>
<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
</tr>
<tr>
<td>T-ETIT-100740</td>
<td>Quantum Functional Devices and Semiconductor Technology</td>
<td>3 CR</td>
</tr>
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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.

**Competence Goal**

The student

- has detailed knowledge in the field of nanotechnology
- is able to evaluate the specific characteristics of nanosystems.

**Prerequisites**

none

**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 [M-WIWI-104837]

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

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

**Part of:** Engineering Sciences

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each term

**Duration:** 1 term

**Language:** German

**Level:** 4

**Version:** 2

### Election block: Wahlpflichtangebot (between 9 and 12 credits)

<table>
<thead>
<tr>
<th>Course Code</th>
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<tbody>
<tr>
<td>T-BGU-101499</td>
<td>Introduction to Hydrogeology</td>
<td>5 CR</td>
<td>Goldscheider</td>
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<tr>
<td>T-BGU-108943</td>
<td>Engineering Hydrology</td>
<td>3 CR</td>
<td>Ehret</td>
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<tr>
<td>T-BGU-101859</td>
<td>Morphodynamics</td>
<td>3 CR</td>
<td>Nestmann</td>
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<tr>
<td>T-BGU-106620</td>
<td>Examination Prerequisite Environmental Communication</td>
<td>0 CR</td>
<td>Kämpf</td>
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<tr>
<td>T-BGU-101676</td>
<td>Environmental Communication</td>
<td>4 CR</td>
<td>Kämpf</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.

**Competence Goal**

See German version

**Prerequisites**

None

**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.
# 6.82 Module: Network Economics [M-WIWI-101406]

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

<table>
<thead>
<tr>
<th>Election block: Compulsory Elective Courses (9 credits)</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-100005 Competition in Networks 4,5 CR Mitusch</td>
<td></td>
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<tr>
<td>T-WIWI-100007 Transport Economics 4,5 CR Mitusch, Szimba</td>
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<tr>
<td>T-WIWI-102609 Advanced Topics in Economic Theory 4,5 CR Mitusch</td>
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<tr>
<td>T-WIWI-102712 Regulation Theory and Practice 4,5 CR Mitusch</td>
<td></td>
</tr>
<tr>
<td>T-WIWI-102713 Telecommunication and Internet Economics 4,5 CR Mitusch</td>
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</tbody>
</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 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.

**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.

**Prerequisites**  
None

**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.

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

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

**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>Duration</th>
<th>Language</th>
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<td>Each term</td>
<td>2 terms</td>
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**Election block: Compulsory Elective Courses (at most 2 items)**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
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<td>Nickel</td>
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<tr>
<td>T-WIWI-106200</td>
<td>Modeling and OR-Software: Advanced Topics</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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**Election block: Supplementary Courses (at most 2 items)**

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<th>Course Code</th>
<th>Course Title</th>
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<th>Lecturer</th>
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<tr>
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<td>Introduction to Stochastic Optimization</td>
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<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
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<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I</td>
<td>4.5 CR</td>
<td>Stein</td>
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<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II</td>
<td>4.5 CR</td>
<td>Stein</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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<td>T-WIWI-106549</td>
<td>Large-scale Optimization</td>
<td>4.5 CR</td>
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**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 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

- 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.

**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.
**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.

**Recommendation**

Basic knowledge as conveyed in the module Introduction to Operations Research is assumed.

**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
**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>
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<tr>
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<th>Recurrence</th>
<th>Duration</th>
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<td>Each term</td>
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**Election block: Optoelektronik und Optische Kommunikationstechnik (Kernbereich) (1 item)**

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

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

**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.

**Prerequisites**

none

**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
### 6.85 Module: Principles of Food Process Engineering [M-CIWVT-101120]

**Responsible:** Dr. Volker Gaukel  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** Engineering Sciences  
**Compulsory Elective Modules (Engineering Sciences)**

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**Mandatory**

| T-CIWVT-101874 | Principles of Food Process Engineering | 9 CR | Gaukel |

**Competence Goal**  
See German version.

**Prerequisites**  
none

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

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Election block: Private Business Law (at least 1 item as well as at least 9 credits)

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<td>T-INFO-101329</td>
<td>Employment Law I</td>
<td>3 CR</td>
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<tr>
<td>T-INFO-101330</td>
<td>Employment Law II</td>
<td>3 CR</td>
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<tr>
<td>T-INFO-101315</td>
<td>Tax Law I</td>
<td>3 CR</td>
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<td>T-INFO-101314</td>
<td>Tax Law II</td>
<td>3 CR</td>
<td>Dietrich</td>
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<tr>
<td>T-INFO-101316</td>
<td>Law of Contracts</td>
<td>3 CR</td>
<td>Hoff</td>
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</table>

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.

Prerequisites
None

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.
**6.87 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

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each winter term

**Duration:** 2 terms

**Language:** German

**Level:** 4

**Version:** 1

### Mandatory

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### Election block: Electives (between 2 and 3 items as well as between 6 and 7.5 credits)

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<td>T-BGU-101845</td>
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<td>3 CR</td>
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<tr>
<td>T-BGU-101832</td>
<td>Operation Methods for Foundation and Marine Construction</td>
<td>1.5 CR</td>
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<td>T-BGU-101801</td>
<td>Operation Methods for Earthmoving</td>
<td>1.5 CR</td>
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<td>T-BGU-101846</td>
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<tr>
<td>T-BGU-101847</td>
<td>Project Studies</td>
<td>3 CR</td>
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### Competence Certificate

- 'Teilleistung' T-BGU-101844 with written examination according to § 4 Par. 2 No. 1
- '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'

### 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.

### Module grade calculation

Grade of the module is CP weighted average of grades of the partial exams

### Prerequisites

The course Verfahrenstechnik [6241704] is compulsory and must be examined.

### Content

Within the frame of this module, various construction and 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.

### Recommendation

None

### Annotation

None

### Workload

See German version
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>
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**Mandatory**

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<tr>
<td>T-BGU-111210</td>
<td>Turnkey Construction II</td>
<td>3 CR</td>
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**Election block: Electives (between 1 and 2 items as well as between 3 and 4,5 credits)**

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<td>Site Management</td>
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<tr>
<td>T-BGU-111313</td>
<td>Turnkey Construction I</td>
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<td>T-BGU-103429</td>
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**Competence Certificate**

- 'Teilleistung' T-BGU-103432 with written examination according to § 4 Par. 2 No. 1
- 'Teilleistung' T-BGU-111210 with oral examination according to § 4 Par. 2 No. 2

according to selected course:

- 'Teilleistung' T-BGU-103427 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-111313 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-103428 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-103429 with oral examination according to § 4 Par. 2 No. 2
- 'Teilleistung' T-BGU-103433 with oral examination according to § 4 Par. 2 No. 2

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

**Competence Goal**

see German version

**Module grade calculation**

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

**Prerequisites**

The courses Projektmanagement in der Bau- und Immobilienwirtschaft I and Schlüsselfertiges Bauen II are compulsory and must be examined.

**Content**

see German version

**Recommendation**

none

**Annotation**

none

**Workload**

see German version
Literature
DIETHelm, G.: Projektmanagement, Band 1: Grundlagen, Verlag Neue Wirtschafts-Briefe, Herne, 2000
ESCHENBRUCH, K.: Recht der Projektsteuerung, Werner Verlag, München, 2003
VOLKMANN, W.: Projektabwicklung, Verlag für Wirtschaft und Verwaltung Hubert Wingen, Essen, 2002
### Module: Public Business Law [M-INFO-101217]

**Responsible:** Dr. Tristan Barczak  
**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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**Election block: Public Business Law (at least 1 item as well as at least 9 credits)**

<table>
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<td>Telecommunications Law</td>
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<td>T-INFO-101303</td>
<td>Data Protection Law</td>
<td>3 CR</td>
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<td>European and International Law</td>
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**Competence Certificate**  
see course description.
6.90 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)

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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
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)

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<td>IT-Based Road Design</td>
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<td>T-BGU-101674</td>
<td>Safety Management in Highway Engineering</td>
<td>3 CR</td>
<td>Zimmermann</td>
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<tr>
<td>T-BGU-106615</td>
<td>Laws concerning Traffic and Roads</td>
<td>3 CR</td>
<td>Hönig</td>
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</table>

**Competence Goal**

See German version.

**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).

**Recommendation**

None

**Annotation**

None
### Module: Seminar Module [M-WIWI-101808]

**Responsible:** Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

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

**Part of:** Compulsory Elective Modules (mandatory)

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#### Election block: Seminar in Economics and Management, Mathematics and Law (between 3 and 6 credits)

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<tr>
<td>T-WIWI-103476</td>
<td>Seminar in Business Administration B (Master)</td>
<td>3 CR Professorenschaft des Fachbereichs Betriebswirtschaftslehre</td>
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<td>T-WIWI-103477</td>
<td>Seminar in Economics B (Master)</td>
<td>3 CR Professorenschaft des Fachbereichs Volkswirtschaftslehre</td>
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<td>Seminar in Economics A (Master)</td>
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<td>Seminar in Operations Research B (Master)</td>
<td>3 CR Nickel, Rebennack, Stein</td>
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<td>Seminar in Statistics A (Master)</td>
<td>3 CR Grothe, Schienle</td>
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<td>T-WIWI-103484</td>
<td>Seminar in Statistics B (Master)</td>
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<td>T-INFO-101997</td>
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<td>T-INFO-105945</td>
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#### Election block: Seminar in Engineering Science (at most 1 item)

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<td>Conveying Technology and Logistics</td>
<td>3 CR Furmans, Pagani</td>
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<tr>
<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
<td>3 CR Fleischer, Lanza, Schulze</td>
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<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
<td>3 CR Lanza</td>
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<tr>
<td>T-BGU-100014</td>
<td>Seminar in Transportation</td>
<td>3 CR Chlond, Vortisch</td>
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<tr>
<td>T-WIWI-108763</td>
<td>Seminar in Engineering Science Master (approval)</td>
<td>3 CR Fachvertreter ingenieurwissenschaftlicher Fakultäten</td>
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<td>T-WIWI-110215</td>
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#### Election block: SQ-Seminar (between 3 and 4 credits)

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<td>T-WIWI-104682</td>
<td>Wildcard Key Competences Seminar 3</td>
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<td>T-WIWI-104685</td>
<td>Wildcard Key Competences Seminar 6</td>
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This item will not influence the grade calculation of this parent.
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 examination regulation). A detailed description of every singled assessment is given in the specific course characierization.

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.

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.

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 a 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].

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.
6.93 Module: Sensor Technology I [M-ETIT-101158]

**Responsible:** Dr. Wolfgang Menesklou

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** Engineering Sciences

**Credits:** 9

**Grading scale:** Grade to a tenth

**Recurrence:** Each summer term

**Duration:** 1 term

**Level:** 4

**Version:** 3

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<th>Sensors</th>
<th>3 CR</th>
<th>Menesklou</th>
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**Election block: Compulsory Elective (at most 2 items as well as at least 6 credits)**

| T-ETIT-100707 | Seminar Sensors | 3 CR | Menesklou |
| T-MACH-101910 | Microactuators | 3 CR | Kohl |
| T-MACH-102164 | Practical Training in Basics of Microsystem Technology | 3 CR | Last |
| T-MACH-105182 | Introduction to Microsystem Technology I | 3 CR | Badilita, Jouda, Korvink |
| T-MACH-105183 | Introduction to Microsystem Technology II | 3 CR | Jouda, Korvink |

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

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

**Prerequisites**
The course Sensor Technology [23231] is obligatory and has to be attended. The elected courses must not be credited in other modules.

**Recommendation**
Knowledge of electrical engineering is assumed. Therefore it is recommended to attend the courses Electrical Engineering II [23224] beforehand.

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

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

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<td>Artificial Intelligence in Service Systems</td>
<td>4.5 CR</td>
<td>Satzger</td>
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<td>T-WIWI-111219</td>
<td>Artificial Intelligence in Service Systems - Applications in Computer Vision</td>
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<td>4.5 CR</td>
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<td>T-WIWI-102899</td>
<td>Modeling and Analyzing Consumer Behavior with R</td>
<td>4.5 CR</td>
<td>Dorner, Weinhardt</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.

**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

**Prerequisites**
None

**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.

**Recommendation**
The course Service Analytics A [2595501] should be taken.

**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.
**Module: Service Design Thinking [M-WIWI-101503]**

**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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<td>12 CR</td>
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**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).

**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.

**Prerequisites**

None

**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 lade out in detail and tested with users.
- Final Prototype: Implementing the functional prototype and presenting it to the customer.

**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.
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.
### 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)

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

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<td>Market Engineering: Information in Institutions</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**

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.

**Prerequisites**

None

**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.

**Recommendation**

None

**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.
Module: Service Innovation, Design & Engineering [M-WIWI-102806]

**Responsible:** Prof. Dr. Alexander Mädche
Prof. Dr. Gerhard Satzger

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

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

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<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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<tr>
<td>9</td>
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<td>Each term</td>
<td>2 terms</td>
<td>German</td>
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**Election block: Compulsory Elective Courses (9 credits)**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>T-WIWI-110877</td>
<td>Engineering Interactive Systems</td>
<td>4.5 CR</td>
<td>Weinhardt</td>
<td>4</td>
<td>3</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>Satzger</td>
<td>4</td>
<td>3</td>
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<tr>
<td>T-WIWI-110887</td>
<td>Practical Seminar: Service Innovation</td>
<td>4.5 CR</td>
<td>Mädche</td>
<td>4</td>
<td>3</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>
<td>Satzger</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>T-WIWI-102641</td>
<td>Service Innovation</td>
<td>4.5 CR</td>
<td>Satzger</td>
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</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.

**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.

**Prerequisites**

**Dependencies between courses:**
The course Practical Seminar Service Innovation cannot be applied in combination with the course Practical Seminar Digital Service Design.

**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.

**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].

**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.
6.98 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)

<table>
<thead>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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**Mandatory**

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<th>Lecturer(s)</th>
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<tr>
<td>T-WIWI-110280</td>
<td>Digital Services: Business Models and Transformation</td>
<td>4,5 CR</td>
<td>Satzger</td>
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**Election block: Supplementary Courses (4,5 credits)**

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<th>Course Code</th>
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<tr>
<td>T-WIWI-108715</td>
<td>Artificial Intelligence in Service Systems</td>
<td>4,5 CR</td>
<td>Satzger</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>
<td>Satzger</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>
<td></td>
</tr>
<tr>
<td>T-WIWI-102641</td>
<td>Service Innovation</td>
<td>4,5 CR</td>
<td>Satzger</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.

**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.

**Prerequisites**

The course "Digital Services: Business Models and Transformation" is compulsory and must be examined.

**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.

**Recommendation**

None

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Service Operations [M-WIWI-102805]


**Responsible:** Prof. Dr. Stefan Nickel

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

**Part of:** Operations Research

<table>
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<th>Credits</th>
<th>Grading scale Grade to a tenth</th>
<th>Recurrence Each term</th>
<th>Duration 1 term</th>
<th>Language</th>
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**Election block: Compulsory Elective Courses (at most 2 items)**

<table>
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<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Language</th>
<th>Level</th>
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<tbody>
<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-102884</td>
<td>Operations Research in Health Care Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<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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**Election block: Supplementary Courses (at most 2 items)**

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<th>Course Code</th>
<th>Course Title</th>
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<th>Grade</th>
<th>Recurrence</th>
<th>Duration</th>
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<th>Level</th>
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<tbody>
<tr>
<td>T-WIWI-102872</td>
<td>Challenges in Supply Chain Management</td>
<td>4.5 CR</td>
<td>Mohr</td>
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<tr>
<td>T-WIWI-110971</td>
<td>Demand-Driven Supply Chain Planning</td>
<td>4.5 CR</td>
<td>Packowski</td>
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</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.

**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

**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.

**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.

**Recommendation**

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

**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.
**6.100 Module: Sociology [M-GEISTSOZ-101169]**

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</table>

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** Compulsory Elective Modules (Law or Sociology)

**Mandatory**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Name</th>
<th>Credits</th>
<th>Grading scale Grade to a tenth</th>
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<tr>
<td>T-GEISTSOZ-104565</td>
<td>Computer Aided Data Analysis</td>
<td>0 CR</td>
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<td>Nollmann</td>
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<tr>
<td>T-GEISTSOZ-109052</td>
<td>Application of Social Science Methods (WiWi)</td>
<td>9 CR</td>
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<td>Nollmann</td>
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</table>

**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.

**Prerequisites**

Students must pass three exercise sheets within the seminar "Computer based data analysis".

**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.
### 6.101 Module: Specialization in Food Process Engineering [M-CIWVT-101119]

**Responsible:** 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>
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<th>Language</th>
<th>Level</th>
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<tr>
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</table>

**Competence Goal**  
See German version.

**Prerequisites**  
The module “Principles of Food Process Engineering” must be passed.

**Content**  
See courses.
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>
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**Election block: Vertiefung der Produktionstechnik (at least 9 credits)**

<table>
<thead>
<tr>
<th>Module Code</th>
<th>Module Name</th>
<th>Credits</th>
<th>Lecturer(s)</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>
</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-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-108878</td>
<td>Laboratory Production Metrology</td>
<td>5 CR</td>
<td>Höffner</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-110984</td>
<td>Production Technology for E-Mobility</td>
<td>4 CR</td>
<td>Fleischer, Hofmann</td>
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<tr>
<td>T-MACH-110960</td>
<td>Project Internship Aditive Manufacturing: Development and Production of an Additive Component</td>
<td>4 CR</td>
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<td>T-MACH-102107</td>
<td>Quality Management</td>
<td>4 CR</td>
<td>Lanza</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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<td>T-MACH-105177</td>
<td>Metal Forming</td>
<td>4 CR</td>
<td>Herlan</td>
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<tr>
<td>T-MACH-102148</td>
<td>Gear Cutting Technology</td>
<td>4 CR</td>
<td>Klaiber</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.

**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.

**Prerequisites**

none

**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>
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<tr>
<th>Credits</th>
<th>Grading scale</th>
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**Election block: Spezielle Werkstoffkunde (at least 9 credits)**

<table>
<thead>
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<th>Course Title</th>
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<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>
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<tr>
<td>T-MACH-102111</td>
<td>Principles of Ceramic and Powder Metallurgy Processing</td>
<td>4 CR</td>
<td>Schell</td>
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<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>
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<tr>
<td>T-MACH-102137</td>
<td>Polymer Engineering I</td>
<td>4 CR</td>
<td>Elsner, Liebig</td>
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<tr>
<td>T-MACH-102138</td>
<td>Polymer Engineering II</td>
<td>4 CR</td>
<td>Elsner, 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>
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<tr>
<td>T-MACH-102139</td>
<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>4 CR</td>
<td>Gruber, Gumbsch</td>
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<tr>
<td>T-MACH-102140</td>
<td>Failure of Structural Materials: Deformation and Fracture</td>
<td>4 CR</td>
<td>Gumbsch, Weygand</td>
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<tr>
<td>T-MACH-102157</td>
<td>High Performance Powder Metallurgy Materials</td>
<td>4 CR</td>
<td>Schell</td>
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<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>
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<tr>
<td>T-MACH-102170</td>
<td>Structural and Phase Analysis</td>
<td>4 CR</td>
<td>Hinterstein, Wagner</td>
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<tr>
<td>T-MACH-105150</td>
<td>Constitution and Properties of Protective Coatings</td>
<td>4 CR</td>
<td>Ulrich</td>
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<td>T-MACH-105170</td>
<td>Welding Technology</td>
<td>4 CR</td>
<td>Farajian</td>
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<td>T-MACH-105164</td>
<td>Laser in Automotive Engineering</td>
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<td>Schneider</td>
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<td>T-MACH-105157</td>
<td>Foundry Technology</td>
<td>4 CR</td>
<td>Wilhelm</td>
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<td>T-MACH-105178</td>
<td>Practical Course Technical Ceramics</td>
<td>1 CR</td>
<td>Schell</td>
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<tr>
<td>T-MACH-105179</td>
<td>Functional Ceramics</td>
<td>4 CR</td>
<td>Hinterstein, Rheinheimer</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. The assessment procedures are described for each course of the module separately.

**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.

**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.

**Prerequisites**  
None

**Content**  
See courses.
**Workload**
The module requires an average workload of 270 hours.

**Learning type**
Lecture, Tutorials.
6.104 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>
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<td>Each term</td>
<td>1 term</td>
<td>German/English</td>
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Election block: Compulsory Elective Courses (between 1 and 2 items)

- T-WIWI-106546 Introduction to Stochastic Optimization 4.5 CR Rebennack
- T-WIWI-106548 Advanced Stochastic Optimization 4.5 CR Rebennack
- T-WIWI-106549 Large-scale Optimization 4.5 CR Rebennack

Election block: Supplementary Courses (at most 1 item)

- T-WIWI-102723 Graph Theory and Advanced Location Models 4.5 CR Nickel
- T-WIWI-102719 Mixed Integer Programming I 4.5 CR Stein
- T-WIWI-102720 Mixed Integer Programming II 4.5 CR Stein
- T-WIWI-111247 Mathematics for High Dimensional Statistics 4.5 CR Grothe
- T-WIWI-103124 Multivariate Statistical Methods 4.5 CR Grothe
- T-WIWI-102715 Operations Research in Supply Chain Management 4.5 CR Nickel
- T-WIWI-106545 Optimization under Uncertainty 4.5 CR Rebennack
- T-WIWI-110162 Optimization Models and Applications 4.5 CR Sudermann-Merx

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 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

- 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.

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.

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.

Recommendation
It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.
Annotation
The course "Introduction to Stochastic Optimization" will be offered until the winter semester 2020/21 as an additional option in the elective offer of the module. Thereafter, the course can only be selected in the supplementary offer. 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.
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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<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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<tr>
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<td>Each term</td>
<td>2 terms</td>
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**Election block: Strategic Design of Modern Production Systems (at least 9 credits)**

<table>
<thead>
<tr>
<th>Code</th>
<th>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>
</tr>
<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 “Global Production”</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>
</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.

**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.

**Prerequisites**

none

**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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<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>English</td>
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**Mandatory**

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<th>Course Title</th>
<th>Credits</th>
<th>Instructor</th>
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<tr>
<td>T-WIWI-102864</td>
<td>Entrepreneurship</td>
<td>3 CR</td>
<td>Terzidis</td>
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<tr>
<td>T-WIWI-110166</td>
<td>SIL Entrepreneurship Project</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
<tr>
<td>T-WIWI-110287</td>
<td>SIL Entrepreneurship Emphasis</td>
<td>3 CR</td>
<td>Terzidis</td>
</tr>
</tbody>
</table>

**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".
Compentence 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 recognize 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.

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/.
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 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
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.
**6.107 Module: Student Innovation Lab (SIL) 2 [M-WIWI-105011]**

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
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)

<table>
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<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>9</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>2 terms</td>
<td>English</td>
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**Mandatory**

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<th>Course Title</th>
<th>Credits</th>
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<tbody>
<tr>
<td>T-ETIT-110291</td>
<td>Innovation Lab</td>
<td>9 CR</td>
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</tbody>
</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

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.
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.

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/.
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 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)**

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<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>9</td>
<td>Grade to a tenth</td>
<td>Each winter term</td>
<td>1 term</td>
<td>German</td>
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<tr>
<td>T-MACH-109919</td>
<td>Basics of Technical Logistics I</td>
<td>4 CR</td>
<td>Mittwollen, Oellerich</td>
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<tr>
<td>T-MACH-109920</td>
<td>Basics of Technical Logistics II</td>
<td>5 CR</td>
<td>Hochstein</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 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.

**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.

**Prerequisites**

none

**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
Module: Transport Infrastructure Policy and Regional Development [M-WIWI-101485]

6.109 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)

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Election block: Compulsory Elective Courses (2 items)

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<th>Credits</th>
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<td>T-WIWI-103107</td>
<td>Spatial Economics</td>
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<td>Ott</td>
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<tr>
<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.

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

Prerequisites
None

Content
The development infrastructure (e.g. transport, energy, telecommunications) has always been one of the most relevant factors for economic development and particularly influences the development of the regional economy. From the repertoire of state actions, investments into transport infrastructure are often regarded the most important measure to foster regional economic growth. Besides the direct effects of transport policy on passenger and freight transport, a variety of individual economic activities is significantly dependent on the available or potential transport options. Decisions on the planning, financing and realization of mayor infrastructure projects require a solid and far-reaching consideration of direct and indirect growth effects with the occurring costs.

Through its combination of lectures the module reflects the complex interdependencies between infrastructure policy, transport industry and regional policy and provides its participants with a comprehensive understanding of the functionalities of one of the most important sectors of the economy and its relevance for economic policy.

Annotation
The courses Assessment of Public Policies and Projects I (winter term) and Assessment of Public Policies and Projects II (summer term) will no longer be part of this module. Student who have already had exams in this courses can integrate these exams in this module.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# 6.110 Module: Transportation Modelling and Traffic Management [M-BGU-101065]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** Engineering Sciences  
**Compulsory Elective Modules (Engineering Sciences)**  
**Credits:** 9  
**Grading scale:** Grade to a tenth  
**Recurrence:** Each term  
**Duration:** 2 terms  
**Language:** German/English  
**Level:** 4  
**Version:** 4

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**Competence Goal**  
See German version.

**Prerequisites**  
None

**Recommendation**  
None
### 6.111 Module: Urban Water Technologies [M-BGU-104448]

**Responsible:** PD Dr.-Ing. Stephan Fuchs  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** Engineering Sciences  
**Compulsory Elective Modules (Engineering Sciences)**

<table>
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#### Mandatory

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<td>T-BGU-111299</td>
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<td>3 CR</td>
<td>Fuchs</td>
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**Prerequisites**
None

**Recommendation**
None
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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Election block: Vehicle Development (at least 9 credits)

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<td>Vehicle Mechatronics I</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).

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.

Prerequisites
None

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.

Recommendation

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.
Learning type
The teaching and learning procedures (lecture, lab course, workshop) are described for each course of the module separately.
Module: Virtual Engineering A [M-MACH-101283]

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

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

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

Mandatory
T-MACH-102123 Virtual Engineering I 4 CR Ovtcharova

Election block: Virtual Engineering A (at least 5 credits)
T-MACH-109933 Business Administration for Engineers and IT professionals 4 CR Sebregondi
T-MACH-102185 CATIA CAD Training Course 2 CR Ovtcharova
T-MACH-105312 CATIA Advanced 4 CR Ovtcharova
T-MACH-108491 Digitalization of Products, Services & Production 4 CR Pätzold
T-MACH-102209 Information Engineering 3 CR Ovtcharova
T-MACH-106743 IoT Platform for Engineering 4 CR Ovtcharova
T-MACH-102181 PLM for Product Development in Mechatronics 4 CR Eigner
T-MACH-106740 Virtual Engineering Lab 4 CR Ovtcharova
T-MACH-106741 Virtual Training Factory 4.X 4 CR Ovtcharova
T-MACH-111285 Virtual Solution Methods and Processes 4 CR Maier, Ovtcharova

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

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

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

Prerequisites
The course Virtual Engineering I [2121352] is compulsory modules and must be examined.

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
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
6.114 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)

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<th>Duration</th>
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<td>4 CR</td>
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Election block: Virtual Engineering B (at least 5 credits)

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

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

Competence Goal
The students 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

Prerequisites
keine

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.
6.115 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)

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<td>T-CIWVT-103351</td>
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</table>

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,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water.

Prerequisites
none

Content
This module gives the basis to understand the most important methods of raw water treatment. Therefore types and sum of water constituents and their interaction with each other and with water molecules are introduced. The effects of the different treatment and purification methods are shown.
6.116 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)

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**Mandatory**

| T-CIWVT-101901 | Water Chemistry and Water Technology II | 9 CR | Horn |

**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,
- knows and understands the basics of water chemistry and the most important methods for the treatment of different types of raw water,
- knows about the different types of water treatment and water purification methods to convert, reduce or concentrate water constituents,

**Prerequisites**

The Module "Water Chemistry and Water Technology I" must be passed.

**Content**

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.
7.2 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

**Responsible:** Jun.-Prof. Dr. Julian Thimme

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

**Part of:** M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

<table>
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<td>Lecture / 📁</td>
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<td>Practice / 📁</td>
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**Exams**

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**Competition 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. The examination is offered every semester and can be repeated at any regular examination date. 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 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**

2530601, WS 20/21, 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 programming 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. Programming 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.
Literature
Basisliteratur

zur Vertiefung/ Wiederholung
7.3 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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**Events**

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**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**

2521533, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)
# 7.4 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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## Events

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<td>Practical Course Blockchain Hackathon (Master)</td>
<td>Practical course / 🧩 Sunyaev, Kannengießer, Sturm</td>
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## Exams

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<tr>
<td>WT 20/21</td>
<td>7900141</td>
<td>Advanced Lab Blockchain Hackathon (Master)</td>
<td>Sunyaev</td>
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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
## 7.5 Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**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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**Legend:** 🖥 Online, 🖥 Blended (On-Site/Online), 🗣 On-Site, x 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, WS 20/21, 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). Further information can be found on the ILLIAS 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 20/21, 3 SWS, Language: German/English, [Open in study portal]

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.

### Project lab Information Service Engineering (Master)
2512600, WS 20/21, 2 SWS, Language: English, [Open in study portal]

Practical course (P) Blended (On-Site/Online)
Content
The ISE project course is based on the summer semester lecture "Information Service Engineering". The topics of the ISE project course focus on artificial intelligence based applications. In particular, we are covering the following:

- Natural Language Processing
- Knowledge Graphs
- Deep Learning

Goal of the course is to work on a 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 course can also be credited as a seminar.

The project will be worked on in teams of 3-4 students each, guided by a tutor from the teaching staff.

The project course will be restricted to 15 participants.

Participation in the lecture "Information Service Engineering" (summer semester) is required.

ISE Tutor Team:

- Dr. Mehwish Alam
- Dr. Danilo Dessi
- M. Sc. Genet Asefa Gesese
- M. Sc. Fabian Hoppe
- M. Sc. Zahra Rezaie
- M. Sc. Sasha Vsesviatska
- B. Sc. Tabea Tietz

Organizational issues
Projektpraktikum Information Service Engineering can also be credited as a seminar.

Seminar Linked Data and the Semantic Web (Bachelor)
2513312, WS 20/21, 2 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 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 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.
Organizational issues
Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.

Lab Automation in Everyday Life (Master)
2512207, SS 2021, 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. 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.

Development of Sociotechnical Information Systems (Master)
2512401, SS 2021, 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 2021, 3 SWS, Language: German/English, Open in study portal

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. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.
WiWi link: https://portal.wiwi.kit.edu/ys/4629

Important dates:
Kick-off: 06.04.2021, 10:00-11:00 CET in Microsoft Teams - Link
Report + code submission: 07.09.2021, 23:59 CET
Presentation deadline: 20.09.2021, 23:59 CET
Presentation day: 24.09.2021, 09:00 CET

Topics:
Privacy Friendly apps
In this subject, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php. Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

- Notes 2.0

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.

- Password Manager Enrolment Add-On
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Visualization app to explore Facebook behavioral data collection
- 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 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.

- Neurotechnologies, Neuroprivacy, and User Acceptance
- Expert feedback for an anti-phishing webpage template (English only)
- “Your website has been hacked” - How to inform business owners about security issues on their webpages in more sensitive ways

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.

7 COURSES

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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<td>Grade to a third</td>
<td>Each winter term</td>
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Events

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Exams

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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 20/21, 4 SWS, Language: German, Open in study portal

Practical course (P)

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 https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html
7 COURSES
Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

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

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

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Events

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<td>Practical Course Security, Usability and Society (Master)</td>
<td>3 SWS</td>
<td>Practical course / 🖥</td>
<td>Volkamer, Strufe, Mayer, Arias Cabarcos, Aldag, Berens, Düzgün, Mossano, Beckmann</td>
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<tr>
<td>ST 2021</td>
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<td>Practical lab Security, Usability and Society (Bachelor)</td>
<td>3 SWS</td>
<td>Practical course / 🖥</td>
<td>Strufe, Mayer, Arias Cabarcos, Berens, Mossano, Beckmann</td>
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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 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:

### Practical Course Security, Usability and Society (Bachelor)

2512554, WS 20/21, 3 SWS, Language: German/English, [Open in study portal](https://secuso.aifb.kit.edu/)

#### Content

The internship "Security, Usability, and Society" covers topics such as user-friendly security and data protection programs as well as the implementation of user studies. The kick-off and the final presentations will be in English. The language of communication with the supervisor can - depending on the topic / supervisor - be German.

Important dates:
- **Kick-off**: (mandatory) 3.11.2020, 10:00-11:30, online. Link: [Microsoft Teams](https://secuso.aifb.kit.edu/english/105.php).
- **Final submission**: 14.03.2021, 23:59
- **Presentation**: March 14, 2021

#### Topics:

- **Privacy-friendly apps**
  In this topic area, students complete an app (or an extension of an app) among our Privacy-Friendly Apps (PFA). Please click the following link to know more about them: [https://secuso.aifb.kit.edu/english/105.php](https://secuso.aifb.kit.edu/english/105.php). Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.
  - NoPhish 2.0
  - Notes 2.0

- **Programming usable security measures**
  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. Some examples are TORPEDO ([https://secuso.aifb.kit.edu/english/TORPEDO.php](https://secuso.aifb.kit.edu/english/TORPEDO.php)) or PassSec + ([https://secuso.aifb.kit.edu/english/PassSecPlus.php](https://secuso.aifb.kit.edu/english/PassSecPlus.php)). Just as for PFA, 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.
  - Password Manager Enrollment Add-On
  - Visualization app to explore Facebook behavioral data collection
  - Portfolio Graphical Recognition-Based Passwords with Gamepads
  - Implementation of an anti-phishing browser extension (English only)

---

### Practical Course Security, Usability and Society (Master)

2512555, WS 20/21, 3 SWS, Language: German/English, [Open in study portal](https://secuso.aifb.kit.edu/)

#### Usable security user studies (online studies only)

These topics relate to setting up or analysing the results of user studies of various kinds. This year, due to the Corona outbreak, we decided to only run online studies. Otherwise interviews and laboratory tests would have been possible. At the end of the semester, the students present a report / work and a lecture in which they present their results.

- Investigating user reaction to password data breaches
- Expert feedback for an anti-phishing webpage template (English only)

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](https://secuso.aifb.kit.edu/Studium_und_Lehre.php)).
Content
The internship “Security, Usability, and Society” covers topics such as user-friendly security and data protection programs as well as the implementation of user studies. The kick-off and the final presentations will be in English. The language of communication with the supervisor can - depending on the topic / supervisor - be German.

Important dates:
- **Kick-off:** (mandatory) 3.11.2020, 10:00-11:30, online. Link: Microsoft Teams
- **Final submission:** 14.03.2021, 23:59
- **Presentation:** March 14, 2021

Topics:
- **Privacy-friendly apps**
  In this topic area, students complete an app (or an extension of an app) among our Privacy-Friendly Apps (PFA). Please click the following link to know more about them: [https://secuso.aifb.kit.edu/english/105.php](https://secuso.aifb.kit.edu/english/105.php). Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.
  - NoPhish 2.0
  - Notes 2.0

- **Programming usable security measures**
  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. Some examples are TORPEDO ([https://secuso.aifb.kit.edu/english/TORPEDO.php](https://secuso.aifb.kit.edu/english/TORPEDO.php)) or PassSec + ([https://secuso.aifb.kit.edu/english/PassSecPlus.php](https://secuso.aifb.kit.edu/english/PassSecPlus.php)). Just as for PFA, 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.
  - Password Manager Enrolment Add-On
  - Visualization app to explore Facebook behavioral data collection
  - Portfolio Graphical Recognition-Based Passwords with Gamepads
  - Implementation of an anti-phishing browser extension (English only)

- **Execution of usable security user studies (online studies only)**
  These topics relate to setting up or analysing the results of user studies of various kinds. This year, due to the Corona outbreak, we decided to only run online studies. Otherwise interviews and laboratory tests would have been possible. At the end of the semester, the students present a report / work and a lecture in which they present their results.
  - Investigating user reaction to password data breaches
  - Expert feedback for an anti-phishing webpage template (English only)
  - Implementing Zero-Trust Authentication Schemes

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](https://secuso.aifb.kit.edu/Studium_und_Lehre.php)).
Content
The internship “Security, Usability and Society” will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.

WiWi portal: https://portal.wiwi.kit.edu/ys/4628

Important dates:
- **Kick-off**: 06.04.2021, 10:00-11:00 CET in Microsoft Teams - Link
- **Report + code submission**: 07.09.2021, 23:59 CET
- **Presentation deadline**: 20.09.2021, 23:59 CET
- **Presentation day**: 24.09.2021, 09:00 CET

Topics:

**Privacy Friendly apps**
In this subject, students complete an app (or an extension of an app) among our Privacy-Friendly Apps. Please click the following link to know more about them: https://secuso.aifb.kit.edu/english/105.php. Students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

- Notes 2.0

**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.

- Password Manager Enrolment Add-On
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Visualization app to explore Facebook behavioral data collection

**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 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.

- Neurotechnologies, Neuroprivacy, and User Acceptance
- Expert feedback for an anti-phishing webpage template (English only)
- “Your website has been hacked” - How to inform business owners about security issues on their webpages in more sensitive ways

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.
7.8 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

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<td>Grade to a third</td>
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**Events**

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

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**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

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

**Practical Course Sociotechnical Information Systems Development (Master)**

<table>
<thead>
<tr>
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<td></td>
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</table>

**Content**

The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

**Learning objectives:**

- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form
7.9 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

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**Exams**

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<td>Advanced Machine Learning (Nachklausur 2020)</td>
<td>Lecture</td>
<td>Geyer-Schulz</td>
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Legend: 📚 Online, 📏 Blended (On-Site/Online), 🗼 On-Site, ✗ Canceled

**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**

2540535, SS 2021, 2 SWS, Language: English, [Open in study portal](Open in study portal)
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
7.10 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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**Events**

| ST 2021 | 2530357 | Advanced Machine Learning and Data Science | 4 SWS | Practical course / Online Ulrich |

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

**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.

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

**Advanced Machine Learning and Data Science**  
2530357, SS 2021, 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**
14-tägig, tba

**Literature**
Literatur wird in der ersten Vorlesung bekannt gegeben.
### 7.11 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

<table>
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#### Events

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<th>Advanced Management Accounting</th>
<th>4 SWS</th>
<th>Lecture / Practice (VÜ)</th>
<th>Wouters, Riar</th>
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| WT 20/21 | 79-2579907-M | Advanced Management Accounting | Wouters |

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

#### Competence Certificate

The assessment consists of an oral exam (30 min) (according to §4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

#### Prerequisites

None.

#### Recommendation

The course requires significant prior knowledge of Management Accounting, similar to the content of the courses MA 1 and 2, although completion of these particular courses is not a formal requirement.

#### Annotation

This course is held in English. Lectures and tutorials are integrated.

The course is compulsory and must be examined.

Students who are interested in attending this course should send an e-mail to Professor Wouters (marc.wouters@kit.edu).

Below you will find excerpts from events related to this course:
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.
7.12 Course: Advanced Management Accounting 2 [T-WIWI-110179]

- **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
- see Annotations

### Version
- 1

#### Competence Certificate
The examination will no longer be offered as of summer semester 2021.

#### 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
Lecture and examination will no longer be offered from summer semester 2021.
### 7.13 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

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<td>Grade to a third</td>
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#### Events

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<td>Statistik für Fortgeschrittene</td>
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<td>Lecture</td>
<td>Grothe, Kaplan</td>
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<td>WT 20/21</td>
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<td>Übung zu Statistik für Fortgeschrittene</td>
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<td>Practice</td>
<td>Grothe, Kaplan</td>
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#### Exams

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**Competition Certificate**  
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation. A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4). The exam is offered every semester. Re-examinations are offered only for repeaters.

**Prerequisites**  
None

**Annotation**  
New course starting winter term 2015/2016

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

#### Statistik für Fortgeschrittene

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<tr>
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**Literature**  
Skript zur Vorlesung

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**Industrial Engineering and Management M.Sc.**  
**Module Handbook as of 09/04/2021**
### 7.14 Course: Advanced Stochastic Optimization [T-WIWI-106548]

<table>
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<th>Prof. Dr. Steffen Rebennack</th>
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<td>Part of:</td>
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<td></td>
<td>M-WIWI-103289 - Stochastic Optimization</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.
7.15 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

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**Events**

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<tr>
<td>ST 2021</td>
<td>2520528</td>
<td>Practice / Online</td>
<td>Pegorari</td>
</tr>
</tbody>
</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:

**Advanced Topics in Economic Theory**
2520527, SS 2021, 2 SWS, Language: English, [Open in study portal](#)

**Literature**
Die Veranstaltung wird in englischer Sprache angeboten:
The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.
7.16 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

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

### Events

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<tr>
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<th>Grading scale</th>
<th>Recurrence</th>
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**Exams**

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<th>Grading scale</th>
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<td>Grade to a third</td>
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</table>

**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 20/21, 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
Course: Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines [T-MACH-105173]

**7.17 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>
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<th>Version</th>
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**Type**  
**Oral examination**

**Credits**  
4

**Grading scale**  
Grade to a third

**Recurrence**  
Each summer term

**Version**  
1

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<tr>
<td>76--T-Mach-105173</td>
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<td>Analysis of Exhaust Gas and Lubricating Oil in Combustion Engines</td>
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</table>

**Legend:**  
🖥 Online, 🧬 Blended (On-Site/Online), 🗣 On-Site, ☑ Cancelled

**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:

**Analysis of Exhaust Gas und Lubricating Oil in Combustion Engines**  
2134150, SS 2021, 2 SWS, Language: German, Open in study portal

**Literature**  
Die Vorlesungsunterlagen werden vor jeder Veranstaltung an die Studenten verteilt.
7.18 Course: Analysis Tools for Combustion Diagnostics [T-MACH-105167]

** Responsible:** Jürgen Pfeil  
** Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101303 - Combustion Engines II

**Type**  
Oral examination

**Credits**  
4

**Grading scale**  
Grade to a third

**Recurrence**  
Each summer term

**Version**  
1

### Events

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<th>2134134</th>
<th>Analysis tools for combustion diagnostics</th>
<th>2 SWS</th>
<th>Lecture / 📱</th>
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### Exams

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<tr>
<td>ST 2021</td>
<td>76-T-MACH-105167</td>
<td>Analysis Tools for Combustion Diagnostics</td>
<td>Koch</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
oral examination, Duration: 25 min., no auxiliary means

**Prerequisites**  
none

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

**Analysis tools for combustion diagnostics**

2134134, SS 2021, 2 SWS, Language: German, Open in study portal

**Literature**

Skript, erhältlich in der Vorlesung
7.19 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**
- Examination of another type

**Credits**
- 3

**Grading scale**
- Grade to a third

**Recurrence**
- Each winter term

**Version**
- 1

### Events

| ST 2021 | 2545108 | Innovationsprozesse analysieren & evaluieren | 2 SWS | Seminar / 🖥 | Beyer |

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

**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.
7 COURSES

Course: Application of Social Science Methods (WiWi) [T-GEISTSOZ-109052]

7.20 Course: Application of Social Science Methods (WiWi) [T-GEISTSOZ-109052]

Responsiable: Prof. Dr. Gerd Nollmann
Organisation: KIT Department of Humanities and Social Sciences
Part of: M-GEISTSOZ-101169 - Sociology

<table>
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<th>Credits</th>
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<tbody>
<tr>
<td>ST 2021</td>
<td>2 SWS</td>
<td>Opinion Dynamics on the Internet II</td>
<td>Seminar / Online</td>
<td>Keijzer</td>
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<td>ST 2021</td>
<td>2 SWS</td>
<td>Gender Pay Gap</td>
<td>Seminar / Online</td>
<td>Nollmann</td>
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<td>ST 2021</td>
<td>2 SWS</td>
<td>Decomposition and Regression Analysis</td>
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Exams

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<td>Nollmann</td>
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</table>

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

Opinion Dynamics on the Internet II
5011002, SS 2021, 2 SWS, Language: English, Open in study portal  
Seminar (S)  
Online

Content
The Internet has become an arena for public debate, providing users with unprecedented means of communicating their opinions and political views via online fora, tweets, Facebook posts, and the like. Many fear that this new technology changes public debate in ways that endanger societal cohesion and democracy, pointing to phenomena like filter bubbles or fake news. This seminar covers the computational social science approach to this research field, highlighting the opportunities and challenges that come with learning about human behavior in an increasingly data driven society. Specifically, we discuss theories and empirical research on opinion dynamics on the Internet, and focus on computational models of opinion dynamics in networks and their application to online (social media) platforms. We explore how social influence on the Internet can be studied empirically with experiments and the analysis of digital trace data, but stress the importance of theoretically well-informed models when doing so. In this course, students will have the opportunity to explore alternative methods from the emerging field of computational social science, analyzing computational models of opinion dynamics on the Internet, or gathering and analyzing data on the web.

The course consists of two parts (5011018 and 5011002) that need to be taken in parallel. It is not possible to attend only one of the two courses. To enroll to both parts, please use the registration procedure of course 5011018.

Organizational issues
The course consists of two parts (5011018 and 5011002) that need to be taken in parallel. It is not possible to attend only one of the two courses. To enroll to both parts, please use the registration procedure of course 5011018.
7.21 Course: Applied Econometrics [T-WIWI-103125]

**Responsible:** Prof. Dr. Melanie Schienle

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

**Part of:** M-WIWI-101638 - Econometrics and Statistics I

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**Exams**

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<th>7900251</th>
<th>Applied Econometrics</th>
<th>Krüger</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>7900280</td>
<td>Applied Econometrics</td>
<td>Krüger</td>
</tr>
</tbody>
</table>

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

**Prerequisites**
None

**Annotation**
The course is not offered regularly.
7 COURSES


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

ST 2021 2511032
- Applied Informatics - Principles of Internet Computing: Foundations for Emerging Technologies and Future Services
  2 SWS
  Lecture
  Sunyaev

ST 2021 2511033
- Übungen zu Angewandte Informatik - Internet Computing
  1 SWS
  Practice
  Sunyaev, Teigeler, Beyene

Exams

WT 20/21 7900004
- Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services (Registration until 08 February 2021)
  Sunyaev

ST 2021 7900025
- Applied Informatics - Internet Computing (Registration until 12 July 2021)
  Sunyaev

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.

By successful processing the exercises 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

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 2021, 2 SWS, Language: German, Open in study portal
Content
The lecture Applied Computer Science II 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
7.23 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

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**Events**

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<td>Artificial Intelligence in Service Systems</td>
<td>2 SWS</td>
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**Exams**

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<td>WT 20/21</td>
<td>7900303</td>
<td>Artificial Intelligence in Service Systems (17.03.2021)</td>
<td>Lecture / Online</td>
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**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

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

**Artificial Intelligence in Service Systems**

2595650, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)

**Content**

Artificial Intelligence (AI) and the application of machine learning is becoming more and more popular to solve relevant business challenges. However, it is not only important to be familiar with precise algorithms, but rather a general understanding of the necessary steps with a holistic view—from real-world challenge to successful deployment of an AI-based solution. As part of this course, we teach the complete lifecycle of an AI project with a focus on supervised machine learning challenges. We do so by also teaching the use of Python and the required packages like scikit-learn and tensorflow with exemplary data. 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. Two possibilities to do so are the use of meta and transfer machine learning, where we teach insights in their theory, design and application.

Students of this course will be able to understand and implement the complete lifecycle of a typical Artificial Intelligence use case with supervised machine learning. Furthermore, they understand the importance and the means of applying AI and Machine Learning within service systems, which allows multiple, independent entities to collaborate and derive insights. Students will be proficient with typical Python code for AI challenges.
Literature

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 2021 | 2595501 | Artificial Intelligence in Service Systems - Applications in Computer Vision | 2 SWS | Lecture / 🖥 | Satzger, Schmitz |

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:

V Artificial Intelligence in Service Systems - Applications in Computer Vision
2595501, SS 2021, 2 SWS, Language: English, Open in study portal

Online
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.

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
Due to the practical group sessions in the course, the number of participants is limited. The official application period in the WiWi portal is over. However, there is a limited number of remaining spaces. In case you are motivated to participate and have previous experience in the fields of Python Programming and Machine Learning please send a mail to jannis.walk@kit.edu until Friday, 9th of April 2021.

Your mail has to contain:
- A short letter of motivation, ideally (but not necessarily) with reference to previous experience in programming and data science (maximum one page)
- Transcript of records (for Bachelor and Master if available)

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

Literature
7.25 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

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Events

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Exams

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Uhrig-Homburg

Legend: 🔄 Online, 🍦 Blended (On-Site/Online), 📺 On-Site, ☢ Canceled

Competence Certificate

Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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

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:

Organizational issues


Literature

Basisliteratur


Zur Wiederholung/Vertiefung

### 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

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#### Exams

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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- C 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:**

#### Auktionstheorie

2520408, WS 20/21, 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
7.27 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

**Type:** Written examination

**Credits:** 9

**Grading scale:** Grade to a third

**Recurrence:** Each summer term

**Version:** 2

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**Events**

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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:

**Automated Manufacturing Systems**

2150904, SS 2021, 6 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ) Online
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
Vorlesungstermine dienstags 8.00 Uhr und donnerstags 8.00 Uhr, Übungstermine donnerstags 9.45 Uhr.
Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Literature
Medien:
Skrift zur Veranstaltung wird über [https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias ([https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/)).
### 7.28 Course: Automation of Discrete Event and Hybrid Systems [T-ETIT-100981]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101157 - Control Engineering II

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#### Exams

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**Prerequisites**

none
### 7.29 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, ❌ Canceled

#### 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:**

#### Automotive Engineering I

**2113809, WS 20/21, 4 SWS, Language: English, [Open in study portal](#)**

**Lecture (V) Online**

#### 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

Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.  
Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.
Literature
### 7.30 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

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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:**

### Automotive Engineering I

2113805, WS 20/21, 4 SWS, Language: German, [Open in study portal](#)

**Lecture (V) Online**

**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
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:
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
Kann nicht mit LV Grundlagen der Fahrzeugtechnik I [2113805] kombiniert werden.  
Can not be combined with lecture [2113805] Grundlagen der Fahrzeugtechnik I.

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

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

**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, ✗ Canceled

**Competence Certificate**

Written Examination

**Duration:** 90 minutes

**Auxiliary means:** none

**Prerequisites**

none

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

#### Automotive Engineering II

2114835, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V) Online**

**Content**

1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of designs

**Learning Objectives:**

The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle bodywork and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

**Organizational issues**

Kann nicht mit der Veranstaltung [2114855] kombiniert werden.  
Can not be combined with lecture [2114855]
7 COURSES

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

Literature

Automotive Engineering II
2114855, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
1. Chassis: Wheel suspensions (rear axles, front axles, kinematics of axles), tyres, springs, damping devices
2. Steering elements: Manual steering, servo steering, steer by wire
3. Brakes: Disc brake, drum brake, comparison of the designs

Learning Objectives:
The students have an overview of the modules which are necessary for the tracking of a motor vehicle and the power transmission between vehicle and roadway. They have knowledge of different wheel suspensions, tyres, steering elements, and brakes. They know different design versions, functions and the influence on driving and braking behavior. They are able to correctly develop the appropriate components. They are ready to analyze, to evaluate, and to optimize the complex interaction of the different components under consideration of boundary conditions.

Literature
Selective literature:
7.32 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

<table>
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**Competence Certificate**
Depending on the further pandemic development in the summer semester 2021 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

- **Type:** Lecture (V)
- **Online:** Open in study portal

**Content**

- **Workload:**
  The total workload for this course is approximately 135.0 hours. For further information see German version.

**Organizational issues**

- **Montag 17:30:00-19:00 Uhr per MS-Teams-Livestream**
  (Achtung: In der ersten Vorlesungswoche beginnt die Veranstaltung um 18:00 Uhr)
7.33 Course: Basics of Mobile Working Machines [T-MACH-110959]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101267 - Mobile Machines

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<td>Each term</td>
<td>2 terms</td>
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**Events**

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<th>Lecturer</th>
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<td>WT 20/21</td>
<td>2114088</td>
<td>Übungen zu ‘Fluidtechnik’</td>
<td>2 SWS</td>
<td>Practice / 🕰️</td>
<td>Geimer, Pult</td>
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<td>WT 20/21</td>
<td>2114093</td>
<td>Fluid Technology</td>
<td>2 SWS</td>
<td>Lecture / 🕰️</td>
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<td>ST 2021</td>
<td>2114073</td>
<td>Mobile Machines</td>
<td>4 SWS</td>
<td>Lecture / 🕰️</td>
<td>Geimer, Lehr</td>
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</tbody>
</table>

Legend: 🕰️ Online, 🕰️ Blended (On-Site/Online), 🗺 On-Site, ✗ Cancelled

**Competence Certificate**
The assessment consists of an oral exam (45 min).

**Prerequisites**
None

**Annotation**

**Content:**

From the lecture Fluid Power only the hydrostatic topics are required, from the lecture Mobile Machines all topics:

- property of fluids,
- pumps and motors,
- valves,
- hydraulic circuits,
- presentation of the components used and the most important mobile working machines,
- basics and structure of the machines
- practical insights into the development and application of the machines

**Media:**

- a set of slides for the lectures can be downloaded
- a written script for the lecture Fluid Power

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

**Fluid Technology**

2114093, WS 20/21, 2 SWS, Language: German, [Open in study portal]

Lecture (V)

Blended (On-Site/Online)
Content
In the range of hydostatics the following topics will be introduced:

- Hydraulic fluids
- Pumps and motors
- Valves
- Accessories
- Hydraulic circuits.

In the range of pneumatics the following topics will be introduced:

- Compressors
- Motors
- Valves
- Pneumatic circuits.
- regular attendance: 21 hours
- self-study: 92 hours

Literature
Skriptum zur Vorlesung Fluidtechnik
Institut für Fahrzeugsystemtechnik
downloadbar

Mobile Machines
2114073, SS 2021, 4 SWS, Language: German, Open in study portal

Content
- Introduction of the required components and machines
- Basics of the structure of the whole system
- Practical insight in the development techniques

Knowledge in Fluid Power is required.

Recommendations:
It is recommended to attend the course Fluid Power Systems [2114093] beforehand.

- regular attendance: 42 hours
- self-study: 184 hours
7.34 Course: Basics of Technical Logistics I [T-MACH-109919]

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

**Organisation:** KIT Department of Mechanical Engineering

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

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<td>Lecture / Practice (VÜ)</td>
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<td>Grade to a third</td>
<td>Each winter term</td>
<td>Mittwollen, Oellerich</td>
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<td>Basics of Technical Logistics I</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**

2117095, WS 20/21, 3 SWS, Language: German, Open in study portal

**Lecture / Practice (VÜ)**

Blended (On-Site/Online)

**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 mündlichen oder schriftlichen Prüfung (nach §4 (2), 1 bzw. 2SPO).
The assessment consists of an oral or a written 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: 48Std
Nacharbeit: 132Std
presence: 48h
rework: 132h

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

**Responsible:** Maximilian Hochstein  
**Organisation:** KIT Department of Mechanical Engineering  

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

<table>
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<th>Title</th>
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<td>Basics of Technical Logistics II</td>
<td></td>
<td>Hochstein, Mittwollen</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 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.
### 7.36 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I [T-MACH-100966]

**Responsible:** Prof. Dr. Andreas Guber  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101290 - BioMEMS

<table>
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**Events**

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**Exam**

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<td><strong>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</strong></td>
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<td><strong>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine I</strong></td>
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<td>Guber</td>
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**Legend:** 📲 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

**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 20/21, 2 SWS, Language: German, [Open in study portal](#)

**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: 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 - Microsystems Technology
M-MACH-101290 - BioMEMS

<table>
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Events

ST 2021 2142883 BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II 2 SWS Lecture / Online Guber

Exams

WT 20/21 76-T-MACH-100967 BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II Guber
ST 2021 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 2021, 2 SWS, Language: German, Open in study portal

Content
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Cristallisation
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
7.38 Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

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

Part of:
- M-MACH-101287 - Microsystem Technology
- M-MACH-101290 - BioMEMS

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

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 2021, 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
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: 14:00 - 15:30 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
7.39 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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<td>Bionics for Engineers and Natural Scientists</td>
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<td>2 SWS</td>
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**Exams**

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<th>Language</th>
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<td>Bionics for Engineers and Natural Scientists</td>
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<td>Lecture / 🖥</td>
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<td>2 SWS</td>
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</table>

**Competence Certificate**

written or oral exam

**Prerequisites**

none

_Below you will find excerpts from events related to this course:_

**Bionics for Engineers and Natural Scientists**

2142140, SS 2021, 2 SWS, Language: German, Open in study portal

**Lecture (V) Online**

**Content**

Bionics focuses on the design of technical products following the example of nature. For this purpose we have to learn from nature and to understand its basic design rules. Therefore, the lecture focuses on the analysis of the fascinating effects used by many plants and animals. Possible implementations into technical products are discussed in the end.

The students should be able analyze, judge, plan and develop biomimetic strategies and products.

Basic knowledge in physics and chemistry

The successfull attendance of the lecture is controlled by a written examination.

**Organizational issues**


Die Prüfung findet als Klausur statt und es werden zwei Termine angeboten werden (voraussichtlich in der ersten Woche nach Vorlesungsende im Sommersemester und in der ersten Woche vor Vorlesungsbeginn im Wintersemester).

**Literature**

Folien und Literatur werden in ILIAS zur Verfügung gestellt.
7.40 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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**Exams**

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<td>7900028</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>Uhrig-Homburg</td>
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</table>

**Competence Certificate**  
Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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 lecture is currently not offered.
7.41 Course: Bond Markets [T-WIWI-110995]

- **Responsible:** Prof. Dr. Marliese Uhrig-Homburg
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101480 - Finance 3
  - M-WIWI-101483 - Finance 2

### Type
- Written examination

### Credits
- 4.5

### Grading scale
- Grade to a third

### Recurrence
- Each winter term

### Version
- 1

#### Events
<table>
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<th>Type</th>
<th>Credits</th>
<th>Grade</th>
<th>Recurrence</th>
<th>Version</th>
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<td>Uhrig-Homburg</td>
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#### Exams

#### Competence Certificate
Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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).

#### Annotation
This course will be held in English.

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

### Bond Markets
2530560, WS 20/21, 3 SWS, Language: English, Open in study portal

### Lecture / Practice (VÜ)
Online

#### 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 through successful participation in the tutorial sessions. 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
Blockveranstaltung: Do 14:00-19:00 Uhr, Fr 9:45-17:15 Uhr
05./06.11., 19./20.11., 03./04.12.20
7.42 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

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**Events**

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<td>Bond Markets - Models &amp; Derivatives</td>
<td>2 SWS</td>
<td>Lecture / 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 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:

**Content**

- **Competence Certificate:** The assessment of success consists in equal parts of a written thesis and an oral exam (according to §4(2), 3 SPO) including a discussion of one’s own work. The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** Students deepen their knowledge of national and international bond markets. They are able to apply the knowledge they have gained about traded instruments and common valuation models for pricing derivative financial instruments.
- **Prerequisites:**
- **Content:** The lecture “Bond Markets – Models & Derivatives” deepens the content of the lecture “Bond Markets”. The modelling of the dynamics of yield curves and the management of credit risks forms the theoretical foundation for the valuation of interest rate and credit derivatives to be discussed. In this course, students deal intensively with selected topics and acquire the relevant knowledge on their own.
- **Recommendation:** Knowledge of “Bond Markets” and “Derivatives” courses is very helpful.
- **Workload:** The total workload for this course is approximately 90 hours (3.0 credits).

**Organizational issues**

Blockveranstaltung
freitags 9:45-17:15 Uhr, 15.01. und 22.01.21
7.43 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**

| WT 20/21 | 2530562 | Bond Markets - Tools & Applications | 1 SWS | Block / Online | Uhrig-Homburg, Grauer |

**Exams**

| WT 20/21 | 7900294 | Bond Markets - Tools & Applications | Uhrig-Homburg |

Legends: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**

The assessment consists of an empirical case study with written elaboration and presentation. The main examination is offered once a year, re-examinations every semester.

**Recommendation**

Knowledge of the "Bond Markets" course is very helpful.

**Annotation**

This course will be held in English.

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

**V** Bond Markets - Tools & Applications  
2530562, WS 20/21, 1 SWS, Language: English, Open in study portal

**Content**

- **Competence Certificate:** The assessment consists of an empirical case study with written elaboration and presentation (according to §4(2), 3 SPO). The main examination is offered once a year, re-examinations every semester.
- **Competence Goal:** The students apply various methods in practice within the framework of a project-related case study. They are able to deal with empirical data and analyze them in a targeted manner.
- **Content:** The course "Bond Markets - Tools & Applications" includes a hands-on project in the field of national and international bond markets. Using empirical datasets, the students have to apply practical methods in order to analyze the data in a targeted manner.
- **Recommendation:** Knowledge of the "Bond Markets" course is very helpful.
- **Workload:** The total workload for this course is approximately 45 hours (1.5 credits).

**Organizational issues**

Blockveranstaltung am 10.12.20, Zeiten nach gesondertem Aushang  
Seminarraum 320 Geb. 09.21
### 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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**Type:** Oral examination  
**Credits:** 4  
**Grading scale:** Grade to a third  
**Recurrence:** Each summer term  
**Version:** 1

**Events**

- **WT 20/21**
  - 2134153
  - Boosting of Combustion Engines
  - 2 SWS
  - 🧩 Kech

- **ST 2021**
  - 2134153
  - Boosting of Combustion Engines
  - 2 SWS
  - 🧩 Kech

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

**Competence Certificate**
oral exam, 20 min

**Prerequisites**
none

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021
### 7.45 Course: Building Laws [T-BGU-103429]

#### 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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#### Exams

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#### Prerequisites
None

#### Recommendation
None

#### Annotation
None

Legend: 📱 Online, 🧬 Blended (On-Site/Online), 📚 On-Site, ✗ Cancelled
7.46 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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**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 in mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

**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:
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)

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

- regular attendance: 21 hours
- self-study: 92 hours

Literature

Weiterführende Literatur:

7.47 Course: BUS-Controls - Advance [T-MACH-108889]

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

**Organisation:** KIT Department of Mechanical Engineering

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

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**Exams**

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**Competence Certificate**

Creation of control program

**Prerequisites**

none
7 COURSES

7.48 Course: Business Administration for Engineers and IT professionals [T-MACH-109933]

**Responsible:** Heinz-Peter Sebregondi

**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>2 SWS</td>
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<td>Sebregondi</td>
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**Exams**

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<td>Business Administration for Engineers and IT professionals</td>
<td>Seminar</td>
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**Competence Certificate**

Assessment of another type. Two presentations and six written compositions in team work. Grading: each composition 1/8 and each presentation 1/8.

**Prerequisites**

None

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

### Business Administration for Engineers and IT professionals

**2122303, WS 20/21, 2 SWS, Language: German/English, Open in study portal**

**Seminar (S)**

**On-Site**

**Content**

**Learning content**

- Competitive strategies, customer value, corporate cultures, lifecycles (technology, business, product), market leadership dynamics.
- Continuum commoditization/differentiation.
- Value chain, core and support functions.
- A company's business portfolio.
- Profit margin sensitivity.
- Profitable and non-profitable products, customers and businesses.
- Drivers of a company's value (McKinsey model), return on invested capital (ROIC), ROIC value driver tree.
- Strategic planning
- Capital investments, discounted cash flow analysis, quantifying of and dealing with risks, cost-estimating methodologies per planning stage.
- Sales, procurement/purchasing, negotiation strategies

**Learning objectives**

- better understand a company’s business, financials and their executives/decision makers
- use the language and metrics of senior executives and hold effective conversations with them
- more effectively sell a solution’s or project’s operational and financial value to executives and decision makers

**Organizational issues**

Teilnehmerzahl ist auf 12 Personen begrenzt. / Number of participants limited to 12 people.
Content
Learning content

- Competitive strategies, customer value, corporate cultures, lifecycles (technology, business, product), market leadership dynamics.
- Continuum commoditization/differentiation.
- Value chain, core and support functions.
- A company’s business portfolio.
- Profit margin sensitivity.
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- Capital investments, discounted cash flow analysis, quantifying of and dealing with risks, cost-estimating methodologies per planning stage.
- Sales, procurement/purchasing, negotiation strategies

Learning objectives

- better understand a company’s business, financials and their executives/decision makers
- use the language and metrics of senior executives and hold effective conversations with them
- more effectively sell a solution’s or project’s operational and financial value to executives and decision makers

Organizational issues
Teilnehmerzahl ist begrenzt. / Number of participants is limited.

Literature
Understanding a company’s business and financials made easy; Heinz-Peter Sebregondi (Amazon 2017)
Erfolgsfaktoren für die nachhaltige Business-Karriere: Die menschliche und die Business-Perspektive; Heinz-Peter Sebregondi (Amazon 2018)
7.49 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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<th>Lecture / 🖥</th>
<th>Dann, Grote, Stoeckel</th>
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<td>ST 2021</td>
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<td>Exercise Business Data Analytics: Application and Tools</td>
<td>1 SWS</td>
<td>Practice / 🖥</td>
<td>Badewitz, Grote, Sterk</td>
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Legend: 🖥 Online, Blended (On-Site/Online), 🗂 On-Site, x Cancelled

**Competence Certificate**
Success is monitored through ongoing elaborations and presentations of tasks and a written exam (60 minutes) at the end of the lecture period. Successful participation in the exercises is a prerequisite for admission to the written examination. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
Knowledge of (object-oriented) programming and statistics is helpful.

**Annotation**
Course name until winter semester 2018/2019 "Applied Analytics with Open Source Tools" (T-WIWI-108438)

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

**Business Data Analytics: Application and Tools**
2540466, SS 2021, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
Online
7.50 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

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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 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 20/21, 2 SWS, Language: English, Open in study portal

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/3871

Anmeldung

7.51 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

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<th>Business Dynamics</th>
<th>2 SWS</th>
<th>Lecture</th>
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<td>WT 20/21</td>
<td>2540532</td>
<td>Exercise Business Dynamics</td>
<td>1 SWS</td>
<td>Practice</td>
<td>Geyer-Schulz, Glenn</td>
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</table>

**Exams**

| WT 20/21 | 7979777 | Business Dynamics | 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

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

**Business Dynamics**

2540531, WS 20/21, 2 SWS, Language: German, Open in study portal

**Organizational issues**

Blockveranstaltung freitags, samstags 8 - 17:15 Uhr

**Literature**

### 7.52 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

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#### Events

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<td>Business Intelligence Systems</td>
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</table>

**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 20/21, 3 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

On-Site
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 analytic 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.

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.
**7.53 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-101410 - Business & Service Engineering  
M-WIWI-101488 - Entrepreneurship (EnTechnon)  
M-WIWI-102806 - Service Innovation, Design & Engineering

<table>
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**Events**

| ST 2021 | 2540456 | Internet Business Models | 2 SWS | Lecture / 🖥 | Huber |
| ST 2021 | 2540457 | Übungen zu Geschäftsmodelle im Internet: Planung und Umsetzung | 1 SWS | Practice / 🖥 | Richter, Huber, Fegert |

Legend: 🖥 Online, ☐ Blended (On-Site/Online), ☐ On-Site, ☑ Cancelled

**Competence Certificate**

Please note that in the summer semester 2020 the exam will only be offered to students who have completed the semester performance but have not yet taken the exam. From summer semester 2021 the exam will be offered again regularly. Success is monitored through ongoing elaborations and presentations of tasks and a written exam (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. Successful participation in the exercises is a prerequisite for admission to the written examination.

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
Please note that the lecture will not be offered in summer semester 2020 due to the research semester of Prof. Weinhardt.

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

**Internet Business Models**  
2540456, SS 2021, 2 SWS, Language: German, [Open in study portal]

**Literature**  
Wird in der Vorlesung bekannt gegeben.
7.54 Course: Business Planning [T-WIWI-102865]

**Responsibility:** Prof. Dr. Orestis Terzidis

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

**Part of:**
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101488 - Entrepreneurship (EnTechnon)

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<td>Seminar</td>
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**Exams**

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

**Competence Certificate**

Alternative exam assessment.

**Prerequisites**

None

**Recommendation**

None

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

**Business Planning for Founders (ENTECH)**

2545007, WS 20/21, 2 SWS, Language: English, Open in study portal

**Content**

The seminar introduces students to the basic concepts of business planning for entrepreneurs. On the one hand, this involves concepts for the concretisation of business ideas (business modelling, market potential assessment, resource planning, etc.) and on the other hand, the preparation of an implementable business plan (with or without VC financing). In the course of the seminar, the students are familiarised with methods of further developing patents and business ideas into a more concrete business plan and formulating them in a business plan.

**Business Planning for Founders**

2545007, SS 2021, 2 SWS, Language: English, Open in study portal

**Content**

The seminar introduces students to the basic concepts of business planning for entrepreneurs. On the one hand, this involves concepts for the concretisation of business ideas (business modelling, market potential assessment, resource planning, etc.) and on the other hand, the preparation of an implementable business plan (with or without VC financing). In the course of the seminar, the students are familiarised with methods of further developing patents and business ideas into a more concrete business plan and formulating them in a business plan.
Content
In order to identify opportunities, the participants should identify fields for entrepreneurial opportunities in a systematic web research. For this purpose, Systematic Mapping procedures will be adapted to the research of general web sources and applied to the research of interesting fields in the area of cyber security.

Information about the seminar:
In the seminar you will work in groups of max. 4 persons. Group applications are welcome but not a prerequisite for participation. Some of the seminars will be held in English.

The focus of the seminar is Opportunity Recognition in the field of IT-Security, followed by ideation sessions with the aim to find possible applications for technologies that are developed at the KIT. Prototyping and also Pitching are part of the seminar.

Target group:
Master Students

Information on the allocation of seminar places:
The registration for the seminar is possible in the Wiwi portal in the period from 11.09.2019 to 05.10.2019 at 23:55 clock. To apply for the seminar, please send us a letter of motivation (max. 5 sentences).

Seminar contents:
- To identify opportunities, the participants should identify fields for entrepreneurial opportunities in a systematic web research. For this purpose, Systematic Mapping procedures will be adapted to the research of general web sources and applied to the research of interesting fields in the area of cyber security.
- All information will be discussed with experts on the second seminar day. The aim of the first two sessions is to develop a systematic segmentation of market needs.
- After the teams have been formed, the workshop “Technology Application Selection (TAS)” follows. This is a framework developed by EnTechnon that will help the teams to develop concrete business ideas based on given technologies. The three steps of the TAS will be the content of the third and fourth seminar days. Participants will generate ideas and then based on specific criteria that we will provide - choose an idea on which they will build their value proposition.
- The final session before the final day will deal with prototyping and validation. This will use rapid prototyping and validation methods from the design thinking environment.
- On the last day - before their final presentations - the participants learn how to present the idea in a short presentation (pitch) to an interested audience.

Organizational issues
Blockveranstaltung im Rahmen des KASTEL Projekts am 12.05., 09.06., 23.06.
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: Written examination
Credits: 4,5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 2

Events

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<td>Practice /</td>
<td>1 SWS</td>
<td>Practice /</td>
<td>Grade to a third</td>
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Exams

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Legend: Online, Blended (On-Site/Online), On-Site, C 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:

Business Process Modelling
2511210, WS 20/21, 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 analysing 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.
Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective. 

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Learning outcomes:
Students are are in a position to discuss the principles of commercial banking. They are familiar with fundamental concepts of bank management and are able to apply them.

Workload:
The total workload for this course is approximately 90 hours. For further information see the German version.

Literature
Weiterführende Literatur:
- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer
Business Strategies of Banks
2530299, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
On-Site

Literature
Weiterführende Literatur:

- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer
### 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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<td>3</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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</tbody>
</table>

**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 20/21, 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 automotive 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.*
### 7.58 Course: CATIA Advanced [T-MACH-105312]

**Course:** CATIA Advanced

**Type:** Examination of another type

**Credits:** 4

**Grading scale:** Grade to a third

**Recurrence:** Each term

**Version:** 1

**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

#### Events

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#### Exams

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<td>Project (P /🧩)</td>
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**Legend:** 🔗 Online, 🧩 Blended (On-Site/Online), 🖥 On-Site, ❌ Cancelled

**Competence Certificate**

Assessment of another type. Design project and written documentation in team work and final presentation. Grading: Project work 3/5, documentation 1/5 and presentation 1/5.

**Prerequisites**

none

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

#### Advanced CATIA

<table>
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**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

**Literature**

Keine / None

#### CATIA advanced

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**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
7.59 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

Type | Completed coursework (practical) | Credits: 2 | Grading scale: pass/fail | Recurrence: Each term | Version: 2
--- | --- | --- | --- | --- | ---

Events

| WT 20/21 | 2123358 | CATIA CAD training course | 2 SWS | Practical course / 🏛️ | Ovtcharova, Mitarbeiter
| ST 2021 | 2123358 | CATIA CAD training course | 3 SWS | Practical course / 🏛️ | Ovtcharova, Mitarbeiter

Exams

| WT 20/21 | 76-T-MACH-102185 | CATIA CAD Training Course | Ovtcharova

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, WS 20/21, 2 SWS, Language: German, Open in study portal

Practical course (P)
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
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
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- Working with constrains
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Organizational issues

Das Praktikum wird mehrmals in der vorlesungsfreien Zeit als einwöchige Blockveranstaltung angeboten. Weitere Informationen siehe ILIAS.

Literature

Praktikumskript
7.60 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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<td>Each summer term</td>
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Events

| ST 2021 | 2126730 | Ceramics Processing | 2 SWS | Lecture / Binder |

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:

V Ceramics Processing
2126730, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Literature

7.61 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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Events

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<th>Challenges in Supply Chain Management</th>
<th>3 SWS</th>
<th>Lecture</th>
<th>Mohr</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 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 2021, 3 SWS, Language: English, Open in study portal

Lecture (V) 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
Blockveranstaltung, Termine werden bekannt gegeben

Literature
Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.
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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<td>ST 2021</td>
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<td>Eigenschaften von Verkehrsmitteln</td>
<td>2 SWS</td>
<td>Lecture/🖥</td>
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**Exams**

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 7.63 Course: Combustion Engines I [T-MACH-102194]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101275 - Combustion Engines I

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<td>Combustion Engines, Hydrogen Engines and CO2 neutral Fuels I</td>
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<td>76-T-MACH-102194</td>
<td>Combustion Engines, Hydrogen Engines and CO2 neutral Fuels I</td>
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<td>76-T-MACH-102194</td>
<td>Combustion Engines I</td>
<td>Koch, Kubach</td>
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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:

**Competition Engines, Hydrogen Engines and CO2 neutral Fuels I**

2133113, WS 20/21, 4 SWS, Language: German, Open in study portal

**Content**
Introduction of IFKM and lecture topics  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Conventional, alternative and CO2-neutral Fuels  
Gasoline Engines  
Diesel Engines  
Hydrogen Engines  
Exhaust Gas Aftertreatment
7.64 Course: Combustion Engines II [T-MACH-104609]

**Responsible:** Dr.-Ing. Rainer Koch  
Dr.-Ing. Heiko Kubach  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101303 - Combustion Engines II

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**Events**

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<td>ST 2021</td>
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</table>

**Competence Certificate**

oral examination, duration: 25 minutes, no auxiliary means

**Prerequisites**

none

**Recommendation**

Fundamentals of Combustion Engines I helpful

*Below you will find excerpts from events related to this course:*
### 7.65 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

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<td>Communication Systems and Protocols</td>
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<td>2</td>
<td>Becker, Becker</td>
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<tr>
<td>ST 2021</td>
<td>2311618</td>
<td>Tutorial for 2311616 Communication Systems and Protocols</td>
<td>Practice / 🖥</td>
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#### Exams

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<td>Communication Systems and Protocols</td>
<td>Becker, Becker</td>
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</table>

**Prerequisites**  
none

Legend: 🖥 Online, 📜 Blended (On-Site/Online), 🤝 On-Site, ✗ Cancelled
### 7.66 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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<td>7900335</td>
<td>Competition in Networks</td>
<td>Mitusch</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.

**Annotation**  
Due to the research semester of Prof. Mitusch the course will not be offered in the winter semester 20/21. An examination will be offered in each semester.
### 7.67 Course: Computational Economics [T-WIWI-102680]

**Responsible:** Dr. rer. nat. 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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#### Events

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<td>WT 20/21</td>
<td>1 SWS</td>
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**Exams**

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#### 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:

# 7.68 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

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7.69 Course: Computer Contract Law [T-INFO-102036]

**Responsible:** Michael Bartsch

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101215 - Intellectual Property Law

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

**Events**

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<td>2 SWS</td>
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**Exams**

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<td>Dreier, Matz</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

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

**Computer Contract Law**

2411604, WS 20/21, 2 SWS, Language: German, Open in study portal

**Lecture (V) Online**

**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-Schuldrocht) 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.

**Organizational issues**

Die Veranstaltung findet im WS 2020/2021 in Form eines Online-Stream live statt.

**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

### Type
Oral examination

### Credits
4

### Grade to a third
Each winter term

### Version
1

### Events

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### Exams

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<th>Credits</th>
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<th>Recurrence</th>
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**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**
2177601, WS 20/21, 2 SWS, Language: German, [Open in study portal]

### 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
Anmeldung verbindlich bis zum 03.11.2020 unter sven.ulrich@kit.edu.
Nach der Anmeldung wird Ihnen der Link zur Vorlesung per E-Mail mitgeteilt.

Literature

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed
### 7.71 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

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**Exams**

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<td>Constitution and Properties of Wearresistant Materials</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 Wear resistant materials

2194643, SS 2021, 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
stellites and hard alloys
hard materials
hard metals
ceramic tool materials
superhard materials
new developments
regular attendance: 22 hours
self-study: 98 hours
Basic understanding of constitution of wear-resistant materials, of the relations between constitution, properties and performance, of principles of increasing of hardness and toughness of materials as well as of the characteristics of the various groups of wear-resistant materials.
Recommendations: none

Organizational issues
Aufgrund der aktuellen Situation findet die Blockveranstaltung online in folgendem Zeitraum statt:
06.04.-08.04.2021: jeweils von 8:00-16:00 Uhr;
Ort: online per MS-Teams
Anmeldung verbindlich bis zum 02.04.2021 unter sven.ulrich@kit.edu.
Nach der Anmeldung wird Ihnen der Link zur Vorlesung per E-Mail am 05.04.2021 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
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  

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Prerequisites:
None

Recommendation:
None

Annotation:
None
Course: Control of Linear Multivariable Systems [T-ETIT-100666]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann

**Organisation:** KIT Department of Electrical Engineering and Information Technology

**Part of:** M-ETIT-101157 - Control Engineering II

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**Exams**

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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.
7.74 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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**Exams**

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<th>Recurrence</th>
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</table>

**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

none

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

**Control Technology**

2150683, SS 2021, 2 SWS, Language: German, Open in study portal
Content
The lecture control technology gives an integral overview of available control components within the field of industrial production systems.
The first part of the lecture deals with the fundamentals of signal processing and with control peripherals in the form of sensors and actors which are used in production systems for the detection and manipulation of process states.
The second part handles with the function of electric control systems in the production environment. The main focus in this chapter is laid on programmable logic controls, computerized numerical controls and robot controls. Finally the course ends with the topic of cross-linking and decentralization with the help of bus systems.
The lecture is very practice-oriented and illustrated with numerous examples from different branches.
The following topics will be covered:

- Signal processing
- Control peripherals
- Programmable logic controls
- Numerical controls
- Controls for industrial robots
- Distributed control systems
- Field bus
- Trends in the area of control technology

Learning Outcomes:
The students ...

- are able to name the electrical controls which occur in the industrial environment and explain their function.
- can explain fundamental methods of signal processing. This involves in particular several coding methods, error protection methods and analog to digital conversion.
- are able to choose and to dimension control components, including sensors and actors, for an industrial application, particularly in the field of plant engineering and machine tools. Thereby, they can consider both, technical and economical issues.
- can describe the approach for projecting and writing software programs for a programmable logic control named Simatic S7 from Siemens. Thereby they can name several programming languages of the IEC 1131.

Workload:
regular attendance: 21 hours
self-study: 99 hours

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/).
7.75 Course: Convex Analysis [T-WIWI-102856]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming

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**Events**

| ST 2021 | 2550120 | Konvexe Analysis | 2 SWS | Lecture / Online | 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 lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

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

**Konvexe Analysis**

2550120, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**Content**

Convex Analysis deals with properties of convex functions and convex sets, amongst others with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number of applications which are not covered by techniques from smooth optimization, e.g. approximation problems with respect to the Manhattan or maximum norms, classification problems or the theory of statistical estimates. The lecture develops along another, geometrically intuitive example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introduction to entropic smoothing and convexity
- Global error bounds
- Smoothness properties of convex functions
- The convex subdifferential
- Global Lipschitz continuity
- Descent directions and stationarity conditions

**Remark:**

Prior to the attendance of this lecture, it is strongly recommend to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

**Learning objectives:**

The student

- knows and understands the fundamentals of convex analysis,
- is able to choose, design and apply modern techniques of convex analysis in practice.
Literature

7.76 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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**Events**

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<td>Fördertechnik und Logistiksysteme</td>
<td>Seminar</td>
<td>Furmans, Pagani</td>
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<td>2119100</td>
<td>Fördertechnik und Logistiksysteme</td>
<td>Seminar</td>
<td>Furmans, Pagani</td>
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**Exams**

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<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**

2119100, SS 2021, SWS, Open in study portal

**Content**

The goal of the seminar is to deal with different topics related to the materials handling and logistics. The students can work on the topic either alone or in a group work. At the end the results are presented and discussed with a final presentation. The 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
7.77 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
### 7.78 Course: Corporate Compliance [T-INFO-101288]

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#### Events

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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 7.79 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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#### 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 (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 2021, 2 SWs, Language: English, Open in study portal

**Literature**

**Weiterführende Literatur**

7.80 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

<table>
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<th>Version</th>
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**Exams**

<table>
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<tr>
<th>Exam Code</th>
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<th>Instructor</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>Corporate Risk Management</td>
<td>Ruckes</td>
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</tbody>
</table>

**Competence Certificate**

Please note that the lecture will not be offered in summer semester 2020.

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**

None

**Annotation**

The course will exceptionally be held in the winter semester 2019/2020. Usually, however, the event takes place as a block course in the summer semester.
7.81 Course: Credit Risk [T-WIWI-102645]

**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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<td>see Annotations</td>
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</table>

**Competence Certificate**

The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The examination is offered every semester and can be repeated at every regular examination date. 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 up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

Knowledge from the course "Derivatives" is very helpful.

**Annotation**

The course will no longer be offered from winter semester 2020/21.
7.82 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

<table>
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<td>Each winter term</td>
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Events

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<td>Critical Information Infrastructures</td>
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<td>Sunyaev, Dehling, Lins</td>
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<tr>
<td>Practice</td>
<td>2511401</td>
<td>Exercises to Critical Information Infrastructures</td>
<td>1</td>
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Exams

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<tr>
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<th>Title</th>
<th>Credits</th>
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<tr>
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<td>7900067</td>
<td>Critical Information Infrastructures</td>
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<td>ST 2021</td>
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<td>Critical Information Infrastructures</td>
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</table>

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

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

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

Critical Information Infrastructures
2511400, WS 20/21, 2 SWS, Language: English, Open in study portal

Lecture (V)  
Online
Content
The course critical information infrastructures (CII) introduces students to the world of complex sociotechnical systems that permeate societies on a global scale. Students will learn to handle the complexities involved in the design, development, operation, and evaluation of critical information infrastructures. In the beginning of the course, critical information infrastructures will be introduced on a general level.

The following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Distributed Ledger Technology
- Internet of Things / Edge and Fog Computing
- Cloud Computing
- Health Information Infrastructures
- Information Privacy
- Certification of Critical IT-Services

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:
Students know concepts and technologies relevant for the design and reliable operation of critical information infrastructures and can leverage them to develop solutions for real-world challenges.

Notes:
The number of participants is limited to 24 students. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3853
The registration will be opened from September 1, 2020 until October 12, 2020.

Please make sure that you are available at the following dates if you want to take the course:

- 11.2020, 11:30 am–01:00 pm: 1. Foundations of Critical Information Infrastructures
- 11.2020, 11:30 am–01:00 pm: 2. Topic Area Presentation
- 11.2020, 11:30 am–01:00 pm: 3. Critical Information Infrastructure Landscape
- 11.2020, 11:30 am–01:00 pm: 4. Research on Information Systems & Group Assignment
- 12.2020, 10:00 am–04:00 pm: Interim Presentation
- 02.2021, 10:00 am–04:00 pm: Final Presentation

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams. We will provide a link to join the team if your registration was approved.

If you have any questions regarding course registration, please contact lins@kit.edu or dehling@kit.edu

Organizational issues
Bitte beachten Sie die geänderte Terminplanung. Die Vorlesung wird als Blockveranstaltung durchgeführt.

Literature
7.83 Course: Current Directions in Consumer Psychology [T-WIWI-111100]

<table>
<thead>
<tr>
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<th>Recurrence</th>
<th>Expansion</th>
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<tbody>
<tr>
<td>Examination of another type</td>
<td>3</td>
<td>Grade to a third</td>
<td>Once</td>
<td>1 terms</td>
<td>1</td>
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</table>

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

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

### Events

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<th>Recurrence</th>
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<th>Version</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>2540441</td>
<td>Current Directions in Consumer Psychology</td>
<td>Others (sons / 🚄)</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Once</td>
<td>1 terms</td>
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<tr>
<td>ST 2021</td>
<td>2540441</td>
<td>Current Directions in Consumer Psychology</td>
<td>Others (sons / 🚄)</td>
<td>2 SWS (Blocked)</td>
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<td>Once</td>
<td>1 terms</td>
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### Exams

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<tbody>
<tr>
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<td>7900361</td>
<td>Current Directions in Consumer Psychology</td>
<td>Blended (On-Site/Online)</td>
</tr>
</tbody>
</table>

**Competence Certificate**
Non exam assessment. Grading will be based on a continuous basis throughout the semester.

**Prerequisites**
Strong Interest in Original Research.

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

### 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.

**Organizational issues**
bei unter 6 Teilnehmer*innen in Präsenz am Institut, sonst online

### 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.
7.84 Course: Current Issues in Innovation Management [T-WIWI-102873]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management

<table>
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<tr>
<th>Type</th>
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<th>Version</th>
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</thead>
<tbody>
<tr>
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<td>3</td>
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<td>Irregular</td>
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</table>

Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation).

Prerequisites
None

Recommendation
None

Annotation
Please note that the seminars we offer vary from semester to semester. Information about the currently offered seminars can be found in the Wiwi-Portal and on the iTM Website.
7.85 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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**Events**

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<th>Recurrence</th>
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<td>Seminar / Blended (On-Site/Online)</td>
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**Exams**

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<td>Guber</td>
<td></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, WS 20/21, 2 SWS, Language: German, Open in study portal

**Organizational issues**

Zeit: Siehe Aushang.
Ort: IMT Seminarraum, Campus Nord, Bau 301, Raum 405
Informationen und Anmeldemöglichkeit auch in der Vorlesung:
2141864 BioMEMS-Mikrosystemtechnik für Life-Sciences und Medizin; I

**Content**

- Short introduction to the basics of BioMEMS
- Selected aspects of biomedical engineering and life sciences
- Possible microtechnical 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
7.86 Course: Data Mining and Applications [T-WIWI-103066]

Responsible: Rheza Nakhaeizadeh
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>Grading scale</th>
<th>Recurrence</th>
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<td>Grade to a third</td>
<td>see Annotations</td>
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</table>

Competence Certificate

The course will be held for the last time in the summer semester 2021. The last exam opportunity for first-timers will be in the summer semester 2021. A last exam opportunity (for repeaters only) will be offered in the winter semester 2021/2022.

- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation (app. 45 minutes)

Prerequisites

None

Annotation

The course will be held for the last time in the summer semester of 2021.

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

Data Mining and Applications

2520375, SS 2021, 2 SWS, Language: German, Open in study portal
Content

Learning objectives:
Students

- know the definition of Data Mining
- are familiar with the CRISP-DM
- are familiar with the most important Data Mining Algorithms like Decision Tree, K-Means, Artificial Neural Networks, Association Rules, Regression Analysis
- will be able to use a DM-Tool

Content:

Part one: Data Mining:
What is Data Mining?; History of Data Mining; Conferences and Journals on Data Mining; Potential Applications; Data Mining Process; Business Understanding; Data Understanding; Data Preparation; Modeling; Evaluation; Deployment; Interdisciplinary aspects of Data Mining; Data Mining tasks; Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks); Fuzzy Mining; OLAP and Data Warehouse; Data Mining Tools; Trends in Data Mining

Part two: Examples of application of Data Mining
Success parameters of Data Mining Projects; Application in industry; Application in Commerce

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 I LIAS bekannt gegeben

Literature
U. Fayyad, G. Piatetsky-Shapiro, P. Smyth, R. Uthurusamy, editors, Advances in Knowledge Discovery and Data Mining, AAAI/MIT Press, 1996 (order online from Amazon.com or from MIT Press).

Jiawei Han, Micheline Kamber, Data Mining : Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016 , 2006.

David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining , MIT Press, Fall 2000


7.87 Course: Data Protection by Design [T-INFO-108405]

**Responsible:** apl. Prof. Dr. Oliver Raabe

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101242 - Governance, Risk & Compliance

<table>
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<tr>
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<td>Grade to a third</td>
<td>Irregular</td>
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**Exams**

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<tr>
<th>WT 20/21</th>
<th>7500071</th>
<th>Data Protection by Design</th>
<th>Raabe</th>
</tr>
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</table>
7.88 Course: Data Protection Law [T-INFO-101303]

**Responsible:** Dr. Johannes Eichenhofer

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101217 - Public Business Law

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<tr>
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<td>Each winter term</td>
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**Events**

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<th>Recurrence</th>
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<tr>
<td>WT 20/21</td>
<td>24018</td>
<td>Datenschutzrecht</td>
<td>2 SWS</td>
<td>Eichenhofer</td>
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**Exams**

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<th>Version</th>
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<td>Datenschutzrecht</td>
<td>2 SWS</td>
<td>Eichenhofer</td>
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</table>

**Legend:** Online, Blended (On-Site/Online), On-Site, Cancelled
7.89 Course: Database Systems and XML [T-WIWI-102661]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of:
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

Type: Written examination
Credits: 4.5
Grading scale: Grade to a third
Recurrence: Each winter term
Version: 2

Events

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<td>2511202</td>
<td>Database Systems and XML</td>
<td>2</td>
<td>Lecture / 📚</td>
<td>Oberweis</td>
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<tr>
<td>WT 20/21</td>
<td>2511203</td>
<td>Exercises Database Systems and XML</td>
<td>1</td>
<td>Practice / 📚</td>
<td>Oberweis, Frister, Forell, Schreiber, Fritsch</td>
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Exams

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<tr>
<td>ST 2021</td>
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<td>Database Systems and XML (Registration until 12 July 2021)</td>
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Legend: 📚 Online, 🧩 Blended (On-Site/Online), 🗓 On-Site, ❌ Cancelled

Competence Certificate
In winter term 2020/21, the exam takes place as an online exam. A trial online exam is scheduled for Feb. 10, 2021 at 5 p.m.

Prerequisites
None

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

Database Systems and XML
2511202, WS 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

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.
7.90 Course: Decentrally Controlled Intralogistic Systems [T-MACH-105230]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-104888 - Advanced Module Logistics

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**Events**

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<th>Event</th>
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<td>WT 20/21</td>
<td>2117084</td>
<td>Decentrally controlled intralogistic systems</td>
<td>2</td>
<td>Practical course / 📚</td>
<td>Furmans, Sperling, Hochstein, Ries</td>
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<tr>
<td>ST 2021</td>
<td>2117084</td>
<td>Decentrally controlled intralogistic systems</td>
<td>2</td>
<td>Practical course / 📚</td>
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**Exams**

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<td>Decentrally Controlled Intralogistic Systems</td>
<td>Furmans</td>
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<td>76-T-MACH-105230</td>
<td>Decentrally Controlled Intralogistic Systems</td>
<td>Furmans</td>
</tr>
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</table>

**Legend:** 📚 Online, 🤖 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
Certificate by colloquium with presentation

**Prerequisites**
None

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

**Decentrally controlled intralogistic systems**

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>SWS</th>
<th>Type</th>
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<tbody>
<tr>
<td>2117084</td>
<td>Decentrally controlled intralogistic systems</td>
<td>2</td>
<td>Practical course / 📚</td>
<td>On-Site</td>
</tr>
</tbody>
</table>

*Open in study portal*
Content

Requirements:
Duty of attendance

Recommendations:

Media:
Lego Mindstorms, PC

Teaching content:

- Introduction to intralogistic systems
- Development of a model of a decentralized logistics system
- Object-oriented programming of the control with LabView
- Implementation of the model in Mindstorms
- Presentation of work results

Note:
Limited number of participants (max. 15 students per group, under CORONA-conditions max. 8 students per group)
Selection is made according to a selection procedure
A passage in English language can be offered if required

Workload:
Attendance time: 10 hours
Self-study: 110 hours (workstation is provided)

Educational goal:
The students can:

- Name and explain the basics of intralogistic conveyor systems
- Describe and explain communication types between decentralized systems
- Apply the basics of project management in subsequent projects
- Deal with the graphical based software development environment LabView
- Develop constructive solutions for mechanical problems
- Apply the theory learned to a practical problem
- Evaluate solutions developed through group discussions and presentations
- Examination:

Examination:
Certificate by colloquium with lecture and by fulfilling the attendance obligation

Organizational issues
Termine im WS2020/2021:
Gruppe 1 (Maximilian Ries) 15.02.2021 - 02.03.2021
Gruppe 2 (Marvin Sperling) 04.03.2021 - 19.03.2021

*Corona-bedingte Änderungen vorbehalten*

Literature
keine
Content

Requirements:
Duty of attendance

Recommendations:

Media:
Lego Mindstorms, PC

Teaching content:
- Introduction to intralogistic systems
- Development of a model of a decentralized logistics system
- Object-oriented programming of the control with LabView
- Implementation of the model in Mindstorms
- Presentation of work results

Note:
Limited number of participants (max. 15 students per group, under CORONA-conditions max. 8 students per group)
Selection is made according to a selection procedure
A passage in English language can be offered if required

Workload:
attendance time: 90 hours (workstation is provided)
Self-study: 30 hours

Educational goal:
The students can:
- name and explain the basics of intralogistic conveyor systems
- describe and explain communication types between decentralized systems
- apply the basics of project management in subsequent projects
- dealing with the graphical based software development environment LabView
- developing constructive solutions for mechanical problems
- applying the theory learned to a practical problem
- evaluate solutions developed through group discussions and presentations
- examination:

Examination:
Certificate by colloquium with lecture, documentation of work results and by fulfilling the attendance obligation

Organizational issues
Termine im SS21:
Gruppe 1 (Maximilian Ries) 23.08.2021 - 03.09.2021
Gruppe 2 (Marvin Sperling) 06.09.2021 - 17.09.2021
*Corona-bedingte Änderungen vorbehalten*

Literature
keine
7.91 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

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**Exams**

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<td>7900293</td>
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<td>Packowski</td>
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</table>

**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 COURSES

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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<th>Type</th>
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Exams

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<td>Derivatives</td>
<td>Uhrig-Homburg</td>
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</table>

Competence Certificate

Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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

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

V Derivatives

2530550, SS 2021, 2 SWS, Language: German, Open in study portal

Organizational issues


Literature


Weiterführende Literatur:

7.93 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

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<td>2 SWS</td>
<td>Lecture / 🖥</td>
<td>Each summer term</td>
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Legend: 🖥 Online, ✎ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
**7.94 Course: Design Thinking [T-WIWI-102866]**

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

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

**Part of:**
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101488 - Entrepreneurship (EnTechnon)
- M-WIWI-101507 - Innovation Management

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**Exams**

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</table>

**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, WS 20/21, 2 SWS, Language: German, Open in study portal

**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 goals:**

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.
7.95 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

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<td>Mädche</td>
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</table>

**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

**Annotation**

This course replaces T-WIWI-108461 “Interactive Information Systems” starting summer term 2020.

The course is held in English.

Below you will find excerpts from events related to this course:
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.
7.96 Course: Developing Business Models for the Semantic Web [T-WIWI-102851]

Responsible: Prof. Dr. York Sure-Vetter
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

### Course Details

- **Type:** Examination of another type
- **Credits:** 3
- **Grading scale:** Grade to a third
- **Recurrence:** Irregular
- **Version:** 1

### Competence Certificate

Alternative exam assessments.

### Prerequisites

None

### Recommendation

As a recommendation to attending the seminar, basic knowledge about semantic technologies and concepts should be available. This may be acquired by attending one of the following lectures – Wissensmanagement, Semantic Web Technologies 1, Semantic Web Technologies 2 or by studying related literature. Furthermore the topic entrepreneurship should be of interest.
7.97 Course: Development of hybrid drivetrains [T-MACH-110817]

Responsible: Prof. Dr. Thomas Koch
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101303 - Combustion Engines II

Type: Written examination
Credits: 4
Grading scale: Grade to a third
Recurrence: Each summer term
Version: 1

Events
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Exams
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<td>Development of hybrid drivetrains</td>
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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 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Blended (On-Site/Online)

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
### 7.98 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

<table>
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<tbody>
<tr>
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#### Events

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<td>Digital Health</td>
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<td>Lecture / Online</td>
<td>4.5</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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#### Exams

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<td>Digital Health</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

### Competence Certificate
Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §4(2),3 of the examination regulation. Details of the grading will be announced at the beginning of the course. The examination is only offered to first-time writers in the winter semester, but can be repeated in the following summer semester.

### Prerequisites
None.

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

#### Digital Health

2511402, WS 20/21, 2 SWS, Language: German/English, [Open in study portal](#)
Content
The master course Digital Health introduces master students to the subject of digitization in health care. Students will learn about the theoretical foundations and practical implications of various topics surrounding the digitization in health care, including health information systems, telematics, big health care data, and patient-centered health care.

After an introduction to the challenge of digitization in health care, the following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 3-4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods are possible.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Mobile Health (mHealth) / Gamification
- Distributed Ledger Technology / Blockchain
- Artificial Intelligence / Machine Learning
- Genomics / Biomedical Data

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:
Students know about the challenges of digitization in health care and can leverage relevant concepts and technologies to address these challenges. Students learn to work in teams and critically discuss digital health topics with fellow students, researchers, and practitioners.

Notes:
The number of participants is limited to 24 students. Please register here: https://portal.wiwi.kit.edu/ys/3897
The registration will be opened from September 11, 2020 until October 12, 2020.
Please make sure that you are available at the following dates if you want to take the course:

- 05.11.2020, 16:00–17:30 - 1. Introduction to Digital Health
- 12.11.2020, 16:00–17:30 - 2. Topic Area Presentation #1
- 19.11.2020, 16:00–17:30 - 3. Topic Area Presentation #2
- 26.11.2020, 16:00–17:30 - 4. Guest Lectures
- 25.02.2021, 10:00–17:00 - Final Presentation

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams. We will provide a link to join the team if your registration was approved.

If you have any questions regarding course registration, please contact scott.thiebes@kit.edu or manuel.schmidt-kraepelin@kit.edu

Workload:
4.5 ECTS = approx. 135 hours.

Organizational issues
Bitte beachten Sie die geänderte Terminplanung und das geänderte Anmeldeverfahren (https://portal.wiwi.kit.edu/ys/3897)

Responsible: Prof. Dr. Martin Klarmann
Anja Konhäuser
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination of another type</td>
<td>1.5</td>
<td>Grade to a third</td>
<td>Each summer term</td>
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</tbody>
</table>

Events

| ST 2021 | 2571156 | Digital Marketing and Sales in B2B | 1 SWS | Others (sons / 📱) | Konhäuser |

Legend: 📱 Online, 📡 Blended (On-Site/Online), ⚹ On-Site, ❌ Cancelled

Competence Certificate
Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

Prerequisites
None.

Annotation
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:

Digital Marketing and Sales in B2B
2571156, SS 2021, 1 SWS, Language: English, Open in study portal

Others (sonst.)
Online
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
-
7.100 Course: Digital Services: Business Models and Transformation [T-WIWI-110280]

**Responsible:** Prof. Dr. Gerhard Satzger  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101448 - Service Management  
- M-WIWI-102754 - Service Economics and Management  
- M-WIWI-102808 - Digital Service Systems in Industry

<table>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
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<td>Grade to a third</td>
<td>Each winter term</td>
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**Events**

<table>
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<tr>
<th>Events</th>
<th>Credits</th>
<th>Type</th>
<th>SWS</th>
<th>Recurrence</th>
<th>Organiser</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>2 SWS</td>
<td>Digital Services: Business Models and Transformation</td>
<td>2</td>
<td>Lecture / Online</td>
<td>Satzger, Schütz</td>
</tr>
<tr>
<td>WT 20/21</td>
<td>1 SWS</td>
<td>Practice</td>
<td></td>
<td>Practice / Online</td>
<td>Enders, Schütz</td>
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**Exams**

<table>
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<th>Credits</th>
<th>Type</th>
<th>SWS</th>
<th>Recurrence</th>
<th>Organiser</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>1 SWS</td>
<td>Digital Services: Business Models and Transformation</td>
<td>1</td>
<td>Each winter term</td>
<td>Satzger</td>
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</table>

**Competence Certificate**
The assessment of this course is a written examination (60 min.) (following §4(2), 1 SPOs) and by submitting written papers as part of the exercise.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
former name until winter semester 2019/2020: "Business and IT Service Management" (T-WIWI-102881)

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

**Digital Services: Business Models and Transformation**
2595484, WS 20/21, 2 SWS, Language: English, Open in study portal

**Content**
Digitalization fuels the trends towards a service-led economy and drives the emergence of innovative digital services, but also new service-oriented offerings of existing enterprises ("servitization"). In particular, the use of new data resources (e.g., sensor-based data in the Internet of Things) and analytical methods open up ample opportunities for new data-driven services and associated novel business models.

In this lecture, we systematically build the theoretical and practical foundations on how to adapt, create and transform business models around digital services - using a top-down approach: The first part of the lecture is devoted to general service theory, management and transformation as a base for digital service businesses. The second and third part of the lecture then further zoom in into the specifics of digital service and data-based service business models and their transformation. Throughout the lecture, we put a particular focus on service systems – elevating the service and business model perspective from individual enterprises to larger "(eco-)systems" or "platforms".

The lecture links theoretical content and current research to practical examples and exercises. Students are invited to actively engage in the discussion and contribute their knowledge. Invited guest speakers from industry as well as case studies ensure sufficient application orientation of this lecture.

Note: While the lecture builds upon aspects of the "Digital Service" lecture in the bachelor program, it is not mandatory for students to have participated in it.
Literature
7 COURSES

T 7.101 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

<table>
<thead>
<tr>
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<th>Version</th>
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<tbody>
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<td>3</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>1</td>
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</table>

Events

| ST 2021 | 2545103 | Digital Transformation and Business Models | 2 SWS | Seminar / Online | Koch |

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

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 2021, 2 SWS, Language: German, Open in study portal

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.
### 7.102 Course: Digitalization from Production to the Customer in the Optical Industry [T-MACH-110176]

**Responsible:** 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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<th>Version</th>
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<td>4</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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#### Events

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<th>Type</th>
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<th>Weighting</th>
<th>Lecturer</th>
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<td>Lecture</td>
<td>2 SWS</td>
<td>Grade to a third</td>
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<td>Wawerla</td>
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#### Exams

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<th>Code</th>
<th>Title</th>
<th>Type</th>
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</tr>
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<td>76-T-MACH-110176</td>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>Wawerla</td>
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</tbody>
</table>

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

**Competence Certificate**
Alternative test achievement (graded):
- Processing and presentation (ca. 30 min) of a case study with weighting 50%
- Written exam (ca. 60 min) with weighting 50%

**Prerequisites**
none

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

<table>
<thead>
<tr>
<th>Lecture (V)</th>
<th>On-Site</th>
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<tbody>
<tr>
<td>Digitalization from Production to the Customer in the Optical Industry</td>
<td>2149701, WS 20/21, 2 SWS, Language: English, Open in study portal</td>
</tr>
</tbody>
</table>

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021  
323
Content
The lecture deals with Digitalization along the entire value chain end-to-end, with a focus on production and supply chain. Within this context, concepts, tools, methods, technologies and concrete applications in the industry are presented. Furthermore, the students get the opportunity to get first-hand insights into the digitalization journey of a German technology company.
Main topics of the lecture:
- Concepts and methods such as disruptive innovation and agile project management
- Overview on technologies at disposal
- Practical approaches in innovation
- Applications in industry
- Field trip to ZEISS

Learning Outcomes:
The students...
- are capable to comment on the content covered by the lecture.
- are able to analyze and evaluate the suitability of digitalization technologies in the optical industry.
- are able to assess the applicability of methods such as disruptive innovation and agile project management.
- are able to appreciate the practical challenges to digitalization in industry.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Aus organisatorischen Gründen ist die Teilnehmerzahl für die Lehrveranstaltung begrenzt. Infolgedessen wird ein Auswahlprozess stattfinden. Die Bewerbung erfolgt über die Homepage des wbk (http://www.wbk.kit.edu/studium-und-lehre.php)
Aufgrund der begrenzten Teilnehmerzahl ist eine Voranmeldung erforderlich.

For organisational reasons, the number of participants for the course is limited. 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.
7.103 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

<table>
<thead>
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<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
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<td>Each term</td>
<td>1</td>
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</table>

**Events**

| WT 20/21 | 6242907 | Digitization in Facility- and Real Estate Management | 4 SWS | Lecture / Practice ( / | Lennerts, Mitarbeiter/innen |

| WT 20/21 | 8246108941 | Digitalization in Facility and Real Estate Management | Lennerts |

*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
7.104 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

<table>
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<th>Version</th>
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</thead>
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<td>Each term</td>
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**Events**

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<th>SWS</th>
<th>Type</th>
<th>Lecturer</th>
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<td>WT 20/21</td>
<td>2122310</td>
<td>Digitalization of Products, Services &amp; Production</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Pätzold</td>
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<tr>
<td>ST 2021</td>
<td>2122310</td>
<td>Digitalization of Products, Services &amp; Production</td>
<td>2 SWS</td>
<td>Seminar / ✅</td>
<td>Pätzold</td>
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**Exams**

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<tbody>
<tr>
<td>WT 20/21</td>
<td>76-T-MACH-108491</td>
<td>Digitalization of Products, Services &amp; Production</td>
<td>Seminar (S)</td>
<td>Pätzold</td>
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</tbody>
</table>

**Competition 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 20/21, 2 SWS, Language: German, Open in study portal

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
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

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- 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
Vorlesungskolloquium / lecture slides
### 7.105 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

<table>
<thead>
<tr>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
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<td>Grade to a third</td>
<td>Each summer term</td>
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#### Events

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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>ST 2021</td>
<td>Verfahrenstechniken der Demontage</td>
<td>2 SWS</td>
<td>Lecture / Practice ( / )</td>
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#### Exams

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
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<td>Disassembly Process Engineering</td>
<td></td>
<td></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: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations  
M-WIWI-102832 - Operations Research in Supply Chain Management

<table>
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<th>Recurrence</th>
<th>Version</th>
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<td>Grade to a third</td>
<td>Each summer term</td>
<td>1</td>
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</table>

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 2021, 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.

Literature
7.107 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

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<td>Each winter term</td>
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**Events**

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<th>Course</th>
<th>Recurrence</th>
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<td>2560402</td>
<td>Dynamic Macroeconomics</td>
<td>2 SWS</td>
<td>Lecture / 🖥</td>
<td>Brumm</td>
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<td>WT 20/21</td>
<td>2560403</td>
<td>Übung zu Dynamic Macroeconomics</td>
<td>1 SWS</td>
<td>Practice / 🖥</td>
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**Exams**

<table>
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<th>Type</th>
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<th>Course</th>
<th>Organiser</th>
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<tr>
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<td>7900261</td>
<td>Dynamic Macroeconomics</td>
<td>Brumm</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.

**Prerequisites**
None.

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

**Dynamic Macroeconomics**

- **2560402, WS 20/21, 2 SWS, Language: English, Open in study portal**

**Literature**

Literatur und Skripte werden in der Veranstaltung angegeben.
### 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

<table>
<thead>
<tr>
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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) 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:**

### 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

Freitag 09:00-11:15 Uhr

### Literature

Wird in der Vorlesung bekanntgegeben.
**7.109 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]**

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management

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<td>Übungen zu eFinance: Informationssysteme für den Wertpapierhandel</td>
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**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.

**Prerequisites**

see below

**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:

**eFinance: Information Systems for Securities Trading**  
2540454, WS 20/21, 2 SWS, Language: English, Open in study portal

**Content**

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.
Literature


Further Literature

## 7.110 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
### 7.111 Course: Elements and Systems of Technical Logistics [T-MACH-102159]

**Responsible:** Georg Fischer  
Dr.-Ing. Martin Mittwollen  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-104888 - Advanced Module Logistics

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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**  
Knowledge out of "Basics of Technical Logistics I" (T-MACH-109919) preconditioned.

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

**Elements and systems of Technical Logistics**  
2117096, WS 20/21, 3 SWS, Language: German, [Open in study portal](#)  

**Lecture / Practice (VÜ)**  
Blended (On-Site/Online)

**Content**

**Learning goals:**  
Students are able to:

- Describe elements and systems of technical logistics,
- Model and calculate structures and functions of special conveying machines,
- Describe interdependence of material flow systems and technique quantitatively and qualitatively
- Equip material flow systems with appropriate machines.

**Content of teaching:**

- material flow systems and their (conveying) technical components
- mechanical behaviour of conveyors;
- structure and function of conveyor machines; elements of intralogistics (belt conveyor, racks, automatic guided vehicles, fan-in, bifurcation, and etc.)
- sample applications and calculations in addition to the lectures inside practical lectures

**Presence:** 36h  
**Rework:** 84h

**Annotations:**

- Knowledge out of Basics of Technical Logistics (LV 2117095) preconditioned.
- 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.
Organizational issues
Die Erfolgskontrolle erfolgt in Form einer mündlichen (20min.) Prüfung (nach §4 (2), 2 SPO). Die Prüfung wird in jedem Semester angeboten und kann zu jedem ordentlichen Prüfungstermin wiederholt werden.
siehe auch Homepage / ILIAS

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 regulations.

look also at our homepage / ILIAS

Literature
Empfehlungen in der Vorlesung.
Recommendations during lectures.
7.112 Course: Elements and Systems of Technical Logistics - Project [T-MACH-108946]

**Responsible:** Georg Fischer  
Dr.-Ing. Martin Mittwollen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-104888 - Advanced Module Logistics

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**Competence Certificate**

Presentation of performed project and defense (30min) according to §4 (2), No. 3 of the examination regulation

**Prerequisites**

T-MACH-102159 (Elements and Systems of Technical Logistics) must have been started

**Recommendation**

Knowledge out of "Basics of Technical Logistics I" (T-MACH-109919) preconditioned.

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

**Elements and systems of Technical Logistics - project**

2117097, WS 20/21, SWS, Language: German, [Open in study portal](#)  
Project (PRO)  
Blended (On-Site/Online)
Content
Learning goals:
Students are able to:

- Describe elements and systems of technical logistics,
- Model and calculate structures and functions of special conveying machines,
- Describe interdependence of material flow systems and technique quantitatively and qualitatively,
- Equip material flow systems with appropriate machines
- Judge about systems in place and justify it in front of subject related persons.

Content of teaching:

- mechanical behaviour of conveyors;
- structure and function of conveyor machines;
- elements of intralogistics (belt conveyor, racks, automatic guided vehicles, fan-in, bifurcation, and etc.)
- sample applications and calculations in addition to the lectures inside practical lectures
- Self manufacturing of a project report to recess the topic.

Media:
supplementary sheets, presentations, blackboard

Prerequisites:
T-MACH-102159 (Elements and Systems of technical logistics) must have been started.

Annotations:

- Knowledge out of Basics of Technical Logistics (LV 2117095) preconditioned.
- Presentation of performed project and defense (30min) according to §4 (2), No. 3 of the examination regulation.

Organizational issues
siehe auch Homepage / ILIAS
**Course: Emerging Trends in Digital Health [T-WIWI-110144]**

**Responsible:** Prof. Dr. Ali Sunyaev

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

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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**Exams**

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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.
### 7.114 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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**Cometence Certificate**  
The alternative exam assessment consists of a final thesis.

**Prerequisites**  
None.

**Annotation**  
The course is usually held as a block course.
7 COURSES

Course: Emissions into the Environment [T-WIWI-102634]

7.115 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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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:

Emissions into the Environment
2581962, WS 20/21, 2 SWS, Language: German, Open in study portal

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.
### 7.116 Course: Employment Law I [T-INFO-101329]

**Responsible:** Dr. Alexander Hoff  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law  

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#### Exams

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Legend: 📀 Online, ⬚ Blended (On-Site/Online), 🔌 On-Site, ✗ Cancelled
Course: Employment Law II [T-INFO-101330]

**Responsible:** Dr. Alexander Hoff  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law

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**Exams**

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### 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-105592 - Digitalization in Facility Management  
M-BGU-105597 - Facility Management in Hospitals

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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 COURSES

Course: Energy and Environment [T-WIWI-102650]

7.119 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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**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:**

**V Energy and Environment**

Lecture (V)

Online

2581003, SS 2021, 2 SWS, Language: German, Open in study portal

**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)
7.120 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

Part of: M-MACH-101296 - Energy and Process Technology I

Type: Written examination  
Credits: 9  
Grading scale: Grade to a third  
Recurrence: Each winter term  
Version: 1

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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:

Energy and Process Technology I

2157961, WS 20/21, 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 COURSES

Course: Energy and Process Technology II [T-MACH-102212]

7.121 Course: Energy and Process Technology II [T-MACH-102212]

Responsible: Prof. Dr. Ulrich Maas
Dr.-Ing. Corina Schwitzke

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101297 - Energy and Process Technology II

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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:

Energy and Process Technology II
2170832, SS 2021, 6 SWS, Language: German

Lecture / Practice (VÜ)
Blended (On-Site/Online)

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 compared 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
7.122 Course: Energy Conversion and Increased Efficiency in Internal Combustion Engines [T-MACH-105564]

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

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101275 - Combustion Engines I

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

Competence Certificate
oral exam, 25 minutes, no auxillary means

Prerequisites
none

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

V Energy Conversion and Increased Efficiency in Internal Combustion Engines and Hydrogen Engines

2133121, WS 20/21, 2 SWS, Language: German, Open in study portal

Content
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
### 7.123 Course: Energy Efficient Intralogistic Systems [T-MACH-105151]

| Responsible: | Dr.-Ing. Meike Braun  
|             | Dr. Frank Schönung  
| Organisation: | KIT Department of Mechanical Engineering  
| Part of: | M-MACH-101278 - Material Flow in Networked Logistic Systems  
|          | M-MACH-104888 - Advanced Module Logistics  
| **Type** | Oral examination  
| **Credits** | 4  
| **Grading scale** | Grade to a third  
| **Recurrence** | Each winter term  
| **Version** | 1  

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| WT 20/21 | 2117500 | Energy efficient intralogistic systems | 2 SWS | Lecture / 🗣️ | Braun, Schönung  

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| WT 20/21 | 76-T-MACH-105151 | Energy Efficient Intralogistic Systems | Braun  

#### 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" (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 20/21, 2 SWS, Language: German, Open in study portal  

#### Content
The content of course "Basics of Technical Logistics" should be known.

#### Organizational issues
Termine und Hinweise siehe Homepage / Aushang

#### Literature
Keine.
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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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 2021, 2 SWS, Language: German, Open in study portal

Lecture (V) Online

Literature

### 7.125 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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**Exams**

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**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 20/21, 2 SWS, [Open in study portal](#)
Content

Learning Goals

The student,

- understands the business model of a network operator and knows its central tasks in the energy supply system,
- has a holistic overview of the interrelationships in the network economy,
- understands the regulatory and business interactions,
- is in particular familiar with the current model of incentive regulation with its essential components and understands its implications for the decisions of a network operator
- is able to analyse and assess controversial issues from the perspective of different stakeholders.

Content of teaching

The lecture “Energy Networks and Regulation” provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator’s abilities to deal with the massive challenges lying ahead ("Energiewende", redispatch, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO
- Objectives of regulation: Fair price calculation and high standard access conditions
- The functioning of incentive regulation
- First major amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily?) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

Literature


7.126 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

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) 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 20/21, 2 SWS, Language: English, Open in study portal

Lecture (V)

Online

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
Literature
Weiterführende Literatur:

Course: Energy Trade and Risk Management [T-WIWI-102691]

Responsible: N.N.
Organisation: KIT Department of Economics and Management

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

Events

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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:

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

Organizational issues

Termine siehe Institutsaushang, freitags 14:00-15:30 Uhr
Literature

Weiterführende Literatur:


www.riskglossary.com
# 7.128 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

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**Exams**

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**Competence Certificate**

oral examination, Duration: 0.5 hours, no auxiliary means

**Prerequisites**

none

**Recommendation**

T-MACH-102194 Combustion Engines I

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

**Engine measurement techniques**

2134137, SS 2021, 2 SWS, Language: German, [Open in study portal](#)  
Lecture (V)  
Blended (On-Site/Online)

**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
### 7.129 Course: Engineering Hydrology [T-BGU-108943]

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<tr>
<th>Responsible</th>
<th>Dr.-Ing. Uwe Ehret</th>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ⏹️ Cancelled

**Competence Certificate**

See German version.

**Prerequisites**

None
7.130 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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Legend: 🖥 Online, 🕰 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Annotation
The course is held in English.

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

Engineering Interactive Systems
2540420, WS 20/21, 3 SWS, Language: English, Open in study portal

Literature
Siehe Englische Literatur
### 7.131 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-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
**7.132 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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**Exams**

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<td>Grade to a third</td>
<td>Each term</td>
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**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:*
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 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 young and 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 consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The examination date is the 17th of December, 2 to 3 p.m. (Location will be the tent in front of the Audimax).

Due to the current situation special regulations will be necessary. We will provide further information on our website.

Organizational issues
montags 16:30-17:00 Q&A, 17:00-18:00 Guest Talks

Literature

Entrepreneurship
2545001, SS 2021, 2 SWS, Language: English, Open in study portal

Literature
Füglistaller, Urs, Müller, Christoph und Volery, Thierry (2008): Entrepreneurship
Ries, Eric (2011): The Lean Startup
7.133 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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<td>Grade to a third</td>
<td>Each summer term</td>
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**Events**

| ST 2021 | 2545002 | Entrepreneurship Research | 2 SWS | Seminar / 🖥 | Henn, Manthey, Terzidis |

**Exams**

| ST 2021 | 7900052 | Entrepreneurship Research | Terzidis |

**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 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:*

**Entrepreneurship Research**

2545002, SS 2021, 2 SWS, Language: German, [Open in study portal](#)  

**Organizational issues**

Block am 21.04., 05.05., 14.07.

**Literature**

Wird im Seminar bekannt gegeben.
7.134 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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<td>2560548</td>
<td>Environmental and Resource Policy</td>
<td>2</td>
<td>Lecture / Practice (VÜ)</td>
<td>Walz</td>
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**Exams**

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<td>WT 20/21</td>
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<td>Environmental and Resource Policy</td>
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<td>Lecture / Practice</td>
<td>Walz</td>
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</table>

**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 Resource Policy  
2560548, SS 2021, 2 SWS, Language: German, Open in study portal

**Literature**

Weiterführende Literature:

Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg
OECD: Environmental Performance Review Germany, Paris
7.135 Course: Environmental Communication [T-BGU-101676]

**Responsible:** Dr. 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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**Exams**

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**Competence Certificate**

Non exam assessment (following §4(2), 3 of the examination regulation).

**Prerequisites**

Examination Prerequisite Environmental Communication must be passed.

**Recommendation**

None

**Annotation**

none
## 7.136 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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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled

### 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].
### 7.137 Course: Environmental Law [T-BGU-111102]

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

**Part of:**
- M-INFO-101217 - Public Business Law
- M-WIWI-101468 - Environmental Economics

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

**Competence Certificate**
- Written exam with 120 min

**Prerequisites**
- None

**Annotation**
- None
### 7.138 Course: European and International Law [T-INFO-101312]

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<th>Ulf Brühann</th>
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Legend: 🔄 Online, 🔄 Blended (On-Site/Online), 🔄 On-Site, ✗ Cancelled
7.139 Course: Examination Prerequisite Environmental Communication [T-BGU-106620]

**Responsible:** Dr. 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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**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

7.140 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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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
7.141 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

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<td>Übung zu Experimentelle Wirtschaftsforschung</td>
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**Exams**

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**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

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

**Experimental Economics**

2540489, WS 20/21, 2 SWS, Language: German, Open in study portal

**Content**
Experiments have become a valuable tool in Economics and Information Systems research. Nearly all fields of the economic discipline use experiments to verify theoretical predictions and to identify cause-effect relationships. Besides being used for empirical validation, this method is applied in political and strategic consulting. The lecture gives an introduction to experimental methods in Economics and in the Information Systems research domain, and shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

**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.
**Course: Experimental Lab Class in Welding Technology, in Groups [T-MACH-102099]**

**Responsible:** Dr.-Ing. Stefan Dietrich  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101268 - Specific Topics in Materials Science

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<th>2173560</th>
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<th>3 SWS</th>
<th>Practical course / 🗣️</th>
<th>Dietrich, Schulze</th>
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**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 20/21, 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.

**Organizational issues**  
Das Praktikum muss Corona-bedingt leider entfallen.

**Literature**  
wird im Praktikum ausgegeben
7 COURSES  Course: Extraordinary additional course in the module Cross-Functional Management Accounting [T-WIWI-108651]

7.143 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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**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.
**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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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗥 On-Site, ❌ Cancelled

**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, WS 20/21, 2 SWS, Language: German, Open in study portal  
Lecture (V)

**Content**

The lecture offers a specialization in manufacturing technology for structure generation in microtechnology. Basic aspects of microtechnical manufacturing are introduced. By means of examples from chip technology and microsystem technology, the basic techniques of pre- and post-treatment, structure build-up, decoating for the production of semi-finished products, tools and micro components are taught. Processes for the production of nanostructures and the nano/micro interface are also dealt with. In typical examples, elementary mechanisms, process control and plant engineering are presented after the production sequence has been introduced. In addition, aspects of production measurement technology, process control and environment, especially for wet processes, are also included.

**Table of contents**

1. Basics of microtechnical production  
2. General manufacturing steps  
2.1 Pretreatment / Cleaning / Rinsing  
2.2 Coating processes (from spin coating to self-assembly)  
2.3 Microstructuring: additive and subtractive  
2.4 Decoating  
3. Microtechnical tool production: masks and forming tools  
4. Interconnects (Damascene process), modern conductor path construction  
5. Wet processes in the LIGA process  
6. Design of process sequences
Content
The lecture offers an advanced understanding of manufacturing processes in microsystem technology. Basic aspects of microtechnological processing will be introduced. With examples from semiconductor microfabrication and microsystem technology the base processing steps for conditioning and finishing, patterning, removal are imparted. Nano-patterning is covered is also included and the micro-nano interface is discussed. By the help of typical processing steps elementary mechanisms, process execution, and equipment are explained. Additionally quality control, process control and environmental topics are included.

Literature
M. Madou
Fundamentals of Microfabrication
CRC Press, Boca Raton, 1997
W. Menz, J. Mohr, O. Paul
Mikrosystemtechnik für Ingenieure
Dritte Auflage, Wiley-VCH, Weinheim 2005
L.F. Thompson, C.G. Willson, A.J. Bowden
Introduction to Microlithography
### 7.145 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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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 📞 On-Site, ✗ Cancelled

**Competence Certificate**  
oral exam, appr. 20 min.

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
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

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<td>WT 20/21 6242905 Facility Management in Hospitals 3 SWS Lecture / Practice (/ Lennerts, Mitarbeiter/innen</td>
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**Competence Certificate**

term paper appr. 10 pages, with final presentation appr. 10 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
## 7.147 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

<table>
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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: deformation and fracture

2181711, WS 20/21, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)  
Online
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!

Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relativ einfach aber dennoch umfassender Überblick für metallische Werkstoffe
7.148 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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Events

| WT 20/21 | 2181715 | Failure of Structural Materials: Fatigue and Creep | 2 SWS | Lecture / 🖥️ | Gruber, Gumbsch |

Exams

| WT 20/21 | 76-T-MACH-102139 | Failure of Structural Materials: Fatigue and Creep | Gruber, Gumbsch |

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

Competence Certificate
oral exam ca. 30 minutes
no tools or reference materials

Prerequisites
none

Recommendation
preliminary 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 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online
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.

Organizational issues

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
7 COURSES

7.149 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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**Events**

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<td>Lecture / 🖥</td>
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**Exams**

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<tr>
<td>WT 20/21</td>
<td>7900059</td>
<td>Financial Analysis</td>
<td></td>
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<td>Luedecke, Ruckes</td>
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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 2021, 2 SWS, Language: English, Open in study portal

**Literature**

7.150 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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**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 course takes place each second summer term: 2018/2020....
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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</table>

**Exams**

- Lecture: Schienle, Buse
- Practice: Görgen, Buse, Schienle
- On-Site: Schienle

**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 course takes place each second winter term starting in WS2020/21
7 COURSES
Course: Financial Intermediation [T-WIWI-102623]

7.152 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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Events

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<td>2 SWS</td>
<td>Lecture / 🖥️</td>
<td>Ruckes</td>
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<td>2530232</td>
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<td>1 SWS</td>
<td>Practice / 🖥️</td>
<td>Ruckes, Hoang, Benz</td>
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Exams

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</table>

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 20/21, 2 SWS, Language: German, [Open in study portal]

Content
The lecture covers the following topics:
- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Stability of the financial system
- The macroeconomic role of financial intermediation
- Principles of the prudential regulation of banks

Learning outcomes: Students
- are in a position to describe the arguments for the existence of financial intermediaries,
- are able of discuss and analyze both static and dynamic aspects of contractual relationships between banks and borrowers,
- are able to discuss the macroeconomic role of the banking system,
- are in a position to explain the fundamental principles of the prudential regulation of banks and are able to recognize and evaluate the implications of specific regulations.

Workload:
The total workload for this course is approximately 135.0 hours. For further information see the German version.
Literatur
Weiterführende Literatur:

### 7.153 Course: Firm creation in IT security [T-WIWI-110374]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr. Orestis Terzidis</th>
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<td>Organisation</td>
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<tr>
<td>Part of</td>
<td>M-WIWI-101488 - Entrepreneurship (EnTechnon)</td>
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#### Events

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<td>WT 20/21</td>
<td>2545109</td>
<td>Business Planning for Founders in the field of IT-Security</td>
<td>Seminar / Online</td>
<td>2 SWS</td>
<td>Ntagiakou, Kienzle, Terzidis</td>
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#### Exams

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<td>WT 20/21</td>
<td>7900155</td>
<td>Business Planning for Founders in the field of IT-Security</td>
<td>Seminar (S)</td>
<td>Terzidis</td>
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</table>

**Legend:** 📏 Online, 🧩 Blended (On-Site/Online), 🗽 On-Site, × Cancelled

### Competence Certificate

Alternative exam assessment. The grade consists of the presentation and the written elaboration.

### Prerequisites

None

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

#### Business Planning for Founders in the field of IT-Security

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
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<th>Language</th>
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<tbody>
<tr>
<td>2545109</td>
<td>WS 20/21, 2 SWS, Language: German/English,</td>
<td>Seminar (S)</td>
<td>Online</td>
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</table>
Content

Information about the seminar:
The seminar will be conducted in Zoom. More information about the process will be available in ILIAS. In the seminar you will work in groups of max. 4 persons. Group applications are welcome but not a prerequisite for participation. Most of the seminars will be held in English.
The focus of the seminar is Opportunity Recognition in the field of IT-Security, followed by ideation sessions with the aim to find possible applications for Cyber Security technologies that are developed at the KIT. Prototyping and also Pitching are part of the seminar.

Target group:
Master Students

Information on the allocation of seminar places:
The registration for the seminar is possible in the Wiwi portal in the period from 09.08.2020 to 23.10.2020 at 23:59 o’clock. To apply for the seminar, please send us a letter of motivation (max. 5 sentences).

Important Dates:
18.11.2020, 09:00-15:00
02.12.2020, 09:00-15:00
16.12.2020, 09:00-15:00

Deliverables:
Homework completed in the meantime among seminar days
Final presentation on 16.12.2020
Business Plan (7000 Words)

After completing this course, the course participants will be able to

- Characterize the specifications of Technology Push and Market Pull
- Describe why personal and team core values are important for team formation and how they can affect start-up projects.
- Develop a sound value proposition for a target customer
- Recognize Business Opportunities in the field of IT-Security applying the TAS Approach
- Learn the processes of Design Thinking
- Build a Prototype
- Create Business Ideas
- Pitch their Business Ideas to potential investors

Organizational issues
Blockveranstaltung im Rahmen des KASTEL Projekts
7.154 Course: Fixed Income Securities [T-WIWI-102644]

**Course Information**

- **Responsible:** Prof. Dr. Marlise Uhrig-Homburg
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101480 - Finance 3
- **Module:** M-WIWI-101483 - Finance 2

**Events**

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<td>Grade to a third</td>
<td>see Annotations</td>
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**Competence Certificate**

The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the 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**

Knowledge from the course "Derivatives" is very helpful.

**Annotation**

The course will no longer be offered from winter semester 2020/21.

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

**Bond Markets**

- **Code:** 2530560, **WS 20/21**, 3 SWS, **Language:** English, [Open in study portal](#)

**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 through successful participation in the tutorial sessions. 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**

Blockveranstaltung: Do 14:00-19:00 Uhr, Fr 9:45-17:15 Uhr

05./06.11., 19./20.11., 03./04.12.20
7.155 Course: Fluid Power Systems [T-MACH-102093]

Responsible: Prof. Dr.-Ing. Marcus Geimer  
Felix Pult

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

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<td>Lecture / Online</td>
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<td>Fluid Power Systems</td>
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<td>Geimer</td>
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</table>

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 20/21, 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

Skriptum zur Vorlesung Fluidtechnik
Institut für Fahrzeugsystemtechnik
downloadbar
7.156 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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**Events**

| ST 2021 | 2174575 | Foundry Technology | 2 SWS | Lecture / 🧩 | Wilhelm |

**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:*

**Foundry Technology**
2174575, SS 2021, 2 SWS, Language: German, [Open in study portal](#)
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
Vorlesungstermine: 23.4., 30.4., 7.5., 21.5., 11.6., 18.6., 2.7., 16.7.

Literature
Literaturhinweise werden in der Vorlesung gegeben
Reference to literature, documentation and partial lecture notes given in lecture
**Course: Freight Transport [T-BGU-106611]**

**Responsible:** 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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### Events

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### Exams

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<td>Chlond</td>
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**Competence Certificate**  
written exam, 60 min.

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
### 7.158 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>Fuels and Lubricants for Combustion Engines</td>
<td>2 SWS</td>
<td>Lecture / 🗣</td>
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**Exams**

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<td>Kehrwald</td>
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</table>

**Competence Certificate**

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

**Prerequisites**

none

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

### Fuels and Lubricants for Combustion Engines

2133109, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**  
On-Site

**Content**

- Introduction and basics
- Fuels for Gasoline and Diesel engines
- Hydrogen
- Lubricants for Gasoline and Diesel engines
- Coolants for combustion engines

**Literature**

Skript
7.159 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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**Events**

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**Exams**

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**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: Horst Dietmar Bardehle
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101266 - Automotive Engineering

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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-Vehicles Bodies I
2113814, WS 20/21, 1 SWS, Language: German, Open in study portal

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

Termine, nähere Informationen und eventuelle Terminänderungen: 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
7.161 Course: Fundamentals for Design of Motor-Vehicle Bodies II [T-MACH-102119]

**Responsible:** Horst Dietmar Bardehle  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101266 - Automotive Engineering

**Type**  
Oral examination  
**Credits**  
1.5  
**Grading scale**  
Grade to a third  
**Recurrence**  
Each summer term  
**Version**  
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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-Vehicles Bodies II**
2114840, SS 2021, 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**
Voraussichtliche Termine, nähere Informationen und evtl. Änderungen: siehe Institutshomepage.

Scheduled dates, further Information and possible changes of date: see homepage of the institute.
Literature
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
**Course: Fundamentals in the Development of Commercial Vehicles I [T-MACH-105160]**

**Responsible:** Dr. Christof Weber  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101265 - Vehicle Development

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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 in the Development of Commercial Vehicles I**  
2113812, WS 20/21, 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 are able to plan, to steer, and to handle this process. 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
Termine und Nähere Informationen: siehe Institutshomepage
Dates and further information will be published on the homepage of the institute.

Literature
Course: Fundamentals in the Development of Commercial Vehicles II [T-MACH-105161]

**Responsible:** Dr. Christof Weber  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

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**Events**

| ST 2021 | 2114844 | Fundamentals in the Development of Commercial Vehicles II | 1 SWS | Lecture / Online | Weber |

**Exams**

| WT 20/21 | 76-T-MACH-105161 | Fundamentals in the Development of Commercial Vehicles II | Weber |

**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 in the Development of Commercial Vehicles II**

2114844, SS 2021, 1 SWS, Language: German, [Open in study portal](#)

**Content**

1. Gear boxes of commercial vehicles
2. Intermediate elements of the drive train
3. Axle systems
4. Front axles and driving dynamics
5. Chassis and axle suspension
6. Braking System
7. Systems
8. Excursion

**Learning Objectives:**

The students know the advantages and disadvantages of different drives. Furthermore they are familiar with components, such as transfer box, propeller shaft, powered and non-powered frontaxle etc. Beside other mechanical components, such as chassis, axle suspension and braking system, also electric and electronic systems are known. Consequently the student are able to analyze and to judge the general concepts as well as to adjust them precisely with the area of application.

**Organizational issues**

Genaue Termine, nähere Informationen und eventuelle Terminänderungen: siehe Instituhthomepage.
Literature
1. HILGERS, M.: Nutzfahrzeugtechnik lernen, Springer Vieweg, ISSN: 2510-1803
7.164 Course: Fundamentals of Automobile Development I [T-MACH-105162]

**Responsible:** Hon.-Prof. Rolf Frech  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101265 - Vehicle Development

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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:*

**Fundamentals of Automobile Development I**

2113810, WS 20/21, 1 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

Online

**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**

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.
Principles of Whole Vehicle Engineering I
2113851, WS 20/21, 1 SWS, Language: English, Open in study portal

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
Termine und nähere Informationen finden Sie auf der Institutshomepage.
Dats and further information will be published on the homepage of the institute.
Kann nicht mit Lehrveranstaltung 2113810 kombiniert werden
Cannot be combined with lecture 2113810.

Literature
Skript zur Vorlesung wird zu Beginn des Semesters ausgegeben
The scriptum will be provided during the first lessons
### 7.165 Course: Fundamentals of Automobile Development II [T-MACH-105163]

**Responsible:** Hon.-Prof. Rolf Frech  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101265 - Vehicle Development

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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:

**Fundamentals of Automobile Development II**  
2114842, SS 2021, 1 SWS, Language: German, Open in study portal  
**Block (B) Online**

**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**  
Vorlesung findet als Blockvorlesung statt.  
Kann nicht mit der Veranstaltung [2114860] kombiniert werden.  
Cannot be combined with lecture [2114860].

**Literature**  
Skript zur Vorlesung ist über ILIAS verfügbar.
Principles of Whole Vehicle Engineering II
2114860, SS 2021, 1 SWS, Language: English, 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
Kann nicht mit der Veranstaltung [2114842] kombiniert werden.
Cannot be combined with lecture [2114842].
Raum 219, Geb. 70.04, Campus Ost.
Genaue Termine entnehmen Sie bitte der Institushomepage.
Scheduled dates:
see homepage of the institute.

Literature
Das Skript zur Vorlesung ist über ILIAS verfügbar.
7 COURSES

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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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, WS 20/21, 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
Skrift, erhältlich in der Vorlesung


Fundamentals of catalytic exhaust gas aftertreatment
2134138, SS 2021, 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

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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<td>3 SWS</td>
<td>Lecture</td>
<td>Wigger, Gutekunst</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

**Competence Certificate**

Depending on the further pandemic development in the summer semester 2021 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.
7.168 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

<table>
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**Events**

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<td>2149655</td>
<td>Gear Technology</td>
<td>2 SWS</td>
<td>Lecture / Klaiber</td>
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**Exams**

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<td>Klaiber</td>
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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:**

**Gear Technology**

- 2149655, WS 20/21, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

- On-Site
Content
The objective of the lecture is the introduction into modern gear technology. In this respect, the basics of gear and transmission technology are reviewed in detail. The load of gears and process chains are derived through the requirements of modern drive systems. For comprehensive understanding of gear manufacturing different processes, machine technologies, tools and applications are introduced with the help of a wide range of sample components. Furthermore, current research projects are presented. Demonstrations in the production laboratory of the institute and an excursion to an industrial gear manufacturing company round off the lecture.

The following topics will be covered:

- Sample applications and the need for gearboxes
- Basics of gear and transmission technology
- Loads of gears and process chains
- Manufacturing techniques
- Heat Treatment
- Quality assurance
- Simulation techniques

Learning Outcomes:
The students ...

- know the basic terms of gearings and are able to explain the imparted basics of gear and transmission technology.
- are able to specify the different manufacturing processes and machine technologies for gear manufacturing. Furthermore, they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- are able to read and interpret measuring records for gearings.
- are able to make an appropriate selection of a process chain for a given application. Hereby, they can determine the main impact factors of the different process steps.

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/).
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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<td>2</td>
<td>Grade to a third</td>
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</table>

Competence Certificate
The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

Prerequisites
none

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

Global Logistics
2149600, SS 2021, 2 SWS, Language: German, Open in study portal
Content

Content:

Characteristics of global trade

- Incoterms
- Customs clearance, documents and export control

Global transport and shipping

- Maritime transport, esp. container handling
- Air transport

Modeling of supply chains

- SCOR model
- Value stream analysis

Location planning in cross-border-networks

- Application of the Warehouse Location Problem
- Transport Planning

Inventory Management in global supply chains

- Stock keeping policies
- Inventory management considering lead time and shipping costs

Media:
presentations, black board

Workload:
regular attendance: 21 hours
self-study: 99 hours

Students are able to:

- assign basic problems of planning and operation of global supply chains and plan them with 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. Handbuch Logistik, Springer Verlag, 2002 (Neuausgabe 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 Supply Chains, Books on Demand 2006
7.170 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  

### 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:

#### Globale Optimierung I
2550134, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**  
**Online**

### 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
7.171 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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**Events**

| ST 2021 | 2550134 | Globale Optimierung I | 2 SWS | Lecture / 📲 | Stein |
| ST 2021 | 2550135 | Übung zu Globale Optimierung I und II | 2 SWS | Practice / 📲 | Stein, Schwarze, Beck |
| ST 2021 | 2550136 | Globale Optimierung II | 2 SWS | Lecture / 📲 | Stein |

Legend: 📲 Online, 🎧 Blended (On-Site/Online), 📦 On-Site, ✗ Cancelled

**Competence Certificate**
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.  
The examination is held in the semester of the lecture and in the following semester.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Part I and II of the lecture are held consecutively in the same semester.

_Below you will find excerpts from events related to this course:_

**Globale Optimierung I**
2550134, SS 2021, 2 SWS, Language: German, Open in study portal  
**Lecture (V)**  
Online
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

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
7.172 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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**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:

**Globale Optimierung II**

2550136, SS 2021, 2 SWS, Language: German, [Open in study portal]

**Lecture (V)**

Online

**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.

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- Introduction and examples
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- 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
### 7.173 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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<td>2</td>
<td>Lecture</td>
<td>Grade</td>
<td>Each winter term</td>
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**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:

**Global Production**

2149613, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)
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 siteappropriate production and product construction casespecifically
- 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
Vorlesungstermine montags 14:00 - 15:30 Uhr
Lectures on Mondays 14:00 - 15:30
Literature
Medien
Skript zur Veranstaltung wird über [https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/) bereitgestellt.

Empfohlene Sekundärliteratur:

Media
Lecture notes will be provided in Ilias [https://ilias.studium.kit.edu/](https://ilias.studium.kit.edu/)

Recommended secondary literature:
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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<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" 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.
7.175 Course: Großdiesel- und -gasmotoren für Schiffsantriebe [T-MACH-110816]

- **Responsible:** Dr.-Ing. Heiko Kubach
- **Organisation:** M-MACH-101303 - Combustion Engines II

<table>
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**Events**

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<th>Location</th>
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<tr>
<td>WT 20/21</td>
<td>2134154</td>
<td>Large Diesel and Gas Engines for Ship Propulsions</td>
<td>2 SWS</td>
<td>Lecture / 🗣️</td>
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<td>Large Diesel and Gas Engines for Ship Propulsions</td>
<td>2 SWS</td>
<td>Lecture / 🧩</td>
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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:

**Large Diesel and Gas Engines for Ship Propulsions**
2134154, WS 20/21, 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
- Combustions Processes for liquid Fuels
- Injection of Gaseous Fuels
- Combustion Processes for Gaseous Fuels
- Emissions
- Integration of Engines in Ships
- Large Engines in other Applications

**Large Diesel and Gas Engines for Ship Propulsions**
2134154, SS 2021, 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 COURSES
Course: Growth and Development [T-WIWI-111318]

7.176 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 |

| Type       | Written examination |
| Credits    | 4,5 |
| Grading scale | Grade to a third |
| Recurrence | Each winter term |
| Version    | 1 |

**Events**

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| Language: German/English |
| Online, Blended (On-Site/Online), On-Site, Cancelled |

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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.

**Annotation**

Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

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

**Theory of endogenous growth**

2561503, WS 20/21, 2 SWS, Language: German/English, [Open in study portal](#)
Content
This course is intended as an introduction to the field of advanced macroeconomics with a special focus on economic growth. Lectures aim to deal with the theoretical foundations of exogenous and endogenous growth models. The importance of growth for nations and discussion of some (well-known) growth theories together with the role of innovation, human capital and environment will therefore be primary focuses of this course.

Learning objective:
Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

Course content:
- Intertemporal consumption decision
- Growth models with exogenous saving rates: Solow
- Growth models with endogenous saving rates: Ramsey
- Growth and environmental resources
- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

Recommendations:
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. In addition, an interest in quantitative-mathematical modeling is required.

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

Exam description:
The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature
Auszug:
7.177 Course: Handling Characteristics of Motor Vehicles I [T-MACH-105152]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

**Type**  
Oral examination

**Credits**  
3

**Grading scale**  
Grade to a third

**Recurrence**  
Each winter term

**Version**  
1

**Events**

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**Competence Certificate**

Verbally

**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 I**

2113807, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

Online

**Content**

1. Problem definition: Control loop driver - vehicle - environment (e.g. coordinate systems, modes of motion of the car body and the wheels)

2. Simulation models: Creation from motion equations (method according to D'Alembert, method according to Lagrange, programme packages for automatically producing of simulation equations), model for handling characteristics (task, motion equations)

3. Tyre behavior: Basics, dry, wet and winter-smooth roadway

**Learning Objectives:**

The students know the basic connections between drivers, vehicles and environment. They can build up a vehicle simulation model, with which forces of inertia, aerodynamic forces and tyre forces as well as the appropriate moments are considered. They have proper knowledge in the area of tyre characteristics, since a special meaning comes to the tire behavior during driving dynamics simulation. Consequently they are ready to analyze the most important influencing factors on the driving behaviour and to contribute to the optimization of the handling characteristics.
**Literature**


7.178 Course: Handling Characteristics of Motor Vehicles II [T-MACH-105153]

Responsibility: 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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Legend: 📃 Online, 🧩 Blended (On-Site/Online), 🗂 On-Site, 🔴 Cancelled

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 2021, 2 SWS, Language: German, Open in study portal

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.

Literature

7.179 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

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**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.

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
oral exam, 20-30 min

Prerequisites
none

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

Advanced powder metals
2126749, SS 2021, 2 SWS, Language: German, Open in study portal

Literature

- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005
7.181 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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### Exams

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🔝 On-Site, ✗ Cancelled
7.182 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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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

none
Course: Human Factors in Security and Privacy [T-WIWI-109270]

**7.183 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**

1. Successful participation in the exercises. Successful means actively participating in the tasks and its discussions. One task may be missed.
2. Also participation in the lectures is required. One lecture may be missed.

**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.
7.184 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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**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:

**Ignition systems**

2133125, WS 20/21, 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 an Alternative Ignition Systems
**7.185 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

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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). 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:*

---

*Incentives in Organizations*

2573003, SS 2021, 2 SWS, Language: English, [Open in study portal](#)
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

Organizational issues
There are recordings of the lecture contents. There will be live sessions on selected lecture dates. These will be announced at the start of the lecture time.
### 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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**Events**

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<tr>
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<td>2122014</td>
<td>Information Engineering</td>
<td>2 SWS</td>
<td>Seminar / Blended (On-Site/Online)</td>
<td>Ovtcharova, Mitarbeiter</td>
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<td>76-T-MACH-102209</td>
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</table>

**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 2021, 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
7.187 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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<td>Informationsmanagement für öffentliche Mobilitätsangebote</td>
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**Exams**

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<td>WT 20/21</td>
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<td>Information Management for Public Mobility Services</td>
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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
7.188 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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### Events

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<td>2511606</td>
<td>Information Service Engineering</td>
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<td>Lecture / Online</td>
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<td>2511607</td>
<td>Exercises to Information Service Engineering</td>
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### Exams

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<td>7900071</td>
<td>Information Service Engineering (Registration until 08 February 2021)</td>
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<tr>
<td>ST 2021</td>
<td>7900070</td>
<td>Information Service Engineering (Registration until 12 July 2021)</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 (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 2021, 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
- 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
7.189 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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<td>Grade to a third</td>
<td>Each summer term</td>
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**Events**

| ST 2021 | 2118094 | Information Systems in Logistics and Supply Chain Management | 2 SWS | Lecture / 🖥 | Kilger |

**Exams**

| WT 20/21 | 76T-MACH-102128 | Information Systems and Supply Chain Management | Mittwollen |
| ST 2021  | 76-T-MACH-102128 | Information Systems and Supply Chain Management | Mittwollen |

**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:

**Information Systems in Logistics and Supply Chain Management**  
2118094, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**Literature**

7.190 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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<td>Entwurf und Bau von Straßen</td>
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<td>Lecture</td>
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<td>ST 2021</td>
<td>6233802</td>
<td>Betrieb und Erhaltung von Straßen</td>
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<td>Lecture</td>
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**Exams**

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<td>Lecture</td>
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</table>

**Competence Certificate**

written exam, 120 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
7.191 Course: Innovation Lab [T-ETIT-110291]

**Responsible:**
- Prof. Dr.-Ing. Sören Hohmann
- Prof. Dr.-Ing. Eric Sax
- Prof. Dr. Wilhelm Stork
- Prof. Dr.-Ing. Thomas Zwick

**Organisation:**
KIT Department of Electrical Engineering and Information Technology

**Part of:**
M-WIWI-105011 - Student Innovation Lab (SIL) 2

### Type
Examination of another type

### Credits
9

### Grading scale
Grade to a third

### Recurrence
Each winter term

### Expansion
2 terms

### Version
1

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<td>Project (P)</td>
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<td>Hohmann, Zwick, Stork, Sax</td>
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**Competence Certificate**
see module description
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:

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 fulfill 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
Die Vorlesung wird als interaktive online Veranstaltung durchgeführt. Die Vorlesung startet am 15.04.2021 und findet donnerstags 10:00-11:30 Uhr statt. 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.
7.193 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

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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.
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**

| ST 2021  | 2560236 | Innovation and policy | 2 SWS | Lecture | Ott |
| ST 2021  | 2560237 |                      | 1 SWS | Practice | Ott |

**Exams**

| WT 20/21 | 7900077 | Innovation and Policy | Ott |

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

**Competence Certificate**

Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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:
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:


**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>6224801</td>
<td>4 SWS</td>
<td>Each term</td>
<td>1 terms</td>
<td>1</td>
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**Integrated Design Project in Water Resources Management**

**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
# 7.196 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

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### Events

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<td>Integrated Product Development</td>
<td>4 SWS</td>
<td>Lecture / 🗣️</td>
<td>Albers</td>
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<td>WT 20/21</td>
<td>2145157</td>
<td>Workshop Product Development</td>
<td>4 SWS</td>
<td>Practice / 🗣️</td>
<td>Albers, Mitarbeiter</td>
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<td>WT 20/21</td>
<td>2145300</td>
<td>Project Work in Product Development</td>
<td>2 SWS</td>
<td>Others (sons / 🗣️)</td>
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### Exams

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<td>76-T-MACH-105401</td>
<td>Integrated Product Development</td>
<td>Albers</td>
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</table>

**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 20/21, 4 SWS, Language: German, Open in study portal

Lecture (V)

On-Site
Content
Registration required in the previous summer semester. The lecture starts in first week of October.

Prerequisites:
The participation in 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.

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

Workshop Product Development
2145157, WS 20/21, 4 SWS, Language: German, Open in study portal
Content
Prerequisites:
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK 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:
lectures: 21 h
preparation to exam: 99 h

Course content:
problem solving: analysis techniques, creativity techniques and evaluation methods
professional skills: presentation techniques, moderation and teamcoaching
development tools: MS Project, Szenario-Manager & Pro/Engineer Wildfire

Learning objectives:
The theoretical background taught in the lecture, is deepened through methodworkshops, business games and case studies. The reflexion of the onself procedure allows for an applicability and practicability of the contents in the accompanying development project as well as for the career entry.

Literature
Klaus Ehrlenspiel - Integrierte Produktentwicklung. Denkabläufe, Methodeneinsatz, Zusammenarbeit, Hanser Verlag, 2009

Project Work in Product Development
2145300, WS 20/21, 2 SWS, Language: German, Open in study portal

Others (sonst.)
On-Site
Content
Participation only possible in combination with the lecture 2145156 'Integrated Product Development'.

Prerequisites:
The participation in "Integrated Product Development" requires the concurrent participation in lectures (2145156), tutorials (2145157) and project work (2145300).

Due to organizational reasons, the number of participants is limited to 42 persons. Thus a selection has to be made. For registration to the selection process a standard form has to be used, that can be downloaded from IPEK hompage from april to july. The selection itself is made by Prof. Albers in personal interviews.

Recommendations:
none

Workload:
regular attendance: 21 h
self-study: 99 h

Examination:
oral examination (60 minutes)
combined examination of lectures, tutorials and project work

Course content:
The project work begins with the early stages of product development, i.e. the identification of market trends and needs. Based on this information the students develop scenarios for future markets and create product profiles, which describe the customers and their demands without anticipating possible product solutions. After having passed several following milestones for ideas, concepts and designs, virtual prototypes and function prototypes are presented to an audience.
The project work is supported by coaching through skilled faculty staff. Additionally weekly tutorials, respectively workshops are given. For doing the project the teams gain access to team workspaces featuring IT-infrastructure and relevant software, such as office, CAD or FEA. Further on the teams learn how team cooperation and knowledge management can be supported in design project by using a wiki system.s

Learning objectives:
The center of "Integrated Product Development" constitutes itself in the development of a technical product within independent working student teams on the basis of the market situation up to virtual and real prototypes. Thereby the integrate treatment of the product development process is of importance. The project teams hereby represent development departments of medium sized companies, in which the presented methods and tools are field - experienced applied and ideas are transformed into concrete product models.
For the preparation of this development project the basics of 3D-CAD-modelling (Pro/ENGINEER) as well as different tools and methods of creative designing, of sketching and solution finding are mediated in workshops. Special events impart an insight of presentation techniques and the meaning of technical design.
7.197 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

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

**Competence Certificate**

Written Exam (120 min)

**Prerequisites**

"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

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

**Integrated Production Planning in the Age of Industry 4.0**

2150660, SS 2021, 6 SWS, Language: German, [Open in study portal](#)
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 (production planning and control, fine layout, IT systems in an industry 4.0 factory)
- Preparation and monitoring of implementation
- Start-up and series support

The lecture contents are rounded off by numerous current practical examples with a strong industry 4.0 reference. 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 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.

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:
Schrift zur Veranstaltung wird über (https://ilias.studium.kit.edu) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu).
7.198 Course: Integrative Strategies in Production and Development of High Performance Cars [T-MACH-105188]

**Responsible:** Dr. 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

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<td>Integrative Strategies in Production and Development of High Performance Cars</td>
<td>Schlichtenmayer</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:*

**Integrative Strategies in Production and Development of High Performance Cars**

2150601, WS 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)

Online
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

Organizational issues
Die LV wurde wegen der Coronapandemie vom SS 20 ins WS 20/21 verschoben.

Literature
Medien:
Skr ipt zur Veranstaltung wird über (https://ilias.studium.kit.edu/) bereitgestellt.

Media:
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
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.

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- Integrative R&D strategies and holistic capacity management
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- The modern role of manufacturing from a R&D perspective
- Global R&D and production
- Methods to identify core competencies

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The students ...

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- 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

Organizational issues
Die Vorlesung wird wöchentlich dienstags, 10:00 – 11:30 Uhr per Zoom stattfinden. Alle weiteren Informationen inkl. Link zur Zoom-Vorlesung finden Sie im ILIAS-Kurs.

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/).
### 7.199 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**

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

### Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

### Prerequisites

None

### Recommendation

It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".

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

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<td>2540525</td>
<td>WS 20/21</td>
<td>Lecture</td>
<td>Online</td>
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Content
Course content:
The lecture is structured in three parts:
In the first part the methods used for architecture design are introduced (system analysis, UML, formal specification of interfaces, software and analysis patterns, and the separation in conceptual and IT-architectures. The second part is dedicated to learning architectures and machine learning methods. The third part presents examples of learning CRM-Architectures.

Workload:
The total workload for this course is approximately 135 hours (4.5 credits):
Time of attendance
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Learning Goals:
Students have special knowledge of software architectures and of the methods which are used in their development (Systems analysis, formal methods for the specification of interfaces and algebraic semantic, UML, and, last but not least, the mapping of conceptual architectures to IT architectures.

Students know important architectural patterns and they can – based on their CRM knowledge – combine these patterns for innovative CRM applications.

Assessment:
The assessment consists of a written exam of 1-hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from exercise work will be added.

Grade: Minimum points
- 1.0: 95
- 1.3: 90
- 1.7: 85
- 2.0: 80
- 2.3: 75
- 2.7: 70
- 3.0: 65
- 3.3: 60
- 3.7: 55
- 4.0: 50
- 5.0: 0

The grade consists of approximately 91% of exam points and 9% of exercise points.

Literature
### 7.200 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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<td>Übung zu Intelligent Agents and Decision Theory</td>
<td>Practice</td>
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**Legend:** 🔄 Online, 🔄 Blended (On-Site/Online), 🔄 On-Site, ❌ Cancelled

**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 2021, SWS, Language: English, [Open in study portal](#)
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:

7.201 Course: International Business Development and Sales [T-WIWI-110985]

**Responsible:** Erice Casenave  
Prof. Dr. Martin Klarmann  
Prof. Dr. Orestis Terzidis

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

**Part of:**  
M-WIWI-101488 - Entrepreneurship (EnTechnon)  
M-WIWI-101488 - Entrepreneurship (EnTechnon)  
M-WIWI-105312 - Marketing and Sales Management

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**Exams**

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**Legend:** ⬠ Online, ⬢ Blended (On-Site/Online), ⬠ On-Site, ✗ Canceled

**Competence Certificate**

Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

**Annotation**

Due to the Corona situation it is currently unclear whether the seminar can be offered in WS20 / 21.

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

**International Business Development and Sales**  
2500003, WS 20/21, 4 SWS, Language: English, Open in study portal

**Block (B) On-Site**

**Content**

This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model.

- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.

Total workload for 6 ECTS: about 180 hours.
7.202 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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**Events**

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<tbody>
<tr>
<td>WT 20/21</td>
<td>2530570</td>
<td>International Finance</td>
<td>2 SWS</td>
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<td>2530570</td>
<td>International Finance</td>
<td>2 SWS</td>
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**Exams**

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<tbody>
<tr>
<td>WT 20/21</td>
<td>7900052</td>
<td>International Finance</td>
<td>Uhrig-Homburg</td>
</tr>
</tbody>
</table>

**Competence Certificate**
Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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 will not be offered in the summer semester 2020 as originally planned, but only in the winter semester 2020/2021. 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, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)  
**Lecture (V)** On-Site

**Organizational issues**
Blockveranstaltung

**Literature**
**Weiterführende Literatur:**

**International Finance**  
2530570, SS 2021, 2 SWS, Language: German, [Open in study portal](#)  
**Lecture (V)** Online

**Organizational issues**
nach dem 21.04. nach Absprache
Literature
Weiterführende Literatur:

Course: International Management in Engineering and Production [T-WIWI-102882]

**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

<table>
<thead>
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**Events**

| WT 20/21 | 2581956 | International Management in Engineering and Production | 2 SWS | Lecture / Online | Sasse |

**Exams**

| WT 20/21 | 7981956 | International Management in Engineering and Production | | Schultmann |

**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:

**International Management in Engineering and Production**

2581956, WS 20/21, 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

Im Seminarraum-West beim IIP, Termine siehe Institutshomepage

**Literature**

Wird in der Veranstaltung bekannt gegeben.
### 7.204 Course: Internet Law [T-INFO-101307]

- **Responsible:** Prof. Dr. Thomas Dreier
- **Organisation:** KIT Department of Informatics
- **Part of:**
  - M-INFO-101215 - Intellectual Property Law
  - M-INFO-101242 - Governance, Risk & Compliance

<table>
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#### Events

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#### Exams

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<tr>
<td>WT 20/21</td>
<td>7500060</td>
<td>Internet Law</td>
<td>Dreier, Matz</td>
</tr>
</tbody>
</table>

Legend: 🖥 Online, 🪨 Blended (On-Site/Online), 🗣 On-Site, 🗙 Cancelled
### 7.205 Course: Introduction to Bayesian Statistics for Analyzing Data [T-WIWI-110918]

**Responsible:** Prof. Dr. Benjamin Scheibehenne  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-103117 - Data Science: Data-Driven Information Systems

**Type**: Examination of another type  
**Credits**: 3  
**Grading scale**: Grade to a third  
**Recurrence**: Once  
**Version**: 1

**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, participation will be limited to 10 students. If you want to participate, please send a short email to scheibehenne@kit.edu until Thursday, the 23rd of April in which you outline why you are interested in this class and what your expectations are.

The class will consist of three day-long sessions from 9:00 (s.t.) to 18:00. The first session will be held on Thursday, the 7th of May 2020. The second session will be on Thursday, the 28th of May. The third session will be on Thursday, the 18th of June. The classroom will be communicated to registered students in advance. In case classrooms will be closed due to the Corona virus, the class will be taught online and the schedule will be adapted.
7.206 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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**Exams**

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

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

**Organizational issues**

Die Veranstaltung findet online statt.

**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
### 7.207 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

<table>
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<td>6339050</td>
<td>Grundlagen der Hydrogeologie (Studienplan 2009 G10-1, G10-2)</td>
<td>4 SWS</td>
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**Events Legend:**  
🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ⌚ Cancelled

**Competence Certificate**
Written exam with 90 minutes

**Prerequisites**
none
7 COURSES

**7.208 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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**Exams**

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<td>76-T-MACH-105182</td>
<td>Introduction to Microsystem Technology I</td>
<td>Korvink, Badilita</td>
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</table>

**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 20/21, 2 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

**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
7.209 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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**Events**

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<td>Introduction to Microsystem Technology II</td>
<td>Lecture / 🖥</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>Korvink, Badilita</td>
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**Exams**

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<td>2 SWS</td>
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**Legend:** 🖥 Online, 🌟 Blended (On-Site/Online), 📣 On-Site, ✗ Canceled

**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 2021, 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

**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 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>
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#### Events

| ST 2021 | 2550470 | Einführung in die Stochastische Optimierung | 2 SWS | Lecture / 🖥 | Rebennack |
| ST 2021 | 2550471 | Übung zur Einführung in die Stochastische Optimierung | 1 SWS | Practice / 🖥 | Rebennack, Sinske |
| ST 2021 | 2550474 | Rechnerübung zur Einführung in die Stochastische Optimierung | 2 SWS | Practice / 🖥 | Rebennack, Sinske |

#### Exams

| WT 20/21 | 7900242 | Introduction to Stochastic Optimization | Rebennack |

**Legend:** 🖥 Online, 🤖 Blended (On-Site/Online), ⚒ On-Site, ❌ Cancelled

**Competence Certificate**
Alternative exam assessment (open book exam). The exam takes place in every semester.

**Prerequisites**
None.

---

Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021
7.211 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: Examination of another type
Credits: 4
Grading scale: Grade to a third
Recurrence: Each term
Version: 1

Events

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<td>IoT platform for engineering</td>
<td>Project (P / 🧩)</td>
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Exams

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<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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</thead>
</table>

Competence Certificate
Assessment of another type (graded), procedure see webpage. Number of participants limited to 20 people. There is a participant selection process.

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

**IoT platform for engineering**
2123352, WS 20/21, SWS, Language: German, [Open in study portal](#)

**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
- prototypical implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

**Organizational issues**
Veranstaltungsort: CAIT am IMI in der Kriegsstraße 77. Zeit siehe ILIAS zur Lehrveranstaltung.

**Literature**
Keine / None

> IoT platform for engineering
2123352, SS 2021, 3 SWS, Language: German, [Open in study portal](#)

> IoT platform for engineering
2123352, WS 20/21, SWS, Language: German, [Open in study portal](#)
**Content**

Industry 4.0, IT systems for fabrication and assembly, process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.

Students can

- map and analyze processes in the context of Industry 4.0 with special methods of process modelling
- collaboratively grasp practical I4.0 issues using existing hardware and software and work out solutions for a continuous improvement process in a team
- prototypically implement the self-developed solution proposal with the given IT systems and the existing hardware equipment and finally present the results

**Organizational issues**

Siehe Homepage zur Lehrveranstaltung

**Literature**

Keine / None
<table>
<thead>
<tr>
<th>Responsible</th>
<th>apl. Prof. Dr. Oliver Raabe</th>
<th>Organisation</th>
<th>KIT Department of Informatics</th>
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<td>M-INFO-101242 - Governance, Risk &amp; Compliance</td>
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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>
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**Events**

| WT 20/21 | 6233901 | DV-gestützter Straßenentwurf | 2 SWS | Lecture / Practice | Zimmermann |

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

**Competence Certificate**

Exam with 15 minutes

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.214 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

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
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<tbody>
<tr>
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<td>2</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>3</td>
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<tr>
<td>ST 2021 2118184</td>
<td>2 SWS</td>
<td></td>
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</table>

**Type:** Oral examination

**Credits:** 4

**Grading scale:** Grade to a third

**Recurrence:** Each summer term

**Version:** 3

**Events**

| ST 2021 | 2118184 | IT-Fundamentals of Logistics: Opportunities for Digital Transformation | 2 SWS | Lecture / 🕹️ | Thomas |

**Competence Certificate**
The assessment consists of an oral exam (30min) taking place in the recess period according to § 4 paragraph 2 Nr. 2 of the examination regulation.

**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</th>
<th>IT-Fundamentals of Logistics: Opportunities for Digital Transformation</th>
<th>Lecture (V)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2118184, SS 2021, 2 SWS, Language: German, Open in study portal</td>
<td>Blended (On-Site/Online)</td>
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</tr>
</tbody>
</table>
7.215 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>
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<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>ST 2021</td>
<td>4 SWS</td>
<td>Seminar / 🖥️</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2545021</td>
<td></td>
<td></td>
<td>Kleinn, Mohammadi, Terzidis</td>
<td></td>
</tr>
</tbody>
</table>

Legend: 🖥️ Online, 🧩 Blended [On-Site/Online], ⛔️ On-Site, ✗ Cancelled

Competence Certificate
The learning control of the program (Summer School) consists of two parts:
A) Investor Pitch:
Based on a presentation (investor pitch) in front of a jury, the insights gained and developed during the course of the event are presented and the business idea presented. Among other things, the presentation performance of the team, the structured content and the logical consistency of the business idea are evaluated. The exact evaluation criteria will be announced in the course.

B) Written elaboration:
The second part of the assessment is a written report. The iterative knowledge gain of the entire event is systematically logged and can be further supplemented by the contents of the presentation. The report documents key action steps, applied methods, findings, market analyses 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.
**7.216 Course: Judgment and Decision Making [T-WIWI-111099]**

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

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Expansion</th>
<th>Version</th>
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<td>Once</td>
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**Events**

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<th>2540440</th>
<th>Judgment and Decision Making</th>
<th>3 SWS</th>
<th>Lecture / Online</th>
<th>Scheibehenne</th>
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**Exams**

<table>
<thead>
<tr>
<th>WT 20/21</th>
<th>7900357</th>
<th>Judgment and Decision Making</th>
<th></th>
<th></th>
<th>Scheibehenne</th>
</tr>
</thead>
</table>

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

**Competence Certificate**

The grade will be based on the written exam (60 minutes) at the end of the semester.

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

**V Judgment and Decision Making**

2540440, WS 20/21, 3 SWS, Language: English, [Open in study portal](#)

**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.

**Organizational issues**

This lecture will be held online. The lecture videos will be available for download and there will be live Q&A sessions.

**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

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Expansion</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 summer term</td>
<td>1 terms</td>
<td>1</td>
</tr>
</tbody>
</table>

**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.
## 7.218 Course: Knowledge Discovery [T-WIWI-102666]  

### Responsible:
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

### Events

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Written examination</td>
<td>4.5</td>
<td>Grade to a third</td>
<td>Each winter term</td>
<td>2</td>
</tr>
</tbody>
</table>

### Competence Certificate

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation. Students can be awarded a bonus on their final grade if they successfully complete special assignments.

### Prerequisites

None

### 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
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
# 7.219 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>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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## Events

<table>
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<th>Course Code</th>
<th>Course Title</th>
<th>SWS</th>
<th>Type</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>2183640</td>
<td>Laboratory &quot;Laser Materials Processing&quot;</td>
<td>3</td>
<td>Practical course / 🧩</td>
<td>Schneider, Pfleging</td>
</tr>
<tr>
<td>ST 2021</td>
<td>2183640</td>
<td>Laboratory &quot;Laser Materials Processing&quot;</td>
<td>3</td>
<td>Practical course / 🧩</td>
<td>Schneider, Pfleging</td>
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</table>

## Exams

<table>
<thead>
<tr>
<th>Semester</th>
<th>Course Code</th>
<th>Course Title</th>
<th>Type</th>
<th>Responsible</th>
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</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>76-T-MACH-102154</td>
<td>Laboratory Laser Materials Processing</td>
<td></td>
<td>Schneider</td>
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<tr>
<td>ST 2021</td>
<td>76-T-MACH-102154</td>
<td>Laboratory Laser Materials Processing</td>
<td></td>
<td>Schneider</td>
</tr>
</tbody>
</table>

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

### Competence Certificate

The assessment consists of a colloquium for every single experiment and an overall final colloquium incl. an oral presentation of 20 min.

### Prerequisites

None

### Recommendation

Basic knowledge of physics, chemistry and material science is assumed.

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

---

**Laboratory "Laser Materials Processing"**  
2183640, WS 20/21, 3 SWS, Language: German, [Open in study portal](#)  
Practical course (P)  
Blended (On-Site/Online)
Content
The laboratory compromises 8 half-day experiments, which address the following laser processing topics of metals, ceramics and polymers:

- safety aspects
- surface hardening and remelting
- melt and reactive cutting
- surface modification by dispersing or alloying
- welding
- surface texturing
- metrology

There are used CO2-, excimer-, Nd:YAG- and high power diode-laser sources within the laboratory.

The student

- can describe the influence of laser, material and process parameters and can choose suitable parameters for the most important methods of laser-based processing in automotive engineering.
- can explain the requirements for safe handling of laser radiation and for the design of safe laser systems.

Basic knowledge of physics, chemistry and material science is assumed.

The attendance to one of the courses Physical Basics of Laser Technology (2181612) or Laser Application in Automotive Engineering (2182642) is strongly recommended.

regular attendance: 34 hours
self-study: 86 hours

The assessment consists of a colloquium for every single experiment and an overall final colloquium incl. an oral presentation of 20 min.

Organizational issues
Maximal 12 Teilnehmer/innen!
Aktuell sind bereit alle Plätze vergeben! Registrierung für Nachrückliste möglich per Email an johannes.schneider@kit.edu
Praktikum findet in 2 Gruppen semesterbegleitend mittwochs (8:00-11:00 bzw. 14:00-17:00) auf dem Campus Nord am IAM-AWP (Geb. 681) und auf dem Campus Süd am IAM-CMS (Geb. 30.48) statt!

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
- 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
Bereits ausgebucht!
Anmeldung per Email an johannes.schneider@kit.edu
Das Praktikum findet 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
7.220 Course: Laboratory Production Metrology [T-MACH-108878]

**Responsible:** Dr.-Ing. Benjamin Häfner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Grade to a third</td>
<td>Each summer term</td>
<td>2</td>
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</table>

**Events**

| ST 2021 | 2150550 | Laboratory Production Metrology | 3 SWS | Practical course / 🗣 | Häfner |

**Exams**

| ST 2021 | 76-T-MACH-108878 | Laboratory Production Metrology | Häfner |

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

**Competence Certificate**

Alternative Test Achievement: Group presentation of 15 min at the beginning of each experiment and evaluation of the participation during the experiments and Oral Exam (15 min)

**Prerequisites**

none

**Annotation**

For organizational reasons the number of participants for the course is limited. Hence 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 2021, 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 focused. 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.
7.221 Course: Laboratory Work Water Chemistry [T-CIWVT-103351]

**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

<table>
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<tr>
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<th>Version</th>
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<td>Grade to a third</td>
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**Events**

<table>
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<th>22664</th>
<th>Practical Course in Water Technology</th>
<th>2 SWS</th>
<th>Practical course</th>
<th>Horn, Abbt-Braun, und Mitarbeiter</th>
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**Exams**

<table>
<thead>
<tr>
<th>WT 20/21</th>
<th>7232002</th>
<th>Laboratory Work Water Chemistry</th>
<th>Horn, Abbt-Braun</th>
</tr>
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<tbody>
<tr>
<td>ST 2021</td>
<td>7232002</td>
<td>Laboratory Work Water Chemistry</td>
<td>Horn, Abbt-Braun</td>
</tr>
</tbody>
</table>

**Prerequisites**

none
### 7.222 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>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 summer term</td>
<td>2</td>
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<th>Type</th>
<th>Recurrence</th>
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</thead>
<tbody>
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<td>ST 2021 2550475</td>
<td>2 SWS</td>
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<td>Lecture / Rebennack</td>
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<td>ST 2021 2550476</td>
<td>1 SWS</td>
<td>Übung zu Large-Scale Optimization</td>
<td>Practice / Rebennack, Sinske</td>
</tr>
<tr>
<td>ST 2021 2550477</td>
<td>2 SWS</td>
<td>Rechnerübung zu Large-scale Optimization</td>
<td>Practice / Rebennack, Sinske</td>
</tr>
</tbody>
</table>

**Legend:** 📱 Online, 🧩 Blended (On-Site/Online), 🔗 On-Site, ✗ Cancelled

**Competence Certificate**  
Alternative exam assessment (open book exam). The exam takes place in every semester.

**Prerequisites**  
None.
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>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
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<td>Grade to a third</td>
<td>Each summer term</td>
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**Events**

<table>
<thead>
<tr>
<th>Events</th>
<th>Code</th>
<th>Title</th>
<th>SWS</th>
<th>Type</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
<td>ST 2021</td>
<td>2182642</td>
<td>Laser in automotive engineering</td>
<td>2</td>
<td>Lecture/🖥</td>
<td>Schneider</td>
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</table>

**Exams**

<table>
<thead>
<tr>
<th>Event</th>
<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Lecturer</th>
</tr>
</thead>
<tbody>
<tr>
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<td>76-T-MACH-105164</td>
<td>Laser in Automotive Engineering</td>
<td>Online</td>
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<tr>
<td>ST 2021</td>
<td>76-T-MACH-105164</td>
<td>Laser in Automotive Engineering</td>
<td>Online</td>
<td>Schneider</td>
</tr>
</tbody>
</table>

**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:

**Laser in automotive engineering**
2182642, SS 2021, 2 SWS, Language: German, [Open in study portal]
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

Organizational issues
Bitte nutzen Sie die Vorlesungsaufzeichnung aus dem SS 19!
Bei Interesse bitte melden bei johannes.schneider@kit.edu!
Aktuelle Infos werden über ILIAS verteilt!

Literature
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
### 7.224 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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#### Exams

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#### Prerequisites

none
### 7.225 Course: Law of Contracts [T-INFO-101316]

**Responsible:** Dr. Alexander Hoff  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101216 - Private Business Law  
M-INFO-101242 - Governance, Risk & Compliance

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
7.226 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

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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
7.227 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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**Exams**

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**Legend:** 🔄 Online, 💬 Blended (On-Site/Online), 🗂 On-Site, ✗ Cancelled

**Competence Certificate**

written exam, 70 min.

**Prerequisites**

none

**Recommendation**

none

**Annotation**

none
7.228 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

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**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:*  

<table>
<thead>
<tr>
<th>Learning Factory “Global Production“</th>
<th>2149612, WS 20/21, 4 SWS, Language: German, Open in study portal</th>
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</thead>
</table>

On-Site
Content
The learning factory “Global Production” serves as a modern teaching environment for the challenges of global production. These are made tangible using the example of the manufacture of electric motors under real production conditions.

The course is characterized by its interactive hands-on sessions, which are theoretically supported by e-learning units. The e-learning units serve to convey essential basics as well as to deepen specific topics from the classroom units (e.g. site selection, supplier selection and planning of production networks). The focus of the hands-on sessions is the case-specific application of relevant methods for planning and managing global production networks.

First, classical methods and tools of Lean Management for the site-specific design of the production system (e.g. Kanban and JIT/ JIS, Line Balancing) are learned and extended by methods of Industry 4.0. Within the scope of site-specific quality assurance, essential methods for data-driven quality assurance in complex production systems are taught and made practically tangible by means of a Six Sigma project. The focus is especially on methods of data mining with an excursion on artificial intelligence. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration. Finally, the view of the entire value chain network will be broadened by the integration of partners from the value chain. Thereby selected methods of supplier management (e.g. make-or-buy) and network design are learned and implemented. In the field of network management, collaboration between value chain partners and locations is considered a tool for increasing efficiency and avoiding disruptions. The special importance of digitisation as an enabler of collaboration is illustrated by the implementation of a traceability concept.

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
- Lean Management and Industry 4.0
- Six Sigma 4.0 - Data Mining for Site-Specific Quality Assurance
- Scalable Automation and Human-Robot Collaboration
- Supplier Management
- Network Planning and Design
- Collaboration and Traceability

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.
- Derive automation potentials and systematically decide on a suitable degree of automation of production plants under given constraints.
- 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.
- understand general interactions in the production network and effectively develop collaboration in the production Environment.
- 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: ~ 36 h
regular attendance: ~ 64 h
self-study: ~ 80 h
Organizational issues
Termine werden über die Institutshomepage bekanntgegeben.


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

Dates will be announced on the homepage of the institute.

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

Literature
Medien:

Media:
E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
### 7.229 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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<th>Lecture</th>
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<td>Liberalised Power Markets</td>
<td>2 SWS</td>
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<td>Fichtner</td>
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**Exams**

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<td>Lecture</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

**Recommendation**

None

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

**Liberalised Power Markets**

2581998, WS 20/21, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

Online
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:

## 7.230 Course: Life Cycle Assessment [T-WIWI-110512]

| 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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### 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:

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<td>Lecture / Online</td>
<td>Maier, Schultmann</td>
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### Content

Introduction to life cycle assessment. The lecture describes structure and individual steps of life cycle assessment in detail.

### Literature

werden in der Veranstaltung bekannt gegeben
Course: Logistics and Supply Chain Management [T-MACH-110771]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-105298 - Logistics and Supply Chain Management

**Type**
- Written examination

**Credits** 9

**Grading scale** Grade to a third

**Recurrence** Each summer term

**Version** 2

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

**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:

**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.
### 7.232 Course: Long-Distance and Air Traffic [T-BGU-106301]

<table>
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**Responsible:** 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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**Legend:** 🖥 Online, ☑ Blended (On-Site/Online), ☑ On-Site, ✗ Cancelled

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**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

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<td>Each winter term</td>
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<td>1</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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**Exams**

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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 (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:

**Machine Learning 1 - Fundamental Methods**
2511500, WS 20/21, 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 machine learning.
Literatur
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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**Exams**

| WT 20/21 | 7900050 | Machine Learning 2 – Advanced Methods (Registration until 08 February 2021) | Zöllner |
| ST 2021  | 7900080 | Machine Learning 2 – Advanced Methods (Registration until 12 July 2021)    | Zöllner |

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

**Competence Certificate**

Please note: in the winter semester 2020/21 the exam will be held in the form of an online Ilias exam.

As of summer semester 2021: 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:

**Machine Learning 2 - Advanced methods**

2511502, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

Lecture (V) Online
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.
### 7.235 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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<td>Machine Tools and High-Precision Manufacturing Systems</td>
<td>6 SWS</td>
<td>Lecture / Practice (Online)</td>
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<td>Fleischer</td>
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**Competence Certificate**

Written exam (120 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:*

**Machine Tools and High-Precision Manufacturing Systems**

2149910, WS 20/21, 6 SWS, Language: German, [Open in study portal](#)
Content
The lecture gives an overview of the construction, use and application of machine tools and high-precision manufacturing systems. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools and high-precision manufacturing systems is conveyed. First, the main components of the systems are systematically explained and their design principles as well as the integral system design are discussed. Subsequently, the use and application of machine tools and high-precision manufacturing systems will be demonstrated using typical machine examples. Based on examples from current research and industrial applications, the latest developments are discussed, especially concerning the implementation of Industry 4.0.

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/TWVL:
regular attendance: 63 hours
self-study: 207 hours

Organizational issues
Vorlesungstermine montags und mittwochs, Übungstermine donnerstags.
Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.
Lectures on Mondays and Wednesdays, tutorial on Thursdays.
The tutorial dates will announced in the first lecture.

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/).
7.236 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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<th>Recurrence</th>
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<td>Each summer term</td>
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<td>2579901</td>
<td>Übung zu Management Accounting 1 (Bachelor)</td>
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**Exams**

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<td>79-2579900-M</td>
<td>Management Accounting 1 (Mastervorzug und Master)</td>
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**Competence Certificate**
Depending on further pandemic developments, the examination will be offered in the summer semester 2021 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’ 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 2021, 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.

Übung zu Management Accounting 1 (Bachelor)
2579901, SS 2021, 2 SWS, Language: English, Open in study portal

Content
see Module Handbook

Übung zu Management Accounting 1 (Bachelor)
2579902, SS 2021, 2 SWS, Language: English, Open in study portal

Content
see Module Handbook
T 7.237 Course: Management Accounting 2 [T-WIWI-102801]

**Responsibility:** Prof. Dr. Marcus Wouters

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

**Part of:** M-WIWI-101498 - Management Accounting

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<td>Management Accounting 2</td>
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<td>2579904</td>
<td>Management Accounting 2</td>
<td>2</td>
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<td>2579905</td>
<td>Management Accounting 2</td>
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**Exams**

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<td>Management Accounting 2 (Mastervorzug und Master)</td>
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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 in the summer semester 2021 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’ 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 2**

Code: 2579903, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)

Lecture (V)  
Online
Content
The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:
- Students have an understanding of theory and applications of management accounting topics. They can use financial information for various purposes in organizations.

Recommendations:
- It is recommended to take part in the course “Management Accounting 1” before this course.

Examination:
- The assessment consists of a written exam (120 min) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:
- The total workload for this course is approximately 135.0 hours. For further information see German version.

Literature
- Zusätzlich werden Artikel auf ILIAS zur Vergütung gestellt.

2579904, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
see ILIAS

2579905, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
see ILIAS
7.238 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

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Events

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<td>2 SWS</td>
<td>Lecture / 🖥</td>
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<td>Übungen zu Management von Informatik-Projekten</td>
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Exams

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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.

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.

The exact details will be announced in the lecture.

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:

Management of IT-Projects

2511214, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)

Online
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

Practice (Ü) Online

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.
### 7.239: Managing New Technologies [T-WIWI-102612]

#### Responsible:
Dr. Thomas Reiß

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

#### Part of:
M-WIWI-101488 - Entrepreneurship (EnTechnon)

**Type**: Written examination

**Credits**: 3

**Grading scale**: Grade to a third

**Recurrence**: Each summer term

**Version**: 2

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**Events**

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<thead>
<tr>
<th>Event</th>
<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Responsible</th>
</tr>
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<tbody>
<tr>
<td>ST 2021</td>
<td>2545003</td>
<td>Managing New Technologies</td>
<td>Lecture / 🖥</td>
<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each summer term</td>
<td>Reiß</td>
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**Exams**

<table>
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<tr>
<th>Event</th>
<th>Code</th>
<th>Title</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>7900189</td>
<td>Managing New Technologies</td>
<td>Reiß</td>
</tr>
</tbody>
</table>

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**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:**

**Literature**

- Hausschildt/Salomo: Innovationsmanagement
- Borchert et al.: Innovations- und Technologiemanagement
- Specht/Möhrle: Gabler Lexikon Technologiemanagement

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.
### Course: Manufacturing Technology [T-MACH-102105]

**Responsible:** Prof. Dr.-Ing. Volker Schulze  
Dr.-Ing. Frederik Zanger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101276 - Manufacturing Technology

<table>
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<td>Each winter term</td>
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#### Events

<table>
<thead>
<tr>
<th>Events</th>
<th>Code</th>
<th>Subject</th>
<th>SWS</th>
<th>Type / Practice</th>
<th>Lecturer(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>2149657</td>
<td>Manufacturing Technology</td>
<td>6</td>
<td>Lecture / Practice</td>
<td>Schulze, Gerstenmeyer</td>
</tr>
<tr>
<td>Exams</td>
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<tr>
<td>WT 20/21</td>
<td>76-T-MACH-102105 Manufacturing Technology</td>
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<td>ST 2021</td>
<td>76-T-MACH-102105 Manufacturing Technology</td>
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<td>Schulze</td>
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</table>

#### Competence Certificate

Written Exam (180 min)

#### Prerequisites

none

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

<table>
<thead>
<tr>
<th>Subject</th>
<th>Code</th>
<th>Type / Practice</th>
<th>Language: German, Open in study portal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manufacturing Technology</td>
<td>2149657, WS 20/21, 6 SWS</td>
<td>Lecture / Practice (VÜ)</td>
<td>Online</td>
</tr>
</tbody>
</table>
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

Vorlesungstermine montags und dienstags, Übungstermine mittwochs.

Bekanntgabe der konkreten Übungstermine erfolgt in der ersten Vorlesung.

Start der Vorlesung am 03.11.2020 auf Zoom. Zugangsdaten werden über IILIAS zur Verfügung gestellt.

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/).
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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<th>Code</th>
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<th>Title</th>
<th>SWS</th>
<th>Type</th>
<th>Grading</th>
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<tr>
<td>ST 2021 2540460</td>
<td>2 SWS</td>
<td>Market Engineering: Information in Institutions</td>
<td></td>
<td>Lecture</td>
<td>T</td>
<td>Weinhardt, Straub</td>
</tr>
<tr>
<td>ST 2021 2540461</td>
<td>1 SWS</td>
<td>Übungen zu Market Engineering: Information in Institutions</td>
<td></td>
<td>Practice</td>
<td>T</td>
<td>Golla</td>
</tr>
</tbody>
</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) 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 2021, 2 SWS, Language: English, Open in study portal

Literature
### 7.242 Course: Market Research [T-WWI-107720]

**Responsible:** Prof. Dr. Martin Klarmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WWI-101510 - Cross-Functional Management Accounting  
- M-WWI-101647 - Data Science: Evidence-based Marketing  
- M-WWI-105312 - Marketing and Sales Management

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### Events

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<td>Market Research</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
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<td>ST 2021</td>
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<td>2571151</td>
<td>Market Research Tutorial</td>
<td>1 SWS</td>
<td>Practice / Online</td>
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<td>7900015</td>
<td>Market Research</td>
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</table>

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

### Competence Certificate

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam. In the summer term 2021, the written open book exam will either take place in the lecture hall or online, depending on further pandemic developments. Further details on the open book exam will be announced in 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 2021, 2 SWS, Language: English, Open in study portal  

Lecture (V) Online
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
7.243 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

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<th>Recurrence</th>
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<td>2 SWS</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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<td>Marketing Analytics Tutorial</td>
<td>1 SWS</td>
<td>Practice</td>
<td>Klarmann</td>
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**Exams**

<table>
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<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>Marketing Analytics</td>
<td>2 SWS</td>
<td>Klarmann</td>
</tr>
</tbody>
</table>

Legend: 🖥 Online, Blended (On-Site/Online), 📧 On-Site, ❌ Canceled

**Competence Certificate**

Alternative 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" will be offered as a block course in the winter term 20/21 with an alternative exam assessment. 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 & Sales Research Group.

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

**Marketing Analytics**

2572170, WS 20/21, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

Online

**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).
Organizational issues
Blockveranstaltung

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.
7.244 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>
<td>Each summer term</td>
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</table>

**Events**

| Events ST 2021 | 2571183 | Marketing Strategy Business Game | 1 SWS | Block / Online | Klarmann, Mitarbeiter |

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

**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.

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

**Marketing Strategy Business Game**

2571183, SS 2021, 1 SWS, Language: German, Open in study portal
Content
Using Markstrat, a marketing strategy business game, students work in groups representing a company that competes on a simulated market against the other groups’ companies.

Students
- are able to operate the strategic marketing simulation software "Markstrat"
- are able to take strategic marketing decisions in groups
- know how to apply strategic marketing concepts to practical contexts (e.g. for market segmentation, product launches, coordination of the marketing mix, market research, choice of the distribution channel or competitive behavior)
- are capable to collect and to select information usefully with the aim of decision-making
- are able to react appropriately to predetermined market conditions
- know how to present their strategies in a clear and consistent way
- are able to talk about the success, problems, critical incidents, external influences and strategy changes during the experimental game and to reflect and present their learning success

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.

- 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 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.

Organizational issues
Termine werden bekannt gegeben

Literature
7.245 Course: Master Thesis [T-WIWI-103142]

**Responsible:** Studiendekan der KIT-Fakultät für Informatik
Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

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

**Part of:** M-WIWI-101650 - Module Master Thesis

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

**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
7.246 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>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination of another type</td>
<td>9</td>
<td>Grade to a third</td>
<td>Each winter term</td>
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Events

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<tr>
<th>Events</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>WT 20/21</td>
<td>Material flow in logistic systems</td>
<td>6 SWS</td>
<td>Others (sons / ⬇️)</td>
<td>Furmans, Jacobi, Klein</td>
<td></td>
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<tr>
<td>Exams</td>
<td>Material Flow in Logistic Systems</td>
<td>Furmans, Mittwollen</td>
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</table>

Legend: Online, ⬇️ Blended (On-Site/Online), ⬆️ On-Site, ✗ Cancelled

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:

Material flow in logistic systems

2117051, WS 20/21, 6 SWS, Language: German, Open in study portal

Others (sonst.)

Blended (On-Site/Online)
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
- Warehouse 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, 2009

Description:
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. 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 at 02.11.2020. In this session, the teaching concept of ”Materialfluss in Logistiksysteme“ is explained and outstanding issues are clarified.

Registration for the course including group allocation via ILIAS is mandatory. The registration will be activated for several days after the introductory session (registration period: 02.11.2020 08:00 h - 08.11.2020 18:00 h).

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.

Organizational issues
Die Advance Organizer und Übungen werden im Online-Format angeboten. Die Kolloquien finden in Präsenz im Institutsgebäude des IFL (Geb. 50.38) statt.
Course: Mathematical Models and Methods for Production Systems [T-MACH-105189]

Responsible: Dr.-Ing. Marion Baumann
Prof. Dr.-Ing. Kai Furmans

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101278 - Material Flow in Networked Logistic Systems

<table>
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Events

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<td>2117059</td>
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<td></td>
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<td>Baumann, Furmans, Zimmermann</td>
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Exams

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<tr>
<td>WT 20/21</td>
<td>76-T-MACH-105189</td>
<td>Mathematical models and methods for Production Systems</td>
<td>Furmans</td>
</tr>
</tbody>
</table>

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
2117059, WS 20/21, 4 SWS, Language: English, Open in study portal

Lecture (V)
On-Site
Content

Media:
black board, lecture notes, presentations

Learning Content:

- Single server systems: M/M/1, M/G/1: priority rules, model of failures
- Networks: open and closed approximations, exact solutions and approximations
- Application to flexible manufacturing systems, AGV (automated guided vehicles) - systems
- Modeling of control approaches like constant work in process (ConWIP) or kanban
- Discrete-time modeling of queuing systems

Learning Goals:

Students are able to:

- Describe queueing systems with analytical solvable stochastic models,
- Derive 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 lecture: Materials flow in logistic systems (also parallel)

Registration information:

This lecture has a restricted number of participants. Further information for registration and deadlines can be found on the website of the institute.

Workload:

regular attendance: 42 hours
self-study: 198 hours

Literature

Shanthikumar, Buzacott: Stochastic Models of Manufacturing Systems
## 7.248 Course: Mathematics for High Dimensional Statistics [T-WIWI-111247]

### Responsible
Prof. Dr. Oliver Grothe

### Organisation
KIT Department of Economics and Management

### Part of
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-101637 - Analytics and Statistics
- M-WIWI-103289 - Stochastic Optimization

### Type
Oral examination

### Credits
4.5

### Grading scale
Grade to a third

### Recurrence
Irregular

### Version
1

### Events

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<td>Practice</td>
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</tr>
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</table>

### 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.

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

### Mathematische Grundlagen hochdimensionaler Statistik

<table>
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<th>Organisation</th>
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<tr>
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<td>2 SWS</td>
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<td>2550562</td>
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</table>

### Content

#### Content:
The lecture focuses on modelling statistical objects (random vectors, random matrices and random graphs) in high dimensions. It deals with concentration inequalities that limit the fluctuations of such objects as well as complexity measures for quantities and functions. The theory is transferred to well-known and widespread applications such as neighbourhood detection in networks, statistical learning theory and LASSO.

### Learning objectives:

Students are able to

- name and justify statistical properties of high-dimensional objects (vectors, matrices, functions).
- describe and explain differences in the behaviour between low- and high-dimensional random objects.
- name procedures for assess uncertainties in statistical models and apply them in simple examples.
- decide well-founded which modeling of high-dimensional structures is best suited in a specific situation.
- transform data into lower dimensions and quantify approximation errors.
- understand basic proofs in high-dimensional statistics using examples.
- develop, implement and evaluate smaller simulations in a programming language of their choice.
7.249 Course: Metal Forming [T-MACH-105177]

**Responsible:** Dr. Thomas Herlan

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

<table>
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**Events**

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**Exams**

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</table>

**Prerequisites**

none

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

**V Metal Forming**

2150681, SS 2021, 2 SWS, Language: German, [Open in study portal](#)
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/)
7.250 Course: Methods and Models in Transportation Planning [T-BGU-101797]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch

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

**Part of:** M-BGU-101065 - Transportation Modelling and Traffic Management

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**Events**

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<td>Berechnungsverfahren und Modelle in der Verkehrsplanung</td>
<td>2 SWS</td>
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**Exams**

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<tbody>
<tr>
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<td>Methods and Models in Transportation Planning</td>
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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None

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

Course: Methods in Economic Dynamics [T-WIWI-102906]

7.251 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

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Exams

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<td>ST 2021</td>
<td>7900108</td>
<td>Methods in Economic Dynamics</td>
<td>Ott</td>
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</table>

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 2021, 1 SWS, Language: German/English, Open in study portal

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).

Literature

Relevante Literatur wird in der Vorlesung bekanntgegeben.
(Relevant literature will be announced in the lecture.)
7.252 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

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**Events**

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<td>Methoden im Innovationsmanagement</td>
<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 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 20/21, 2 SWS, Language: German, Open in study portal

**Seminar (S)**  
Online

**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.
7.253 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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**Exams**

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<td>Microactuators</td>
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<td>Kohl</td>
</tr>
</tbody>
</table>

**Competence Certificate**

written exam, 60 min.

**Prerequisites**

none

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

**Microactuators**  
2142881, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**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**

- Folienksript "Mikroaktorik"  
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004  
7.254 Course: Mixed Integer Programming I [T-WIWI-102719]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming
M-WIWI-102832 - Operations Research in Supply Chain Management
M-WIWI-103289 - Stochastic Optimization

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

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.
The examination can also be combined with the examination of Mixed Integer Programming II [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).
7.255 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

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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).
# 7.256 Course: Mobility Services and new Forms of Mobility [T-BGU-103425]

**Responsible:** 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

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<td>6232811</td>
<td>Mobilitätsservices und neue Formen der Mobilität</td>
<td>2 SWS</td>
<td>Lecture / Practice / Kagerbauer</td>
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## Exams

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<td>Mobility Services and new Forms of Mobility</td>
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<td>Kagerbauer</td>
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</table>

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
7.257 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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Events

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<td>ST 2021</td>
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<td>Übung zu Modeling and Analyzing Consumer Behaviour with R</td>
<td>1 SWS</td>
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<td>Knierim, Giebenhain</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(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
Number of participants limited.

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

Modeling and Analyzing Consumer Behavior with R
2540470, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V) Online

Literature
Wickham, Hadley, ggplot2: Elegant Graphics for Data Analysis (Use R!), Springer 2009 (2nd edition)
7.258 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

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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
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<td>4.5</td>
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<td>Each winter term</td>
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Events

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<th>Grading scale</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>Modellieren und OR-Software: Fortgeschrittene Themen</td>
<td>3 SWS</td>
<td>Practical course</td>
<td>Bakker</td>
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Exams

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<tr>
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<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>Modeling and OR-Software: Advanced Topics</td>
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</table>

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

Competence Certificate

The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

Prerequisites

None.

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

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
<td>2550490, WS 20/21</td>
<td>Modellieren und OR-Software: Fortgeschrittene Themen</td>
<td>3 SWS</td>
<td>Practical course</td>
<td></td>
</tr>
</tbody>
</table>

Online

Content

The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis. We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling programming languages are OPL and ILOG Script.

Organizational issues

die genauen Termine werden auf der Homepage bekannt gegeben
Course: Morphodynamics [T-BGU-101859]

**Responsible:** Prof. Dr. Franz Nestmann

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

**Part of:** M-WIWI-104837 - Natural Hazards and Risk Management

<table>
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<tbody>
<tr>
<td>Oral examination</td>
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<td>Grade to a third</td>
<td>1</td>
</tr>
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</table>

**Events**

| ST 2021 | 6222805 | Morphodynamics | 2 SWS | Lecture / Practice ( / ) | Nestmann |

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

**Competence Certificate**
See German version.

**Prerequisites**
None
7.260 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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<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>ST 2021</td>
<td>2 SWS</td>
<td>Lecture</td>
<td>Lecture / Online</td>
<td>Grothe</td>
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<tr>
<td>ST 2021</td>
<td>2 SWS</td>
<td>Practice</td>
<td>Lecture / Online</td>
<td>Grothe, Kächele</td>
<td></td>
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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 in the summer semester 2021 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).

A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4).

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 2021, 2 SWS, Open in study portal

Literature
Skript zur Vorlesung
7.261 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

### Type
- Written examination

### Credits
- 4

### Grading scale
- Grade to a third

### Recurrence
- Each summer term

### Version
- 1

#### Events

<table>
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<tr>
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<th>Code</th>
<th>Title</th>
<th>Type</th>
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<th>Grade Scale</th>
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<tr>
<td>ST 2021</td>
<td>2142861</td>
<td>Nanotechnology for Engineers and Natural Scientists</td>
<td>Lecture / 🏫</td>
<td>2 SWS</td>
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**Exams**

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<td>76-T-MACH-105180</td>
<td>Nanotechnology for Engineers and Natural Scientists</td>
<td>Hölscher</td>
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</tbody>
</table>

**Competence Certificate**
- written exam 90 min

**Prerequisites**
- none

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

**V Nanotechnology for Engineers and Natural Scientists**

**Content**

Nanotechnology deals with the fabrication and analysis of nanostructures. The topics of the lecture include:

- the most common measurement principles of nanotechnology especially scanning probe methods
- the analysis of physical and chemical properties of surfaces
- interatomic forces and their influence on nanostructures
- methods of micro- and nanofabrication and lithography
- basic models of contact mechanics and nanotribology
- important functional characteristics of nanodevices

Basic knowledge in mathematics and physics is assumed.

The successful attendance of the lecture is controlled by a 30 minutes oral exam.

**Organizational issues**


Für die mündlichen Prüfungen werden zwei Termine angeboten werden (voraussichtlich in der ersten Woche nach Vorlesungsende im Sommersemester und in der ersten Woche vor Vorlesungsbeginn im Wintersemester).

**Literature**

Alle Folien und Originalliteratur werden auf ILIAS zur Verfügung gestellt.
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

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

Competence Certificate
written examination
presence in more than 70% of the lectures
Duration: 1 h

aids: none

Prerequisites
none
T 7.263 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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<td>Grade to a third</td>
<td>Each summer term</td>
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**Events**

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<tbody>
<tr>
<td>WT 20/21</td>
<td>2182712</td>
<td>Nanotribology and -Mechanics</td>
<td>Dienwiebel</td>
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<tr>
<td>ST 2021</td>
<td>2182712</td>
<td>Nanotribology and -Mechanics</td>
<td>Dienwiebel</td>
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**Exams**

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<tbody>
<tr>
<td>WT 20/21</td>
<td>76-T-MACH-102167</td>
<td>Nanotribology and -Mechanics</td>
<td>Dienwiebel</td>
</tr>
</tbody>
</table>

Legend: 📇 Online, 🔄 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

**Competence Certificate**

presentation (40%) and colloquium (30 min, 60%)

no tools or reference materials

**Prerequisites**

none

**Recommendation**

preliminary knowledge in mathematics and physics

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

V Nanotribology and -Mechanics

2182712, WS 20/21, 2 SWS, Language: English, Open in study portal
Content
In the summer semester the lecture is offered in German and in the winter semester in English!

Part 1: Fundamentals of nanotribology
- General tribology / nanotechnology
- Forces and dissipation on the nanometer scale
- Experimental methods (SFA, QCM, FFM)
- Prandtl-Tomlinson model
- Superlubricity
- Carbon-based tribosystems
- Electronic friction
- Nanotribology in liquids
- Atomic abrasion
- Nanolubrication

Part 2: Topical papers
The student can
- explain the physical foundations and common models used in the field of nanotribology and nanomechanics
- describe the most important experimental methods in nanotribology
- critically evaluate scientific papers on nanotribological issues with respect to their substantial quality

preliminary 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 12.10.2020 an den Dozenten: martin.dienwiebel@kit.edu

Literature
Tafelbilder, Folien, Kopien von Artikeln
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

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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
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
7.264 Course: Nature-Inspired Optimization Methods [T-WIWI-102679]

**Responsible:** Dr. rer. nat. 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 summer term

**Version:** 2

### Events

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<th>Content</th>
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<td>2 SWS</td>
<td>Nature-Inspired Optimization Methods</td>
<td>Lecture</td>
<td>Shukla</td>
<td></td>
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<tr>
<td>ST 2021 2511107</td>
<td>1 SWS</td>
<td>Übungen zu Nature-Inspired Optimization Methods</td>
<td>Practice</td>
<td>Shukla</td>
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</table>

<table>
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<tr>
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<th>Credits</th>
<th>Content</th>
<th>Type</th>
<th>Codenr.</th>
<th>Location</th>
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<tbody>
<tr>
<td>WT 20/21 7900016</td>
<td>Nature-Inspired Optimisation Methods (Registration until 08 February 2021)</td>
<td>Shukla</td>
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<tr>
<td>ST 2021 7900026</td>
<td>Nature-Inspired Optimization Methods (Registration until 12 July 2021)</td>
<td>Shukla</td>
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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

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

### 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

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Irregular

Version
1

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Applied Econometrics" [2520020]

Annotation
The course takes place every second winter semester: 2018/19 then 2020/21
7.266 Course: Nonlinear Optimization I [T-WIWI-102724]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
4

Events

<table>
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<tr>
<th>Event</th>
<th>Code</th>
<th>Subject</th>
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<tr>
<td>WT 20/21</td>
<td>2550111</td>
<td>Nonlinear Optimization I</td>
<td>2</td>
<td>Lecture /</td>
<td>Stein</td>
</tr>
<tr>
<td>WT 20/21</td>
<td>2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
<td>2</td>
<td>Practice /</td>
<td>Stein</td>
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Exams

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<tr>
<th>Event</th>
<th>Code</th>
<th>Subject</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>7900086_WS2021_HK</td>
<td>Nonlinear Optimization I</td>
<td>Stein</td>
</tr>
</tbody>
</table>

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 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)

Online

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
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
7.267 Course: Nonlinear Optimization I and II [T-WIWI-103637]

**Responsible:** Prof. Dr. Oliver Stein
**Organisation:** KIT Department of Economics and Management

**Type**: Written examination  
**Credits**: 9  
**Grading scale**: Grade to a third  
**Recurrence**: Each winter term  
**Version**: 6

### Events

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<th>Code</th>
<th>Course</th>
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<tr>
<td>WT 20/21</td>
<td>2550111</td>
<td>Nonlinear Optimization I</td>
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<td>Lecture / Online</td>
<td>Stein</td>
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<tr>
<td>WT 20/21</td>
<td>2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
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<td>Practice / Online</td>
<td>Stein</td>
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<tr>
<td>WT 20/21</td>
<td>2550113</td>
<td>Nonlinear Optimization II</td>
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<td>Lecture / Online</td>
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**Exams**

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<th>Code</th>
<th>Course</th>
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<tr>
<td>WT 20/21</td>
<td>7900088_WS2021_HK</td>
<td>Nonlinear Optimization I and II</td>
<td>Lecture / Online</td>
<td>Stein</td>
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</table>

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

### 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**

2550111, WS 20/21, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**Online**

**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
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993

Nonlinear Optimization II
2550113, WS 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
### Course: Nonlinear Optimization II [T-WIWI-102725]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101473 - Mathematical Programming

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**Events**

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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 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 20/21, 2 SWS, Language: German, Open in study portal

**Content**

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

**Remark:**

The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

**Learning objectives:**

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.
Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
7.269 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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**Competence Certificate**

written exam, 60 minutes

**Prerequisites**

none

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

**V** Novel actuators and sensors  
2141865, WS 20/21, 2 SWS, Language: German, Open in study portal

**Literature**

- Vorlesungsskript "Neue Aktoren" und Folienskript "Sensoren"
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
7.270 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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Prerequisites

None

Recommendation

None

Annotation

None
**7 COURSES**

**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**  
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**Grading scale**  
Grade to a third

**Recurrence**  
Each winter term

**Version**  
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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
### 7.272 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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**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](http://dol.ior.kit.edu/english/Courses.php).
### 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

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#### Exams

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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/](http://dol.ior.kit.edu/) english/Courses.php.

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

#### Content

Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture’s focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.

In form and content, the lecture addresses all levels of Supply Chain Management: After a short introduction, the tactical and operational level will be discussed with regard to inventory models, scheduling as well as cutting and packing. The strategic level will be discussed in terms of layout planning. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.
Literature

- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
7.274 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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**Prerequisites**
none

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
## 7.275 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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**Prerequisites**  
none
### 7.276 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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#### Exams

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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.
**7.277 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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**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.
# 7.278 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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<th>Exams</th>
<th>WT 20/21</th>
<th>Codes</th>
<th>Optoelectronic Components</th>
<th>Freude</th>
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<td>7309486</td>
<td>Optoelectronic Components</td>
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**Prerequisites**

none

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
## 7.279 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

<table>
<thead>
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### Events

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<tr>
<td>ST 2021</td>
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<td>Panel Data</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
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<td>ST 2021</td>
<td>2520321</td>
<td>Übungen zu Paneldaten</td>
<td>2 SWS</td>
<td>Practice / Online</td>
<td>Heller</td>
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</table>

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

### Prerequisites

None

---

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

### Panel Data

2520320, SS 2021, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V) Online**

### 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

**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

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

Events

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<th>Code</th>
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<td>Parametric Optimization</td>
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<td>2 SWS</td>
<td>Practice / 🗦</td>
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Exams

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<th>Event</th>
<th>Code</th>
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<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<td>Stein</td>
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</table>

Legend: 🗦 Online, 🧩 Blended (On-Site/Online), 🗨 On-Site, ❌ Canceled

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Annotation
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

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

Parametric Optimization
2550115, WS 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V) Online

Content
Parametric optimization deals with the influence of parameters on the solution of optimization problems. In optimization practice, such investigations play a fundamental role in order to be able to assess the quality of a numerically obtained solution or to make quantitative statements about its parameter dependence. Furthermore, a number of parametric optimization methods exist, and parametric problems occur in applications such as game theory, geometric optimization problems, and robust optimization. The lecture gives a mathematically sound introduction to these topics and is structured as follows:

- Introductory examples and terminology
- Sensitivity
- Stability and regularity conditions
- Applications: semi-infinite optimization and Nash games

Remark:
Prior to the attendance of this lecture, it is strongly recommend to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

Learning objectives:
The student

- knows and understands the fundamentals of parametric optimization,
- is able to choose, design and apply modern techniques of parametric optimization in practice.
Literature

### 7.281 Course: Patent Law [T-INFO-101310]

**Responsible:** Markus Hössle  
Matthias Koch  

**Organisation:** KIT Department of Informatics  

**Part of:** M-INFO-101215 - Intellectual Property Law

<table>
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**Events**

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**Exams**

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</table>

**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 7.282 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>Sonnenbichler, Geyer-Schulz</td>
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<td>1 SWS</td>
<td>Practice</td>
<td>Sonnenbichler, Geyer-Schulz</td>
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</table>

**Exams**  
- WT 20/21, 7900365, Personalization and Services, Geyer-Schulz

**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.

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

**Personalization & Services**  
2540533, WS 20/21, 2 SWS, Language: German, Open in study portal  

**Literature**  
Die Vorlesung orientiert sich an aktuellen wissenschaftlichen Veröffentlichungen. Die Literaturliste finden Sie nach Themen gegliedert jeweils am Ende der Vorlesungseinheiten.
### 7.283 Course: PH APL-ING-TL01 [T-WIWI-106291]

**Organisation:** University

**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

<table>
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<td>7500149</td>
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7.284 Course: PH APL-ING-TL02 [T-WIWI-106292]

Organisation: 
University

Part of: 
M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.285 Course: PH APL-ING-TL03 [T-WIWI-106293]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.286 Course: PH APL-ING-TL04 ub [T-WIWI-106294]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.287 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.288 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

**Organisation:**  University  
**Part of:**  M-WIWI-101404 - Extracurricular Module in Engineering

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### 7.289 Course: PH APL-ING-TL07 [T-WIWI-108384]

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<tr>
<td>Recurrence</td>
<td>Once</td>
</tr>
<tr>
<td>Version</td>
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</table>
**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

<table>
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<td>Each winter term</td>
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**Events**

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<th>Language</th>
<th>Type</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>2181612</td>
<td>Physical basics of laser technology</td>
<td>German</td>
<td>Lecture / Practice (VÜ)</td>
<td>3 SWS</td>
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</table>

**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 20/21, 3 SWS, Language: German, [Open in study portal](#)
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. An excursion to the laser laboratory of the Institute for Applied Materials (IAM) will be offered.

- 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
R. Poprawe: Lasertechnik für die Fertigung, 2005, Springer
### 7.291 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

<table>
<thead>
<tr>
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<th>Recurrence</th>
<th>Version</th>
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<tbody>
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<td>Each summer term</td>
<td>1</td>
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</table>

**Type:**
- Written examination

**Credits:**
- 6

**Grading scale:**
- Grade to a third

**Recurrence:**
- Each summer term

**Version:**
- 1

#### Events

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<th>Course</th>
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<td>Physics for Engineers</td>
<td>4</td>
<td>Lecture / Practice (🖥)</td>
<td>Weygand, Dienwiebel, Nesterov-Müller, Gumbsch</td>
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#### Exams

<table>
<thead>
<tr>
<th>Event</th>
<th>Course Code</th>
<th>Course</th>
<th>Type</th>
<th>Lecturer(s)</th>
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<td>76-T-MACH-100530</td>
<td>Physics for Engineers</td>
<td>Online</td>
<td>Gumbsch, Dienwiebel, Nesterov-Müller, Weygand</td>
</tr>
</tbody>
</table>

**Competence Certificate**
- Written exam 90 min

**Prerequisites**
- None

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

**Physics for Engineers**
- Code: 2142890, SS 2021, 4 SWS, Language: German, Open in study portal
- Lecture / Practice (VÜ)
  - Online
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
Kursbeitritt erfolgt bis zum 15.4.2021 (erste Vorlesung) ohne Passwort.
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

Type
Written examination

Credits
5.5

Grading scale
Grade to a third

Recurrence
Each winter term

Version
1

Events

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<th>Title</th>
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<tr>
<td>2581952</td>
<td>Planning and Management of Industrial Plants</td>
<td>Lecture</td>
<td>2 SWS</td>
<td>Lecture / 📚</td>
<td>Glöser-Chahoud, Schultmann</td>
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<td>2581953</td>
<td>Übungen Anlagenwirtschaft</td>
<td>Practice</td>
<td>2 SWS</td>
<td>Practice / 📚</td>
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Exams

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<tbody>
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<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 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

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.
### 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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**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, WS 20/21, 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

**PLM for product development in mechatronics**  
2122376, SS 2021, 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
### 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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**Exams**

**Competence Certificate**

Presentation of the four steps of the course content (design, implementation, test concept and evaluation)

**Prerequisites**

None
7 COURSES

Course: Polymer Engineering I [T-MACH-102137]

7.295 Course: Polymer Engineering I [T-MACH-102137]

Responsible: Prof. Dr.-Ing. Peter Elsner
Dr.-Ing. Wilfried Liebig

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

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</table>

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 20/21, 2 SWS, Language: German, Open in study portal

Lecture (V) Online

Content

1. Economical aspects of polymers
2. Introduction of mechanical, chemical end electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

learning objectives:

The field of Polymer Engineering includes synthesis, material science, processing, construction, design, tool engineering, production technology, surface engineering and recycling. The aim is, to equip the students with knowledge and technical skills, and to use the material “polymer” meeting its requirements in an economical and ecological way.

The students

- are able to describe and classify polymers based on the fundamental synthesis processing techniques
- can find practical applications for state-of-the-art polymers and manufacturing technologies
- are able to apply the processing techniques, the application of polymers and polymer composites regarding to the basic principles of material science
- can describe the special mechanical, chemical and electrical properties of polymers and correlate these properties to the chemical bindings.
- can define application areas and the limitation in the use of polymers

Organizational issues

Veranstaltung findet synchron statt, Do 15.45Uhr-17.15Uhr, weitere Informationen siehe ILIAS

Literature

Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.
### Course: Polymer Engineering II [T-MACH-102138]

**Responsible:** Prof. Dr.-Ing. Peter Elsner  
Dr.-Ing. Wilfried Liebig  

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

**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:*

**Polymer Engineering II**

2174596, SS 2021, 2 SWS, Language: German, [Open in study portal](#)
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
- know about practical applications and processing of polymer parts
- are able to design polymer parts according to given restrictions
- can choose appropriate polymers based on the technical requirements
- can decide how to use polymers regarding the production, economical and ecological requirements

Requirements:
Polymerengineering I

Workload:
The workload for the lecture Polymerengineering II is 120 h per semester and consists of the presence during the lecture (21 h) as well as preparation and rework time at home (99 h).

Literature
Literaturhinweise, Unterlagen und Teilmanuskript werden in der Vorlesung ausgegeben.
Recommended literature and selected official lecture notes are provided in the lecture.
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

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<td>2 SWS</td>
<td>Polymers in MEMS A: Chemistry, Synthesis and Applications</td>
<td>Rapp</td>
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**Competence Certificate**  
Oral examination

**Prerequisites**  
none

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

**Polymers in MEMS A: Chemistry, Synthesis and Applications**  
2141853, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)

**Organizational issues**  
Findet als Blockveranstaltung am Semesterende statt. Anmeldungen bitte an bastian.rapp@imtek.uni-freiburg.de
### 7.298 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

<table>
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#### Events

| WT 20/21 | 2141854 | Polymers in MEMS B: Physics, Microstructuring and Applications | 2 SWS | Lecture | Worgull |

#### Exams

| WT 20/21 | 76-T-MACH-102191 | Polymers in MEMS B: Physics, Microstructuring and Applications | Worgull |

**Competence Certificate**  
Oral examination

**Prerequisites**  
none

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

### Polymers in MEMS B: Physics, Microstructuring and Applications

2141854, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)  

Lecture (V)
**7.299 Course: Polymers in MEMS C: Biopolymers and Bioplastics [T-MACH-102200]**

**Responsible:** Dr.-Ing. Bastian Rapp  
Dr.-Ing. Matthias Worgull

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101291 - Microfabrication

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**Events**

| ST 2021 | 2142855 | Polymers in MEMS C - Biopolymers and Bioplastics | 2 SWS | Worgull |

**Exams**

| WT 20/21 | 76-T-MACH-102200 | Polymers in MEMS C: Biopolymers and Bioplastics | Worgull, Rapp |

**Competence Certificate**

Oral examination

**Prerequisites**

none

*Below you will find excerpts from events related to this course:*
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.
### 7.300 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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<td>Übungen zu Portfolio and Asset Liability Management</td>
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Legend: 🖥️ Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

**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 2021, 2 SWS, Language: English, Open in study portal**

**Lecture (V) Online**

**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

**Literature**

To be announced in the lecture
### 7.301 Course: Power Network [T-ETIT-100830]

**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*
# 7.302 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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## Events

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## Exams

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

**Prerequisites**

none
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

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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 2021, 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
**7.304 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

<table>
<thead>
<tr>
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**Events**

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**Exams**

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</table>

**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**
Das Praktikum wird im WS 2020/2021 nicht angeboten.

**Literature**


Richerson, D. R.: Modern Ceramic Engineering, CRC Taylor & Francis, 2006
7.305 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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<td>Practical Seminar: Information Systems &amp; Service Design</td>
<td>3</td>
<td>Lecture</td>
<td>📱</td>
<td>Mädche</td>
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<tr>
<td>ST 2021</td>
<td>2540554</td>
<td>Practical Seminar: Information Systems &amp; Service Design (Master)</td>
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<td>Lecture</td>
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Exams

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<td>Practical Seminar Digital Service Systems</td>
<td>Lecture</td>
<td>📱</td>
<td>Mädche</td>
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</table>

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

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
2540554, WS 20/21, 3 SWS, Language: English, Open in study portal

Practical Seminar: Information Systems & Service Design (Master)
2540554, SS 2021, 3 SWS, 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.
### 7.306 Course: Practical Seminar: Advanced Analytics [T-WIWI-108765]

**Responsible:** Prof. Dr. Christof Weinhardt  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-103118 - Data Science: Data-Driven User Modeling

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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.
## 7.307 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

<table>
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### 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 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.

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

- Practical Seminar: Information Systems & Service Design  
  2540554, WS 20/21, 3 SWS, Language: English, Open in study portal
7.308 Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

Responsibility: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

<table>
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Events

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Exams

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<td>Nickel</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), ⚡ On-Site, ✗ Cancelled

Compeence 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.ior.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.

**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

<table>
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<th>Recurrence</th>
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<td>WT 20/21</td>
<td>Practical Seminar: Information Systems &amp; Service Design</td>
<td>3 SWS</td>
<td>Lecture / 🖥️</td>
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<td>3 SWS</td>
<td>Lecture / 🖥️</td>
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<th>Grading scale</th>
<th>Recurrence</th>
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<td>ST 2021</td>
<td>Interactive Analytics Seminar</td>
<td>Mädche</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**

2540554, WS 20/21, 3 SWS, Language: English, Open in study portal

**Practical Seminar: Information Systems & Service Design (Master)**

2540554, SS 2021, 3 SWS, 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.
### 7.310 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

<table>
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#### Exams

| WT 20/21 | 7900363 | Practical Seminar: Information Systems and Service Design | Mädche |

#### 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.
### 7.311 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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**Events**

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<td>2143875</td>
<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2 SWS</td>
<td>Practical course</td>
<td>Last</td>
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<td>WT 20/21</td>
<td>2143877</td>
<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2 SWS</td>
<td>Practical course</td>
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<td>ST 2021</td>
<td>2143875</td>
<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2 SWS</td>
<td>Practical course / Online</td>
<td>Last</td>
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<td>Introduction to Microsystem Technology - Practical Course</td>
<td>2 SWS</td>
<td>Practical course / Online</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

**Prerequisites**  
none

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

**Introduction to Microsystem Technology - Practical Course**  
2143875, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)  
Practical course (P)

**Content**  
See homepage: [www.imt.kit.edu/lectures.php](http://www.imt.kit.edu/lectures.php)  
Date: during the semester break  
Place: IMT Laboratories, North Campus, Building 307  
Practical course date in the second full week of September, respectively in the week after Ash Wednesday. The exam takes place in the following week.

**Literature**  
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997  
Unterlagen zum Praktikum zur Vorlesung 'Grundlagen der Mikrosystemtechnik'

**Introduction to Microsystem Technology - Practical Course**  
2143877, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)  
Practical course (P)
Content
See homepage: www.imt.kit.edu/lectures.php
Date: during the semester break
Place: IMT Laboratories, North Campus, Building 307
Practical course date in the second full week of September, respectively in the week after Ash Wednesday. The exam takes place in the following week.

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung 'Grundlagen der Mikrosystemtechnik'

Introduction to Microsystem Technology - Practical Course
2143875, SS 2021, 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

Literature
Menz, W., Mohr, J.: Mikrosystemtechnik für Ingenieure, VCH-Verlag, Weinheim, 1997
Unterlagen zum Praktikum zur Vorlesung 'Grundlagen der Mikrosystemtechnik'
### 7.312 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

<table>
<thead>
<tr>
<th><strong>Responsible:</strong></th>
<th>Prof. Dr. Johannes Philipp Reiß</th>
</tr>
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<tbody>
<tr>
<td><strong>Organisation:</strong></td>
<td>KIT Department of Economics and Management</td>
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| **Part of:**     | M-WIWI-101453 - Applied Strategic Decisions  
                          M-WIWI-101505 - Experimental Economics |

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**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.
7.313 Course: Predictive Modeling [T-WIWI-110868]

Responsible: Jun.-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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<td>Grade to a third</td>
<td>Each summer term</td>
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Events

| ST 2021 2521311 | Predictive Modeling | 2 SWS | Lecture / Online | Krüger |
| ST 2021 2521312 | Predictive Modeling (Tutorial) | 2 SWS | Practice / Online | Krüger, Koster |

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

Competence Certificate
Open Book exam, online

Prerequisites
None

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

Predictive Modeling
2521311, SS 2021, 2 SWS, Language: English, Open in study portal

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 2021, 2 SWS, Language: English, Open in study portal
7.314 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

<table>
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<td>2</td>
<td>Lecture / Online</td>
<td>Glenn</td>
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<td>WT 20/21 7900170</td>
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<td>Geyer-Schulz</td>
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</tbody>
</table>

**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

<table>
<thead>
<tr>
<th>ID</th>
<th>Credits</th>
<th>Type</th>
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<tr>
<td>2540529</td>
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<td>Price Management</td>
<td>2</td>
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</table>

**Literature**

7.315 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

<table>
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<td>Each winter term</td>
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</table>

**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**
Please note that the workshop “Price Negotiation and Sales Presentations” as well as all other 1.5-ECTS courses will not take place in the winter term 20/21 due to a research semester. The course will probably be offered again starting in WS21/22. 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 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 courses from the election block can be attended in the module.
7.316 Course: Pricing Excellence [T-WIWI-111246]

Responsible: Fabian Bill
Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105312 - Marketing and Sales Management

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Events

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<tr>
<td>ST 2021</td>
<td>2571175</td>
<td>Pricing Excellence</td>
<td>1 SWS</td>
<td>Others (sons) / Bill</td>
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</tbody>
</table>

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 2021, 1 SWS, Language: English, Open in study portal

Others (sonst.)
Online

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
7.317 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

<table>
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Events

WT 20/21 2193010 Basic principles of powder metallurgical and ceramic processing 2 SWS Lecture / Online Schell

Exams

WT 20/21 76-T-MACH-102111 Principles of Ceramic and Powder Metallurgy Processing Schell

ST 2021 76-T-MACH-102111 Principles of Ceramic and Powder Metallurgy Processing Schell

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 20/21, 2 SWS, Language: German, Open in study portal

Organizational issues
Die Veranstaltung findet online statt.
Erster Termin: 05.11.2020

Literature
- R.M. German. "Powder metallurgy and particulate materials processing, Metal Powder Industries Federation, 2005
## 7.318 Course: Principles of Food Process Engineering [T-CIWVT-101874]

**Responsible:** 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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<td>WT 20/21 22213</td>
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<td>2 SWS</td>
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<td>ST 2021 22214</td>
<td>Lecture / 🖥️</td>
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<th>Type</th>
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<th>Version</th>
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<tbody>
<tr>
<td>WT 20/21 7220008</td>
<td>Principles of Food Process Engineering</td>
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<td>ST 2021 7220008</td>
<td>Principles of Food Process Engineering</td>
<td>9</td>
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**Legend:** 🖥️ Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Cancelled

**Prerequisites**

**none**
### 7.319 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

<table>
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<td>6241703</td>
<td>Verfahrenstechnik</td>
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<td>WT 20/21</td>
<td>8240101844</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**
None

**Recommendation**
None

**Annotation**
None
### 7.320 Course: Process Mining [T-WIWI-109799]

**Responsibility:** 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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<td>Process Mining</td>
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<td>Lecture / 🖥</td>
<td>Oberweis</td>
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<td>Practice / 🖥</td>
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**Exams**

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<td>ST 2021</td>
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<td>Process Mining (Registration until 12 July 2021)</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 in the first week after lecture period.

**Prerequisites**  
None

**Annotation**  
Former name (up to winter semester 2018/2019) "Workflow Management".

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

**Process Mining**  
2511204, SS 2021, 2 SWS, Language: German, [Open in study portal](#)
Content
The area of process mining covers approaches which aim at deducing 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.
### 7.321 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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<td>Each summer term</td>
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#### Events

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<th>Product and Innovation Management</th>
<th>2 SWS</th>
<th>Lecture / Online</th>
<th>Klarmann</th>
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#### Exams

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<th>7900024</th>
<th>Product and Innovation Management</th>
<th>Klarmann</th>
</tr>
</thead>
</table>

**Competition Certificate**

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam. In the summer term 2021, the written open book exam will either take place in the lecture hall or online, depending on further pandemic developments. Further details on the open book exam will be announced in 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:**

<table>
<thead>
<tr>
<th>Product and Innovation Management</th>
<th>Lecture (V)</th>
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<tbody>
<tr>
<td>2571154, SS 2021, 2 SWS, Language: English</td>
<td>Online</td>
</tr>
</tbody>
</table>
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).

Literature

**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

---

**Type:** Oral examination  
**Credits:** 4  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

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**Events**

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<th>Product- and Production-Concepts for modern Automobiles</th>
<th>2 SWS</th>
<th>Lecture / 🗣</th>
<th>Steegmüller, Kienzle</th>
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</table>

**Exams**

<table>
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<tr>
<th>WT 20/21</th>
<th>76-T-MACH-110318</th>
<th>Product- and Production-Concepts for modern Automobiles</th>
<th>Steegmüller, Kienzle</th>
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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 20/21, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

On-Site
**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/).
### 7.323 Course: Production and Logistics Management [T-WIWI-102632]

**Responsible:** Dr.-Ing. Simon Glöser-Chahoud  
Prof. Dr. Frank Schultmann

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

**Part of:** M-WIWI-101412 - Industrial Production III

<table>
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<th>Credits</th>
<th>Grade</th>
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<tbody>
<tr>
<td>ST 2021</td>
<td>2581954</td>
<td>Production and Logistics Management</td>
<td>2 SWS</td>
<td>Lecture / 📀</td>
<td>Schultmann, Glöser-Chahoud</td>
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<tr>
<td>ST 2021</td>
<td>2581955</td>
<td>Übung zu Produktions- und Logistikmanagement</td>
<td>2 SWS</td>
<td>Practice / 📀</td>
<td>Zimmer, Huster</td>
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**Exams**

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<tr>
<td>WT 20/21</td>
<td>7981954</td>
<td>Production and Logistics Management</td>
<td>Schultmann</td>
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**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**

<table>
<thead>
<tr>
<th>Code</th>
<th>Type</th>
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</tr>
</thead>
<tbody>
<tr>
<td>2581954</td>
<td>Lecture (V) Online</td>
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</table>

**Content**

This course covers central tasks and challenges of operative production and logistics management. Students get to know the set-up and mode of planning systems such as production planning and control systems, enterprise resource planning systems and advanced planning systems to cope with the accompanying planning tasks in supply chain management. Methods to solve these tasks from the field of operational research will be explored with respect to manufacturing program planning, material requirement planning, lot size problems and scheduling. Alongside to MRP II (Manufacturing Resources Planning), students will be introduced to integrated supply chain management approaches. Finally, commercially available planning systems will be presented and discussed.

**Literature**

Wird in der Veranstaltung bekannt gegeben.
Course: Production Technology for E-Mobility [T-MACH-110984]

Responsible: Prof. Dr.-Ing. Jürgen Fleischer  
Dr.-Ing. Janna Hofmann

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101284 - Specialization in Production Engineering

Type: Oral examination  
Credits: 4  
Grading scale: Grade to a third  
Recurrence: Each summer term  
Version: 1

Events

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<td>Lecture / 🛬</td>
<td>Each summer term</td>
<td>Fleischer, Hofmann</td>
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<tr>
<td>76-T-MACH-110984</td>
<td>Production Technology for E-Mobility</td>
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Exams

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<td>Lecture / 🛬</td>
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<td>Production Technology for E-Mobility</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:

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

Organizational issues

Die Lehrveranstaltung wird erstmalig im Sommersemester 2021 angeboten.

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/)

Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021
7.325 Course: Project Development with Case Study [T-BGU-111217]

**Responsible:** Prof. Dr.-Ing. Kunibert Lennerts

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

**Part of:** M-BGU-105597 - Facility Management in Hospitals

<table>
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<td>Lecture</td>
<td>/</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
7.326 Course: Project Internship Additive 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

<table>
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<td>WT 20/21</td>
<td>2149700</td>
<td>Project Internship Additive Manufacturing: Development and Production of an Additive Component</td>
<td>2 SWS</td>
<td>Practical course /</td>
<td>Zanger, Lubkowitz</td>
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**Exams**

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**Competence Certificate**

Alternative test achievement (graded):

- Milestone based presentation of the results in presentation form (10 min) and submitting of the presentation file with weighting 30%
- Oral exam (15 min) with weighting 40%
- Project work with weighting 30%

**Prerequisites**

none

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

**Project Internship Additive Manufacturing: Development and Production of an Additive Component**

2149700, WS 20/21, 2 SWS, Language: German, Open in study portal
Content
The lecture “Project Internship Additive Manufacturing: Development and Production of an Additive Component” combines the basics of metallic laser powder bed fusion (LPBF) with a development project in cooperation with an industrial company. The students learn the basics of the following topics in the project-related lecture:

- Influence of different process variables on the component quality of parts produced in the LPBF process
- Preparation and simulation of the LPBF process
- Production of additive metallic components
- Process monitoring and quality assurance in additive manufacturing
- Topology optimization
- CAM for subtractive 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 Ilias bekannt gegeben.
Bei der Vorlesung handelt es sich um eine Blockveranstaltung.
Eine Anmeldung über Ilias ist erforderlich.
Dates will be announced via Ilias.
The lecture is a block event.
A registration via Ilias is required.

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/)
### 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>Recurrence</th>
<th>Credits in Course</th>
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<tbody>
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<td>2512501</td>
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<td>3 SWS</td>
<td>Practical course / Online</td>
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<td>Cognitive Automobiles and Robots</td>
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<td>Seminar / Online</td>
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<td>Zöllner</td>
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</table>

#### 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:

**Practical Course Cognitive Automobiles and Robots (Master)**  
2512501, WS 20/21, 3 SWS, Language: German/English, [Open in study portal](#)  
Practical course (P) 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.

Cognitive Automobiles and Robots
2513500, SS 2021, 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.
7.328 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

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

| ST 2021 | 2512500 | Project Lab Machine Learning | 3 SWS | Practical course / 🧩 Zöllner |

**Exams**

| ST 2021 | 7900086 | Project Lab Machine Learning | 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:

**Project Lab Machine Learning**

2512500, SS 2021, 3 SWS, Language: German/English, Open in study portal

**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.
### 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  

<table>
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#### Events

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<td>Project Management</td>
<td>Schultmann, Volk, Wiens, Schumacher, Rosenberg, Wehrle</td>
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<td>WT 20/21</td>
<td>2581964</td>
<td>Practice</td>
<td>1 SWS</td>
<td>Übung zu Project Management</td>
<td>Volk, Wiens, Schumacher, Rosenberg, Wehrle, Gehring</td>
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#### Exams

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<th>Credits</th>
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<tr>
<td>WT 20/21</td>
<td>7981963</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 (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 20/21, 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.
### 7.330 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

<table>
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<td>Projektmanagement in der Bau- und Immobilienwirtschaft</td>
<td>Lecture/Practice</td>
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<td>Haghsheno, Hirschberger, Sittinger, Münzl, Budau</td>
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### Exams

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<td>Lecture/Practice</td>
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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
# 7.331 Course: Project Management in Construction and Real Estate Industry II [T-BGU-103433]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**  
- M-BGU-101884 - Lean Management in Construction  
- M-BGU-101888 - Project Management in Construction

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### Events

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<tr>
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<td>Lecture / Practice (/)</td>
<td>4 SWS</td>
<td>Haghsheno, Hirschberger, Sittinger, Münzl, Budau</td>
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<tr>
<td>WT 20/21</td>
<td>6241701</td>
<td>Projektmanagement in der Bau- und Immobilienwirtschaft</td>
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### Exams

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

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
## 7.332 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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<td>Lecture / Practice</td>
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**Legend:** Online, Blended (On-Site/Online), On-Site, Cancelled

### Competence Certificate
- Project: report, appr. 10 pages, and presentation, appr. 10 min.

### Prerequisites
- none

### Recommendation
- none

### Annotation
- none
7.333 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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**Legend:** 📱 Online, 😱 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 7.334 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

<table>
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<td>Lecture</td>
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<td>Grade to a third</td>
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<td>Lecture</td>
<td>Gauterin, Gießler, Frey</td>
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</tbody>
</table>

**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:

#### Project Workshop: Automotive Engineering
2115817, WS 20/21, 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.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.

**Learning Objectives**
During the Project Workshop Automotive Engineering a team of six persons will work on a task given by an German industrial partner using the instruments of project management. The task is relevant for the actual business and the results are intended to be industrialized after the completion of the project workshop.

The team will generate approaches in its own responsibility and will develop solutions for practical application. Coaching will be supplied by both, company and institute.

At the beginning in a start-up meeting goals and structure of the project will be specified. During the project workshop there will be weekly team meetings. Also a milestone meeting will be held together with persons from the industrial company. In a final presentation the project results will be presented to the company management and to institute representatives.
Organizational issues
Begrenzte Teilnehmerzahl mit Auswahlverfahren, in deutscher Sprache. Bewerbungen sind am Ende des vorhergehenden Semesters einzureichen.
Termin und Raum: siehe Institutshomepage.
Limited number of participants with selection procedure, in German language. Please send the application at the end of the previous semester
Date and room: see homepage of institute.

Literature

Skripte werden beim Start-up Meeting ausgegeben.
The scripts will be supplied in the start-up meeting.

Project Workshop: Automotive Engineering
2115817, SS 2021, 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.

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

Literature

Skripte werden beim Start-up Meeting ausgegeben.
# 7.335 Course: Psychological Processes in Individual Decisions [T-WIWI-111315]

<table>
<thead>
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<tr>
<td>ST 2021</td>
<td>2500003</td>
<td>Psychological processes in individual decisions</td>
<td>2 SWS</td>
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**Competence Certificate**
The examination takes place in the form of an alternative exam assessment: The students develop their own research idea and an experimental design accompanying the seminar. This idea will be presented at the end and explained in a written paper.

30% assessment: presentation
70% assessment: written work

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The course will be offered once in the summer semester 2021.
7.336 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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<th>3 SWS</th>
<th>Lecture / Practice (VÜ) / Online</th>
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<td>WT 20/21</td>
<td>790puma</td>
<td></td>
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<td>Wigger</td>
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**Competence Certificate**

Depending on the further pandemic development in the summer semester 2021 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:**

**Public Management**

2561127, WS 20/21, 3 SWS, Language: German, Open in study portal

**Organizational issues**

Dienstag 14:00-15:30 Uhr per Zoom-Livestream

**Literature**

Weiterführende Literatur:

# 7.337 Course: Public Media Law [T-INFO-101311]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101217 - Public Business Law

<table>
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**Events**

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<td>Lecture / Online</td>
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**Exams**

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<td>Dreier, Eichenhofer, Matz</td>
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Legend: 🛰 Online, 🪸 Blended (On-Site/Online), ☑ On-Site, ✗ Cancelled
7.338 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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Events

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<td>Lecture / [edly]</td>
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Exams

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<td>Lecture / [edly]</td>
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Legend: [edly] Online, [edly] Blended (On-Site/Online), [edly] On-Site, [edly] Canceled

Competence Certificate
Depending on the further pandemic development in the summer semester 2021 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:

Public Revenues
2560120, SS 2021, 2 SWS, Language: German, [edly] Open in study portal

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

Course: Python Algorithm for Vehicle Technology [T-MACH-110796]

Responsible: Stephan Rhode
Organisation: M-MACH-101265 - Vehicle Development
          M-MACH-101266 - Automotive Engineering

Type: Written examination  Credits: 4  Grading scale: Grade to a third  Recurrence: Each summer term  Version: 1

Events

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Exams

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<td>ST 2021</td>
<td>76-T-MACH-110796</td>
<td>Python Algorithm for Vehicle Technology</td>
<td>Rhode</td>
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</table>

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 2021, 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
Campus Ost, Geb. 70.04, Raum 219
Termine siehe Institutshomepage
Bitte bringen Sie Ihren Laptop mit zu den Vorlesungen!
Please bring your laptop to the lecture!

Literature
7.340 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

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**Events**

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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:*
Content
Based on the quality philosophies Total Quality Management (TQM) and Six-Sigma, the lecture will specifically address the needs of a modern quality management. The process orientation in a modern company and the process-specific fields of quality assurance are presented in detail. Preventive as well as non-preventive quality management methods, which are state of the art in operational practice today, are content of the lecture. The use of suitable measurement techniques in production engineering (production measurement technology) as well as their potential levels of integration in the production system are discussed. The use of suitable statistical methods for data analysis and their modern extension by methods of artificial intelligence are be discussed. The contents are complemented by legal aspects in the field of quality management.

Main topics of the lecture:

- The term "Quality"
- Total Quality Management (TQM)
- Six-Sigma and universal methods and tools within the DMAIC cycle
- QM in early product stages – Determination and realization of customer requirements
- QM in product development
- Production measurement technology
- QM in production - statistical methods
- Artificial intelligence and machine learning in quality management
- Operating behaviour and reliability
- Legal aspects in QM

Learning Outcomes:
The students ...

- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Organizational issues
Vorlesungstermine montags 9:45 Uhr
Übung erfolgt während der Vorlesung

Literature
Medien:
Die Vorlesungsfolien inkl. Notizen zur Veranstaltung werden über ILIAS (https://ilias.studium.kit.edu/) bereitgestellt:

Media:
Lecture slides and notes will be provided in ILIAS (https://ilias.studium.kit.edu/).

**Responsible:** Dr. Patrick Plötz

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

**Part of:** M-WIWI-101451 - Energy Economics and Energy Markets

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<th>Recurrence</th>
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<td>Each winter term</td>
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<th>Credits</th>
<th>Type Advent/Practice</th>
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<tr>
<td>WT 20/21</td>
<td>2581007</td>
<td>Quantitative Methods in Energy Economics</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
<td>Plötz, Dengiz, Yilmaz</td>
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<tr>
<td>WT 20/21</td>
<td>2581008</td>
<td>Übung zu Quantitative Methods in Energy Economics</td>
<td>1 SWS</td>
<td>Practice / Online</td>
<td>Dengiz, Yilmaz, Fichtner</td>
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**Exams**

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<th>Type</th>
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<td>7981007</td>
<td>Quantitative Methods in Energy Economics</td>
<td>Fichtner</td>
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</table>

**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 20/21, 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 address new problems by them.

**Literature**

Wird in der Vorlesung bekannt gegeben.
7.342 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>Grade to a third</td>
<td>Each summer term</td>
<td>1</td>
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</table>

**Prerequisites**
none
7.343 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

<table>
<thead>
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<th>Credits</th>
<th>Type</th>
<th>Grading scale</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>WT 20/21 2115919</td>
<td>2 SWS</td>
<td>Rail System Technology</td>
<td>Lecture / Online</td>
<td>Gratzfeld</td>
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<td>WT 20/21 2115996</td>
<td>2 SWS</td>
<td>Rail Vehicle Technology</td>
<td>Lecture / Online</td>
<td>Gratzfeld</td>
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<td>2 SWS</td>
<td>Rail System Technology</td>
<td>Lecture / Online</td>
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<td>ST 2021 2115996</td>
<td>2 SWS</td>
<td>Rail Vehicle Technology</td>
<td>Lecture / Online</td>
<td>Reimann, Gratzfeld</td>
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<td>Rail System Technology</td>
<td>Lecture / Online</td>
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</table>

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:

**Rail System Technology**
2115919, WS 20/21, 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
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
5. Vehicle dynamics: tractive and brake effort, driving resistance, inertial force, load cycles
6. Signaling and Control: operating procedure, succession of trains, European Train Control System, blocking period, automatic train control
7. Traction power supply: power supply of rail vehicles, comparison electric traction and diesel traction, dc and ac networks, system pantograph and contact wire, filling stations

Organizational issues
Die Vorlesung "Bahnsystemtechnik" im WS 20/21 findet als asynchrone Online-Veranstaltung statt.

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, WS 20/21, 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, multisystem vehicles, dual mode vehicles, hybrid vehicles), non-electric drives
5. Brakes: basics, principles (wheel brakes, rail brakes, blending), brake control (requirements and operation modes, pneumatic brake, electropneumatic brake, emergency brake, parking brake)
6. Train control management system: definition of TCMS, bus systems, components, network architectures, examples, future trends

Organizational issues
Die Vorlesung "Schienenvfahrzeugtechnik" im WS 20/21 findet als asynchrone Online-Veranstaltung statt.

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, SS 2021, 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
4. Wheel-rail-contact: carrying of vehicle mass, adhesion, wheel guidance, current return
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Organizational issues
Die Vorlesung "Bahnsystemtechnik" findet im SS 2021 als asynchrone Online-Veranstaltung statt.

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.

A bibliography is available for download (Ilias-platform).
Organizational issues
Die Vorlesung "Schienenfahrzeugtechnik" findet im SS 2021 als asynchrone Online-Veranstaltung statt.

Literature
Eine Literaturliste steht den Studierenden auf der Ilias-Plattform zum Download zur Verfügung.
A bibliography is available for download (Ilias-platform).
7.344 Course: Recommender Systems [T-WIWI-102847]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type
Written examination

Credits
4,5

Grading scale
Grade to a third

Recurrence
Each summer term

Version
1

Events

ST 2021 2540506 Recommender Systems 2 SWS Lecture / Geyer-Schulz
ST 2021 2540507 Exercise Recommender Systems 1 SWS Practice / Nazemi

Exams

WT 20/21 7900149 Recommender Systems Geyer-Schulz

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

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

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

Recommender Systems
2540506, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online
Content
At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Learning objectives:
The student
- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Workload:
The total workload for this course is approximately 135 hours (4.5 credits):
Time of attendance
- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m
Self-study
- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m
Sum: 135h 00m

Exam:
Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from excercises work will be added.

Grade: Minimum points
- 1.0: 95
- 1.3: 90
- 1.7: 85
- 2.0: 80
- 2.3: 75
- 2.7: 70
- 3.0: 65
- 3.3: 60
- 3.7: 55
- 4.0: 50
- 5.0: 0
Literature


Weiterführende Literatur:


7.345 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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<th>Recurrence</th>
<th>Version</th>
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<td>4,5</td>
<td>Grade to a third</td>
<td>see Annotations</td>
<td>2</td>
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</table>

**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: Risk Management in Industrial Supply Networks [T-WIWI-102826]

**Responsible:** Prof. Dr. Frank Schultmann  
Dr. Marcus Wiens  
**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>Each winter term</td>
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<th>Type</th>
<th>Responsible</th>
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<tbody>
<tr>
<td>WT 20/21</td>
<td>2581992</td>
<td>Risk Management in Industrial Supply Networks</td>
<td>2 SWS</td>
<td>Lecture / Online</td>
<td>Wiens, Schultmann</td>
</tr>
<tr>
<td>WT 20/21</td>
<td>2581993</td>
<td>Übung zu Risk Management in Industrial Supply Networks</td>
<td>1 SWS</td>
<td>Practice / Online</td>
<td>Klein, Wiens</td>
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**Exams**

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<td>Risk Management in Industrial Supply Networks</td>
<td>1 SWS</td>
<td>Lecture (V)</td>
<td>Schultmann</td>
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</table>

**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).

**Prerequisites**

None

**Recommendation**

None

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

**Risk Management in Industrial Supply Networks**

2581992, WS 20/21, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

**Online**

**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.
### 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**

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<th>2545102</th>
<th>Roadmapping</th>
<th>2 SWS</th>
<th>Seminar</th>
<th>Koch</th>
</tr>
</thead>
</table>

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

**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 2021, 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

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**Events**

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<td>2</td>
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</table>

**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:**

**Safety Engineering**

2117061, WS 20/21, 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

**Note**

Dates: See IFL-Homepage
Organizational issues
Termine: siehe ILIAS


Literature
Defren/Wickert: Sicherheit für den Maschinen- und Anlagenbau, Druckerei und Verlag: H. von Ameln, Ratingen
7.349 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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<th>Recurrence</th>
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<td>Sicherheitsmanagement im Straßenwesen</td>
<td>2 SWS</td>
<td>Lecture / Practice / Blended</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
7.350 Course: Selected Applications of Technical Logistics [T-MACH-102160]

- **Responsible:** Viktor Milushev
  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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<tr>
<td>ST 2021</td>
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<td>Selected Applications of Technical Logistics</td>
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**Exams**

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<td>Lecture / 🖥</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

**Recommendation**

Knowledge out of Basics of Technical Logistics I (T-MACH-109919) / Elements and Systems of Technical Logistics (T-MACH-102159) preconditioned.

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

**Selected Applications of Technical Logistics**

2118087, SS 2021, 3 SWS, Language: German, [Open in study portal](#)

**Content**

- design and dimension of machines from intralogistics
- static and dynamic behaviour
- operation properties and specifics
- Inside practical lectures: sample applications and calculations in addition to the lectures

Details according to schedule will be published

**Organizational issues**

Die Erfolgskontrolle erfolgt in Form einer mündlichen (20min.) Prüfung (nach §4 (2), 2 SPO). Die Prüfung wird in jedem Semester angeboten und kann zu jedem ordentlichen Prüfungstermin wiederholt werden.

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.

Es werden inhaltliche Kenntnisse aus der Veranstaltung „Grundlagen der Technischen Logistik-I“ (LV 2117095) vorausgesetzt

Knowledge out of Basics of Technical Logistics-1 preconditioned

**Literature**

Empfehlungen in der Vorlesung
## 7.351 Course: Selected Applications of Technical Logistics - Project [T-MACH-108945]

**Responsible:** Viktor Milushev  
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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**Exams**

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**Competence Certificate**

presentation of performed project and defense (30min) according to $4 (2), No. 3 of the examination regulation

**Prerequisites**

T-MACH-102160 (selected applications of technical logistics) must have been started

**Recommendation**

Knowledge out of Basics of Technical Logistics I (T-MACH-109919) / Elements and Systems of Technical Logistics (T-MACH-102159) preconditioned.

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

**Selected Applications of Technical Logistics - Project**

2118088, SS 2021, 1 SWS, Language: German, [Open in study portal](#)

**Organizational issues**

Ort und Zeit: siehe ILIAS / Homepage / Infos in der Veranstaltung

**Literature**

Empfehlungen in der Vorlesung
7 COURSES

Course: Selected Issues in Critical Information Infrastructures [T-WIWI-109251]

T

7.352 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 |

| Type                  | Examination of another type |
| Credits               | 4.5 |
| Grading scale         | Grade to a third |
| Recurrence            | Each summer term |
| Version               | 2 |

Events

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Exams

| ST 2021 | 7900172 | Lab Blockchain Hackathon (Master)                 | Sunyaev                            |

Legend: Online, 📖 Blended (On-Site/Online), 📧 On-Site, ✗ Canceled

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 09/04/2021

672
### 7.353 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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#### Exams

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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🗂 On-Site, ✗ Cancelled
7.354 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

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

Competence Certificate
Oral examination

Prerequisites
none
**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:*
Content
The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals.

Central concepts are the representation of knowledge in form of RDF and ontologies, the access via Linked Data, as well as querying the data by using SPARQL. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:
The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:
Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Workload:
- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of 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.

Literature


Weitere Literatur

7.356 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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**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](https://www.wbk.kit.edu/studium-und-lehre.php).

*Below you will find excerpts from events related to this course:*
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, SS 2021, 2 SWS, Language: German, Open in study portal

Content
In the age of Industry 4.0, large amounts of production data are generated by the global production networks and value chains. Their analysis enables valuable conclusions about production and lead to an increasing process efficiency. The aim of the seminar is to get to know production data analysis as an important component of future industrial projects. The students get to know the data mining tool KNIME and use it for analyses. A specific industrial use case with real production data enables practical work and offers direct references to industrial applications. The participants learn selected methods of data mining and apply them to the production data. The work within the seminar takes place in small groups on the computer. Subsequently, presentations on specific data mining methods have to be prepared.

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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
### 7.357 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]

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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:

#### Seminar Human Resource Management (Master)

2500006, WS 20/21, 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)
2500007, WS 20/21, 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

Digital Citizen Science
2500019, WS 20/21, 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.

Collaborative Development of Conversational Agents
2500043, WS 20/21, 3 SWS, Language: English, Open in study portal
**Content**
This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:

- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

**Requirements**

- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

**Literature**
Relevant literature will be made available in the seminar.

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**Advances in Financial Machine Learning**

2530372, WS 20/21, 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**

14-tägig, tba

**Literature**

Literatur wird in der ersten Vorlesung bekannt gegeben.

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**Quantitative descriptions of human behavior using R**

2540442, WS 20/21, 2,5 SWS, Language: English, [Open in study portal]
Content

Description

The goal of this course is to help students develop a basic understanding of how quantitative modeling and simulations are used in behavioral research, especially in tracking/explaining behavior observed in experiments. The course will take a seminar form. Students will be assigned to read one journal article per week, with special attention paid to the quantitative/modeling part of the paper. In the weekly lecture/discussion that follows, we will talk about the article, try to reproduce the models/simulations along with their predictions and results using R, and discuss possible extensions of the work.

English will be the language used in all lectures, discussions, course materials, and assessments.

Competence Certificate

The assessment consists of writing two R scripts that implement certain functions specified by the instructor. The first assessment will be due after 8 weeks and the second will be due one week after the last lecture.

Workload

Students are expected to spend a total of 90 hours (30 hours per ECTS) on this class. Weekly lecture/discussion will have an average duration of 2 hours. Reading and programming assignments will take an average of 4 hours each week.

Prerequisite

Basic knowledge of the R language. Familiarity with concepts and operations such as vectors, functions, reading and writing data, conditional statements is considered sufficient.

Data Science in Service Management

2540473, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Content

wird auf deutsch und englisch gehalten

Organizational issues

Blockveranstaltung, siehe WWW

Master Seminar in Data Science and Machine Learning

2540510, WS 20/21, 2 SWS, Language: German, Open in study portal

Content

Methods im Innovationsmanagement

2545107, WS 20/21, 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.

Hospital Management

2550493, WS 20/21, 2 SWS, Language: German, Open in study portal

Seminar Management Accounting - Special Topics

2579919, WS 20/21, 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.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.

Literature
Will be announced in the course.

Interactive Analytics Seminar
2400121, SS 2021, 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

Collaborative Development of Conversational Agents
2500043, SS 2021, 3 SWS, Language: English, Open in study portal

Seminar (S)
Online
**Content**
This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:

- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

**Requirements**

- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

**Literature**

Relevant literature will be made available in the seminar.

---

**Advances in Financial Machine Learning**

2530372, SS 2021, 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 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**

14-tägig, tba

**Literature**

Literatur wird in der ersten Vorlesung bekannt gegeben.

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**Master Seminar in Data Science and Machine Learning**

2540510, SS 2021, 2 SWS, Language: German/English, [Open in study portal]

**Information Systems and Service Design Seminar**

2540557, SS 2021, 3 SWS, Language: English, [Open in study portal]
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

Digital Service Design Seminar
2540559, SS 2021, 3 SWS, Language: English, Open in study portal

Content
Description
In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype

Learning objectives
The students
- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

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
Content

Description

This blocked event contains 3 stages.

In Stage 1, students meet online for one day and experience recent economic psychology research as participants. The research topics will mainly consist of novel economic games with certain level of strategic depth (i.e., we will not play simple games like rock paper scissors, nor we will play games that many people are familiar with like the prisoner's dilemma).

In Stage 2, students will receive the data from the games they played in Stage 1 along with a few journal articles assigned by the instructor on related topics. Based on reading, they choose one of the datasets from Stage 1 to write up a short report.

In Stage 3, students will try to design and conduct a study on a related topic themselves based on what they have learned in the previous stages. They will collect their own data and write a research report. The nature of this project is to be determined together by the students and instructor. It would either be ideas generated by the students themselves, or something assigned by the instructor.

English will be the language used in all discussions, course materials, and assessments.

Competence Certificate

The assessment is based on the short report in Stage 2 and the research report in Stage 3.

Workload

Students are expected to spend a total of 90 hours (30 hours per ECTS), including meeting and assignments, on this seminar.

Organizational issues

Blockveranstaltung. Temrine werden bekanntgegeben

Entrepreneurship Research

2545002, SS 2021, 2 SWS, Language: German, Open in study portal

Organizational issues

Block am 21.04., 05.05., 14.07.

Literature

Wird im Seminar bekannt gegeben.

Hospital Management

2550493, SS 2021, 2 SWS, Language: German, Open in study portal

Content

The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

The assessment consists of attendance and a presentation or a case study.

Organizational issues

von Montag, 17. Mai bis Samstag, 22. Mai jeweils von 7:30 bis 9:15 Uhr
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.
### 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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<tr>
<td>7900219</td>
<td>Entrepreneurial Strategy and Financing of Start-Ups</td>
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ST 2021 7981978 Seminar in Production and Operations Management III Schultmann
ST 2021 7981979 Seminar Energy Economics I Fichtner
ST 2021 7981980 Seminar Energy Economics II Fichtner
ST 2021 7981981 Seminar Energy Economics III Fichtner

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

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore, for some seminars, there is an application required.
The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

Seminar Human Resource Management (Master)
2500006, WS 20/21, 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.
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

Digital Citizen Science
2500019, WS 20/21, 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. Mädeche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

Collaborative Development of Conversational Agents
2500043, WS 20/21, 3 SWS, Language: English, Open in study portal
**Content**

This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:

- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

**Requirements**

- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

**Literature**

Relevant literature will be made available in the seminar.

---

**Advances in Financial Machine Learning**

2530372, WS 20/21, 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**

14-tägig, tba

**Literature**

Literatur wird in der ersten Vorlesung bekannt gegeben.

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**Quantitative descriptions of human behavior using R**

2540442, WS 20/21, 2,5 SWS, Language: English, [Open in study portal](#)
Content

Description

The goal of this course is to help students develop a basic understanding of how quantitative modeling and simulations are used in behavioral research, especially in tracking/explaining behavior observed in experiments. The course will take a seminar form. Students will be assigned to read one journal article per week, with special attention paid to the quantitative/modeling part of the paper. In the weekly lecture/discussion that follows, we will talk about the article, try to reproduce the models/simulations along with their predictions and results using R, and discuss possible extensions of the work.

English will be the language used in all lectures, discussions, course materials, and assessments.

Competence Certificate

The assessment consists of writing two R scripts that implement certain functions specified by the instructor. The first assessment will be due after 8 weeks and the second will be due one week after the last lecture.

Workload

Students are expected to spend a total of 90 hours (30 hours per ECTS) on this class. Weekly lecture/discussion will have an average duration of 2 hours. Reading and programming assignments will take an average of 4 hours each week.

Prerequisite

Basic knowledge of the R language. Familiarity with concepts and operations such as vectors, functions, reading and writing data, conditional statements is considered sufficient.

Data Science in Service Management

2540473, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Content
wird auf deutsch und englisch gehalten

Organizational issues
Blockveranstaltung, siehe WWW

Master Seminar in Data Science and Machine Learning

2540510, WS 20/21, 2 SWS, Language: German, Open in study portal

Content

Digital Service Design Seminar

2540559, WS 20/21, 3 SWS, Open in study portal

Content

Methods im Innovationsmanagement

2545107, WS 20/21, 2 SWS, Language: German, Open in study portal

Content

Hospital Management

2550493, WS 20/21, 2 SWS, Language: German, Open in study portal

Seminar Management Accounting - Special Topics

2579919, WS 20/21, 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.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.

Literature
Will be announced in the course.

Collaborative Development of Conversational Agents
2500043, SS 2021, 3 SWS, Language: English, Open in study portal

Content
This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:
- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

Requirements
- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

Literature
Relevant literature will be made available in the seminar.
**Advances in Financial Machine Learning**  
2530372, SS 2021, 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**
14-tägig, tba

**Literature**
Literatur wird in der ersten Vorlesung bekannt gegeben.

---

**Master Seminar in Data Science and Machine Learning**  
2540510, SS 2021, 2 SWS, Language: German/English, [Open in study portal](#)

**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 bekanntgegeben.
Digital Service Design Seminar
2540559, SS 2021, 3 SWS, Language: English, Open in study portal

Content
Description
In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype.

Learning objectives
The students
- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

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

Economic Psychology in Action
2540588, SS 2021, 2 SWS, Language: English, Open in study portal

Content
Description
This blocked event contains 3 stages.

In Stage 1, students meet online for one day and experience recent economic psychology research as participants. The research topics will mainly consist of novel economic games with certain level of strategic depth (i.e., we will not play simple games like rock paper scissors, nor we will play games that many people are familiar with like the prisoner's dilemma).

In Stage 2, students will receive the data from the games they played in Stage 1 along with a few journal articles assigned by the instructor on related topics. Based on reading, they choose one of the datasets from Stage 1 to write up a short report.

In Stage 3, students will try to design and conduct a study on a related topic themselves based on what they have learned in the previous stages. They will collect their own data and write a research report. The nature of this project is to be determined together by the students and instructor. It would either be ideas generated by the students themselves, or something assigned by the instructor.

English will be the language used in all discussions, course materials, and assessments.

Competence Certificate
The assessment is based on the short report in Stage 2 and the research report in Stage 3.

Workload
Students are expected to spend a total of 90 hours (30 hours per ECTS), including meeting and assignments, on this seminar.

Organizational issues
Blockveranstaltung, Termine werden bekanntgegeben

Entrepreneurship Research
2545002, SS 2021, 2 SWS, Language: German, Open in study portal

Organizational issues
Block am 21.04., 05.05., 14.07.

Literature
Wird im Seminar bekannt gegeben.
Hospital Management
2550493, SS 2021, 2 SWS, Language: German, Open in study portal

Content
The seminar ‘Hospital Management’ presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

The assessment consists of attendance and a presentation or a case study.

Organizational issues
von Montag, 17. Mai bis Samstag, 22. Mai jeweils von 7:30 bis 9:15 Uhr

Seminar Human Resource Management (Master)
2573012, SS 2021, 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.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

Seminar Human Resources and Organizations (Master)
2573013, SS 2021, 2 SWS, Language: German, Open in study portal

Content
The seminar 'Human Resources and Organizations' is a seminar in Business Administration B (Master) focusing on the management of human resources in organizations. The seminar aims to provide students with a comprehensive understanding of human resource management principles and practices.

The seminar covers topics such as recruitment, selection, training, development, performance management, and compensation. Students will be guided through the process of designing, implementing, and evaluating human resource management strategies.

The assessment for this seminar consists of a presentation or case study. The seminar is conducted in a seminar format.

Organizational issues
von Montag, 17. Mai bis Samstag, 22. Mai jeweils von 7:30 bis 9:15 Uhr
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 2021, 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.

Seminar in Management Accounting - Special Topics
2579919, SS 2021, 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).

**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.
### 7.359 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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<th>Grading scale</th>
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<td>Each term</td>
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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.
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<td>WT 20/21</td>
<td>2560140</td>
<td>Topics in Political Economy (Bachelor)</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
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<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Ott</td>
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<tr>
<td>ST 2021</td>
<td>2500004</td>
<td>Introduction to Statistical Machine Learning</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Schienle, Lerch</td>
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<td>ST 2021</td>
<td>2521310</td>
<td>Advanced Topics in Econometrics</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Schienle, Krüger, Görgen, Koster</td>
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<td>ST 2021</td>
<td>2560233</td>
<td>Seminar zur Luftverkehrspolitik</td>
<td>Seminar / 🖥</td>
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<td>Mitusch, Wisotzky</td>
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<tr>
<td>ST 2021</td>
<td>2560282</td>
<td>Wirtschaftspolitisches Seminar</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Ott, Assistenten</td>
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<tr>
<td>ST 2021</td>
<td>2560552</td>
<td>Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
<td>Szech, Zhao</td>
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<tr>
<td>ST 2021</td>
<td>2560555</td>
<td>Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)</td>
<td>Seminar / 🖥</td>
<td>2 SWS</td>
<td>Seminar / 🖥</td>
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<td>WT 20/21</td>
<td>7900139</td>
<td>Seminar in Economics (Bachelor/Master)</td>
<td>Seminar in Economics A (Master)</td>
<td>Seminar in Economics A (Master) Digital Markets</td>
<td>Seminar in Macroeconomics</td>
<td>Seminar in Macroeconomics</td>
<td>Seminar in Macroeconomics I</td>
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<td>WT 20/21</td>
<td>7900140</td>
<td>Seminar in Economics A (Master) Digital Markets</td>
<td>Seminar in Macroeconomics</td>
<td>How (not) to vote - Advantages and pitfalls of common voting methods</td>
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<td>WT 20/21</td>
<td>7900216</td>
<td>Seminar in Macroeconomics</td>
<td>Seminar in Macroeconomics</td>
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<tr>
<td>WT 20/21</td>
<td>7900255</td>
<td>How (not) to vote - Advantages and pitfalls of common voting methods</td>
<td>Seminar in Macroeconomics</td>
<td>Seminar in Macroeconomics I</td>
<td>Seminar in Macroeconomics II</td>
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<td>WT 20/21</td>
<td>7900257</td>
<td>Date Mining, Seminar in Economics A (Master)</td>
<td>Seminar on Morals and Social Behavior (M.Sc.)</td>
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<td>WT 20/21</td>
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<td>Seminar on Morals and Social Behavior (M.Sc.)</td>
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<td>Seminar on Morals and Social Behavior (M.Sc.)</td>
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<tr>
<td>WT 20/21</td>
<td>7900281</td>
<td>Organization and management of development projects</td>
<td>Seminar on Morals and Social Behavior (M.Sc.)</td>
<td>Seminar on Morals and Social Behavior (M.Sc.)</td>
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<td>WT 20/21</td>
<td>7900297</td>
<td>Topics in Experimental Economics</td>
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<td>WT 20/21</td>
<td>79sefi2</td>
<td>Seminar in Economics A (Master)</td>
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<td>ST 2021</td>
<td>7900033</td>
<td>Introduction to Statistical Machine Learning</td>
<td>Seminar in Macroeconomics I</td>
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<td>ST 2021</td>
<td>7900059</td>
<td>Markets for Attention and the Digital Economy (Master)</td>
<td>Seminar in Macroeconomics I</td>
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<td>7900131</td>
<td>Overcoming the Corona Crisis (Master)</td>
<td>Seminar in Macroeconomics II</td>
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<td>ST 2021</td>
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<td>Social Preferences in Behavioral Economics</td>
<td>Seminar in Macroeconomics II</td>
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<td>ST 2021</td>
<td>79sefi2</td>
<td>Seminar Death, Mistake &amp; Fraud in Science A (Master)</td>
<td>Seminar in Macroeconomics II</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
**Course:** Seminar in Economics A (Master) [T-WIWI-103478]

**Topics in Political Economy (Bachelor)**

- 2560140, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://campus.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)

Seminar Papers of 8–10 pages are to be handed in.

For bachelor students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in one individual abstract of 75-100 words. The quality of abstracts will reflect with 25% in the final grade.

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.

**Topics in Political Economy (Master)**

- 2560142, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://campus.kit.edu/)

**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](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

Seminar Papers of 8–10 pages are to be handed in.

For Master students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in two individual abstracts – one with 75-100 words and one with 150-200 words. The quality of abstracts will reflect with 25% in the final grade.

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.

**Morals & Social Behavior (Master)**

- 2560143, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://campus.kit.edu/)
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.
For Master students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in two individual abstracts – one with 75-100 words and one with 150-200 words. The quality of abstracts will reflect with 25% in the final grade.
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.

**Introduction to Statistical Machine Learning**
2500004, SS 2021, 2 SWS, Language: German/English, Open in study portal

**Advanced Topics in Econometrics**
2521310, SS 2021, 2 SWS, Language: German/English, Open in study portal

**Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)**
2560552, SS 2021, 2 SWS, Language: English, Open in study portal

**Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)**
2560555, SS 2021, 2 SWS, Language: English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben

Organizational issues
Blockveranstaltung

Organizational issues
Blockveranstaltung

Organizational issues
Blockveranstaltung

Organizational issues
Blockveranstaltung

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 or https://portal.wiwi.kit.edu/Seminare
The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.
Seminar Papers of 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.
### Course: Seminar in Economics B (Master) [T-WIWI-103477]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre

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

**Part of:** M-WIWI-101808 - Seminar Module

<table>
<thead>
<tr>
<th>Events</th>
<th>Credits</th>
<th>Type</th>
<th>Recurrence</th>
<th>Version</th>
<th>Grading scale</th>
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<td>WT 20/21</td>
<td>2 SWS</td>
<td>Seminar / 🗣</td>
<td>Each term</td>
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<td>Grade to a third</td>
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<td>WT 20/21</td>
<td>2 SWS</td>
<td>Seminar / 🗣</td>
<td>Each term</td>
<td>1</td>
<td>Grade to a third</td>
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### Events

#### WT 20/21
- **2560140**: Topics in Political Economy (Bachelor)
- **2560142**: Topics in Political Economy (Master)
- **2560143**: Morals & Social Behavior (Master)
- **2560259**: Selected aspects of European transport planning and -modelling
- **2561281**: Wirtschaftspolitisches Seminar
- **2521310**: Advanced Topics in Econometrics
- **2560233**: Seminar zur Luftverkehrspolitik
- **2560282**: Wirtschaftspolitisches Seminar
- **2560552**: Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)
- **2560555**: Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)

#### ST 2021
- **2500004**: Introduction to Statistical Machine Learning
- **2521310**: Advanced Topics in Econometrics
- **2560233**: Seminar zur Luftverkehrspolitik
- **2560282**: Wirtschaftspolitisches Seminar
- **2560552**: Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)
- **2560555**: Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)

### Exams

#### WT 20/21
- **7900140**: Seminar in Economics A (Master) Digital Markets
- **7900216**: Seminar in Macroeconomics
- **7900255**: How (not) to vote - Advantages and pitfalls of common voting methods
- **7900258**: Data Mining, Seminar in Economics B (Master)
- **7900278**: Seminar on Morals and Social Behavior (M.Sc.)
- **7900281**: Organization and management of development projects
- **7900297**: Topics in Experimental Economics
- **79sefi3**: Seminar in Economics B (Master)
- **7900033**: Introduction to Statistical Machine Learning
- **7900059**: Markets for Attention and the Digital Economy (Master)
- **7900065**: Seminar in Macroeconomics I
- **7900131**: Overcoming the Corona Crisis (Master)
- **7900221**: Seminar in Macroeconomics II
- **7900248**: Social Preferences in Behavioral Economics
- **79sefi3**: Seminar Death, Mistake & Fraud in Science B (Master)

#### ST 2021
- **7900221**: Seminar in Macroeconomics II
- **7900248**: Social Preferences in Behavioral Economics
- **79sefi3**: Seminar Death, Mistake & Fraud in Science B (Master)

**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:

**Topics in Political Economy (Bachelor)**
2560140, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.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).

Seminars Papers of 8–10 pages are to be handed in.

For bachelor students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in one individual abstract of 75–100 words. The quality of abstracts will reflect with 25% in the final grade.

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.

**Topics in Political Economy (Master)**
2560142, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)

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](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare).

Seminars Papers of 8–10 pages are to be handed in.

For Master students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in two individual abstracts - one with 75-100 words and one with 150-200 words. The quality of abstracts will reflect with 25% in the final grade.

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.

**Morals & Social Behavior (Master)**
2560143, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)
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.
For Master students, grades will be based on the quality of presentation slides (25%) and the seminar paper (50%). Additionally each student will have to hand in two individual abstracts – one with 75-100 words and one with 150-200 words. The quality of abstracts will reflect with 25% in the final grade.
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.

V Introduction to Statistical Machine Learning
2500004, SS 2021, 2 SWS, Language: German/English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben

V Advanced Topics in Econometrics
2521310, SS 2021, 2 SWS, Language: German/English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben

V Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)
2560552, SS 2021, 2 SWS, Language: English, Open in study portal

Content
Participation will be limited to 12 students.

Organizational issues
Blockveranstaltung

V Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)
2560555, SS 2021, 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.
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
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
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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**Type**
Examination of another type

**Credits**
3

**Grading scale**
Grade to a third

**Recurrence**
Each term

**Version**
1

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### Events

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<th>Format</th>
<th>Instructor(s)</th>
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<td>WT 20/21</td>
<td>2119100</td>
<td>Fördertechnik und Logistiksysteme</td>
<td>Seminar / 🧩</td>
<td>Furmans, Pagani</td>
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<td>ST 2021</td>
<td>2119100</td>
<td>Fördertechnik und Logistiksysteme</td>
<td>Seminar / 🧩</td>
<td>Furmans, Pagani</td>
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### Exams

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<th>Course Code</th>
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<th>Instructor(s)</th>
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<tr>
<td>WT 20/21</td>
<td>76-T-MACH-102135</td>
<td>Conveying Technology and Logistics</td>
<td>Furmans</td>
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<tr>
<td>WT 20/21</td>
<td>8245100014</td>
<td>Seminar in Transportation</td>
<td>Vortisch, Chlond</td>
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<tr>
<td>ST 2021</td>
<td>76-T-MACH-102135</td>
<td>Conveying Technology and Logistics</td>
<td>Furmans</td>
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<tr>
<td>ST 2021</td>
<td>76-T-MACH-2115009</td>
<td>Seminar for Rail System Technology</td>
<td>Gratzfeld</td>
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</table>

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

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**Competence Certificate**
See German version.

**Prerequisites**
See module description.

**Recommendation**
None

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

**Fördertechnik und Logistiksysteme**
2119100, SS 2021, SWS, [Open in study portal](#)

**Seminar (S)**
Blended (On-Site/Online)

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**Content**
The goal of the seminar is to deal with different topics related to the materials handling and logistics. The students can work on the topic either alone or in a group work. At the end the results are presented and discussed with a final presentation. The 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
### 7.363 Course: Seminar in Informatics A (Master) [T-WIWI-103479]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101808 - Seminar Module

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<th>Version</th>
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<td>Grade to a third</td>
<td>Each term</td>
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<th>Type</th>
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<tr>
<td>WT 20/21 2400125</td>
<td>Security and Privacy Awareness</td>
<td>2 SWS</td>
<td>Seminar</td>
<td>Boehm, Volkamer, Aldag, Gottschalk, Mayer, Mossano, Dügün</td>
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<tr>
<td>WT 20/21 2513312</td>
<td>Seminar Linked Data and the Semantic Web (Bachelor)</td>
<td>2 SWS</td>
<td>Seminar</td>
<td>Färber, Käfer, Heling, Bartscherer</td>
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<tr>
<td>WT 20/21 2513313</td>
<td>Seminar Linked Data and the Semantic Web (Master)</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

Placeholder for seminars offered by the Institute AIFB.

Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

### Security and Privacy Awareness

2400125, WS 20/21, 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.

**Dates:**

- Kick-Off: 02.11.20
- Final version: 07.03.21
- Presentation: 22.03.21 / maybe also 23.03.21

Topics will be assigned after the Kick-Off.

**Topics:**

- Development of a flyer for internet security to enhance security awareness.
- Systematic Literature Review: Enhancing Email Security Interventions Accessibility for Visually Impaired Users.
- Ethical analysis of different debriefing methods for deception studies.
- What is informational privacy and what is its worth?
- Investigation of the perception of (technical) backdoors for criminal prosecution.
- Security awareness in the context of gatekeepers: Assumptions of the users versus legal responsibility.
- E-privacy regulations, what comes after the planet49 judgement (EuGH)?
- What is happening to the international data protection law after the Schremm III (privacy shield invalid) judgement?

More information for each topic will be updated as soon as possible.

ATTENTION: The seminar is only for MASTER students!

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).
**Seminar Linked Data and the Semantic Web (Bachelor)**

Content

Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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 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 Linked Data and the Semantic Web (Master)**

Content

Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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.

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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)**

Content

Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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 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.
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.

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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.
Course: Seminar in Informatics A (Master)  [T-WIWI-103479]

Content
Participation is restricted to 10 students max.

Contributions of the students:
Each student will be assigned at max 2 papers on the topic. Out of which the student will have to give a seminar presentation and write a seminar report paper of 15 pages explaining the methods from at least one of the two assigned papers, in their own words.

Implementation (if applicable):
If code is available from the authors, then re-implementation of it for small scale experiments using Google Colab with python.

Teaching Team:
- Dr. Mehwish Alam
- Dr. Danilo Dessi
- M. Sc. Russa Biswas

Data representation or feature representation plays a key role in the performance of machine learning algorithms. In recent years, rapid growth has been observed in Representation Learning (RL) of words and Knowledge Graphs (KG) into low dimensional vector spaces and its applications to many real-world scenarios. Word embeddings are a low dimensional vector representation of words that are capable of capturing the context of a word in a document, semantic similarity as well as its relation with other words. Similarly, KG embeddings are a low dimensional vector representation of entities and relations from a KG preserving its inherent structure and capturing the semantic similarity between the entities. Each embedding space exhibits different semantic characteristics based on the source of information, e.g. text or KGs as well as the learning of the embedding algorithms. The same algorithm, when applied to different representations of the same training data, leads to different results due to the variation in the features encoded in the respective representations. The distributed representation of text in the form of the word and document vectors as well as of the entities and relations of the KG in form of entity and relation vectors have evolved as the key elements of various natural language processing tasks such as Entity Linking, Named Entity Recognition and disambiguation, etc. Different embedding spaces are generated for textual documents of different languages, hence aligning the embedding spaces has become a stepping stone for machine translation. On the other hand, in addition to multilingualism and domain-specific information, different KGs of the same domain have structural differences, making the alignment of the KG embeddings more challenging. In order to generate coherent embedding spaces for knowledge-driven applications such as question answering, named entity disambiguation, knowledge graph completion, etc., it is necessary to align the embedding spaces generated from different sources.

In this seminar, we would like to study the different state of the art algorithms for aligning embedding space. We would focus on two types of alignment algorithms: (1) Entity - Entity alignment, and (2) Entity - Word alignment.

Organizational issues
Registration and further information can be found in the WiWi-portal.

Seminar Knowledge Discovery and Data Mining (Master)
2513309, SS 2021, 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

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/.

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 2021, 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

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.

Cognitive Automobiles and Robots
2513500, SS 2021, 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.
7 COURSES

Course: Seminar in Informatics B (Master) [T-WIWI-103480]

7.364 Course: Seminar in Informatics B (Master) [T-WIWI-103480]

**Responsible:** Professorenschaft des Fachbereichs Informatik

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

**Part of:** M-WIWI-101808 - Seminar Module

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ST 2021 7900147  Cognitive Automobiles and Robots  Zöllner
ST 2021 7900198  Seminar Data Science & Real-time Big Data Analytics (Master)  Färber
ST 2021 7900202  Seminar Knowledge Discovery and Data Mining (Master)  Sure-Vetter
ST 2021 7900246  Seminar Advanced Methods in Natural Language Processing: Metaphors  Sack

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

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

Prerequisites
None.

Recommendation
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

Annotation
Placeholder for seminars offered by the Institute AIFB.

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

Security and Privacy Awareness
2400125, WS 20/21, 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.

Dates:
- Kick-Off: 02.11.20
- Final version: 07.03.21
- Presentation: 22.03.21 / maybe also 23.03.21

Topics will be assigned after the Kick-Off.

Topics:
- Development of a flyer for internet security to enhance security awareness.
- Systematic Literature Review: Enhancing Email Security Interventions Accessibility for Visually Impaired Users.
- Ethical analysis of different debriefing methods for deception studies.
- What is informational privacy and what is its worth?
- Investigation of the perception of (technical) backdoors for criminal prosecution.
- Security awareness in the context of gatekeepers: Assumptions of the users versus legal responsibility.
- E-privacy regulations, what comes after the planet49 judgement (EuGH)?
- What is happening to the international data protection law after the Schremm III (privacy shield invalid) judgement?

More information for each topic will be updated as soon as possible.

ATTENTION: The seminar is only for MASTER students!

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).
Seminar Linked Data and the Semantic Web (Bachelor)

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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 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 Linked Data and the Semantic Web (Master)

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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 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)

Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this 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 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.
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 20/21, 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 Cognitive Automobiles and Robots (Master)
2513500, WS 20/21, 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 Representation Learning for Knowledge Graphs (Master)
2513601, WS 20/21, 2 SWS, Language: English, Open in study portal
Content
Participation is restricted to 10 students max.

Contributions of the students:
Each student will be assigned at max 2 papers on the topic. Out of which the student will have to give a seminar presentation and write a seminar report paper of 15 pages explaining the methods from at least one of the two assigned papers, in their own words.

Implementation (if applicable):
If code is available from the authors, then re-implementation of it for small scale experiments using Google Colab with python.

Teaching Team:
- Dr. Mehwish Alam
- Dr. Danilo Dessi
- M. Sc. Russa Biswas

Data representation or feature representation plays a key role in the performance of machine learning algorithms. In recent years, rapid growth has been observed in Representation Learning (RL) of words and Knowledge Graphs (KG) into low dimensional vector spaces and its applications to many real-world scenarios. Word embeddings are a low dimensional vector representation of words that are capable of capturing the context of a word in a document, semantic similarity as well as its relation with other words. Similarly, KG embeddings are a low dimensional vector representation of entities and relations from a KG preserving its inherent structure and capturing the semantic similarity between the entities. Each embedding space exhibits different semantic characteristics based on the source of information, e.g. text or KGs as well as the learning of the embedding algorithms. The same algorithm, when applied to different representations of the same training data, leads to different results due to the variation in the features encoded in the respective representations. The distributed representation of text in the form of the word and document vectors as well as of the entities and relations of the KG in form of entity and relation vectors have evolved as the key elements of various natural language processing tasks such as Entity Linking, Named Entity Recognition and disambiguation, etc. Different embedding spaces are generated for textual documents of different languages, hence aligning the embedding spaces has become a stepping stone for machine translation. On the other hand, in addition to multilingualism and domain-specific information, different KGs of the same domain have structural differences, making the alignment of the KG embeddings more challenging. In order to generate coherent embedding spaces for knowledge-driven applications such as question answering, named entity disambiguation, knowledge graph completion, etc., it is necessary to align the embedding spaces generated from different sources.

In this seminar, we would like to study the different state of the art algorithms for aligning embedding space. We would focus on two types of alignment algorithms: (1) Entity - Entity alignment, and (2) Entity - Word alignment.

Organizational issues
Registration and further information can be found in the WiWi-portal.

Seminar Knowledge Discovery and Data Mining (Master)
2513309, SS 2021, 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

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/.

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 2021, 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

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.

Cognitive Automobiles and Robots

2513500, SS 2021, 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.
Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

Responsible: Prof. Dr. Stefan Nickel, Prof. Dr. Steffen Rebennack, Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101808 - Seminar Module

### Type
Examination of another type

### Credits
3

### Grading scale
Grade to a third

### Recurrence
Each term

### Version
1

#### Events

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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:

### Seminar on Methodical Foundations of Operations Research

**2550131, WS 20/21, 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 studenten 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.

### Organizational issues
Blockveranstaltung, Termin n. V.

### Literature
Die Literatur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a preparatory meeting.

### Seminar: Modern OR and Innovative Logistics

**2550491, WS 20/21, 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.
Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:
If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:
The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
### 7.366 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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### Prerequisites

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### Recommendation

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**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.

**Organizational issues**
Blockveranstaltung, Termin n. V.

**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 20/21, 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.
Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:
If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:
The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
## 7.367 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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<td>Seminar / 📅</td>
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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:

#### Topics in Econometrics
2521310, WS 20/21, 2 SWS, Language: German, Open in study portal  
Seminar (S)  
Online

#### Organizational issues
Blockveranstaltung, Termine werden auf Homepage und über Ilias bekannt gegeben

#### Introduction to Statistical Machine Learning
2500004, SS 2021, 2 SWS, Language: German/English, Open in study portal  
Seminar (S)  
Online
Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben

**Advanced Topics in Econometrics**
2521310, SS 2021, 2 SWS, Language: German/English, Open in study portal

Organizational issues
Blockveranstaltung. Termine werden bekannt gegeben
### 7.368 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.

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

### Introduction to Statistical Machine Learning

2500004, SS 2021, 2 SWS, Language: German/English, [Open in study portal](#)

**Organizational issues**

Blockveranstaltung, Termine werden bekanntgegeben

### Advanced Topics in Econometrics

2521310, SS 2021, 2 SWS, Language: German/English, [Open in study portal](#)

**Organizational issues**

Blockveranstaltung, Termine werden bekanntgegeben
7.369 Course: Seminar in Transportation [T-BGU-100014]

**Responsible:** 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  
M-WIWI-101808 - Seminar Module

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</table>

**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]

**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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**Exams**

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**Legend:** 🖤 Online, 📦 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

**Competence Certificate**
Alternative exam assessment.

**Recommendation**
Prior attendance of the course Innovation Management [2545015] is recommended.
7.371 Course: Seminar Mobility Services (Master) [T-WIWI-103174]

**Responsible:** Prof. Dr. Gerhard Satzger  
Carola Stryja

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

**Part of:**  
M-BGU-101064 - Fundamentals of Transportation  
M-BGU-101065 - Transportation Modelling and Traffic Management

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**Competence Certificate**  
A final written exam will be conducted.

**Prerequisites**  
None

**Annotation**  
The course is not offered regularly.
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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Events

| ST 2021 | 2149665 | Seminar Production Technology | 1 SWS | Seminar / 🖥 | Fleischer, Lanza, Schulze, Zanger |

Exams

| WT 20/21  | 76-T-MACH-109062 | Seminar Production Technology | Fleischer, Lanza, Schulze |
| ST 2021   | 76-T-MACH-109062 | Seminar Production Technology | Fleischer, Lanza, Schulze |

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:

Seminar Production Technology
2149665, SS 2021, 1 SWS, Language: German, Open in study portal
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
### 7.373 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
### 7.374 Course: Seminar: Governance, Risk & Compliance [T-INFO-102047]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101242 - Governance, Risk & Compliance

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#### Exams

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

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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 2021, 2 SWS, Open in study portal**

**Content**

- Registration via [https://portal.wiwi.kit.edu/ys/4516](https://portal.wiwi.kit.edu/ys/4516)
Organizational issues
nach Vereinbarung
7.376 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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<td>2 SWS</td>
<td>Seminar / Online</td>
<td>Boehm, Volkamer, Aldag, Gottschalk, Mayer, Mossano, Dügün</td>
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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- X Cancelled

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

**Security and Privacy Awareness**  
2400125, WS 20/21, 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.

Dates:
- Kick-Off: 02.11.20
- Final version: 07.03.21
- Presentation: 22.03.21 / maybe also 23.03.21

Topics will be assigned after the Kick-Off.

Topics:
- Development of a flyer for internet security to enhance security awareness.
- Systematic Literature Review: Enhancing Email Security Interventions Accessibility for Visually Impaired Users.
- Ethical analysis of different debriefing methods for deception studies.
- What is informational privacy and what is its worth?
- Investigation of the perception of (technical) backdoors for criminal prosecution.
- Security awareness in the context of gatekeepers: Assumptions of the users versus legal responsibility.
- E-privacy regulations, what comes after the planet49 judgement (EuGH)?
- What is happening to the international data protection law after the Schremm III (privacy shield invalid) judgement?

More information for each topic will be updated as soon as possible.

ATTENTION: The seminar is only for MASTER students!

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).
### 7.377 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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**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.
## 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-102806 - Service Innovation, Design & Engineering

### Type
- Written examination  
### Credits
- 4.5  
### Grading scale
- Grade to a third  
### Recurrence
- Each summer term  
### Version
- 1

### Events

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**Legend:** 🚗 Online, 🧬 Blended (On-Site/Online), 🗬️ On-Site, ❌ Cancelled

### Competence Certificate

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

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

### Service Innovation

**2595468, SS 2021, 2 SWS, Language: English, Open in study portal**

### Lecture (V)

**Online**

### 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.
Literature

# 7.380 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
### 7.381 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
7.382 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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<td>Genoese, Zimmermann</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

**Competence Certificate**
Examination as written assignment and oral presentation (§4 (2), 1 SPO).

**Prerequisites**
None

**Recommendation**
Visiting the course “Introduction to Energy Economics”

**Annotation**
See German version.

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

**Simulation Game in Energy Economics**
2581025, SS 2021, 3 SWS, Language: German, Open in study portal

**Lecture / Practice (VÜ)**
Online

**Content**

- Introduction
- Agents and market places in the electricity industry
- Selected planning tasks of energy service companies
- Methods of modelling in the energy sector
- Agent-based simulation: The PowerACE model
- Simulation game: Simulation in energy economics (electricity and emission trading, investment decisions)

The lecture is structured in a theoretical and a practical part. In the theoretical part, the students are taught the basics to carry out simulations themselves in the practical part which comprises amongst others the simulation of the power exchange. The participants of the simulation game take a role as a power trader in the power market. Based on various sources of information (e.g. prognosis of power prices, available power plants, fuel prices), they can launch bids in the power exchange.

**Assessment:** presentation and written summary

**Prerequisites:** Basics in Energy economics ad markets are advantageous.

**Organizational issues**
CIP-Pool West, Raum 102, Geb. 06.41 - siehe Institutsaushang

**Literature**

**Weiterführende Literatur:**
Course: Simulation of Coupled Systems [T-MACH-105172]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development

### Events

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### Exams

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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 very ordinary examination date.

A registration in mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

**Prerequisites**

Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108888 must have been passed.

**Recommendation**

- Knowledge of ProE (ideally in actual version)
- Basic 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 2021, 2 SWS, Language: German, Open in study portal

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
Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

**7.384 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

<table>
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**Exams**

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<td>Simulation of Coupled Systems - Advance</td>
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</table>

**Competence Certificate**

Preparation of semester report

**Prerequisites**

none
# 7.385 Course: Site Management [T-BGU-103427]

| **Responsible:** | Prof. Dr.-Ing. Shervin Haghsheno |
| **Organisation:** | KIT Department of Civil Engineering, Geo- and Environmental Sciences |
| **Part of:** | M-BGU-101884 - Lean Management in Construction  
M-BGU-101888 - Project Management in Construction |

| **Type** | Oral examination |
| **Credits** | 1.5 |
| **Grading scale** | Grade to a third |
| **Recurrence** | Each summer term |
| **Version** | 1 |

## Events

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<td>Lecture / 📋</td>
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## Prerequisites

None

## Recommendation

None

## Annotation

None
7.386 Course: Smart Energy Infrastructure [T-WIWI-107464]

**Responsible:** Dr. Armin Ardöne  
Dr. Dr. Andrej Marko Pustisek  

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

**Part of:** M-WIWI-101452 - Energy Economics and Technology

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<th>Lecture/Online</th>
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**Exams**

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<th>7981023</th>
<th>Smart Energy Infrastructure</th>
<th>Fichtner</th>
</tr>
</thead>
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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.

**Annotation**


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

**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
7.387 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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<td>Lecture</td>
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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) (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.
7.388 Course: Social Choice Theory [T-WIWI-102859]

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

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

**Part of:**
- M-WIWI-101500 - Microeconomic Theory
- M-WIWI-101504 - Collective Decision Making

**Type:** Examination of another type

**Credits:** 4.5

**Grading scale:** Grade to a third

**Recurrence:** Each summer term

**Version:** 2

**Events**

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<td>Social Choice Theory</td>
<td>2 SWS</td>
<td>Lecture / 📱</td>
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<td>ST 2021</td>
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<td>Übung zu Social Choice Theory</td>
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**Legend:** 📱 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Canceled

**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 2021, 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  
**Part of:** M-WIWI-101472 - Informatics  
M-WIWI-101628 - Emphasis in Informatics  
M-WIWI-101630 - Electives in Informatics

<table>
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**Events**

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<td>Practical Course Sociotechnical Information Systems Development (Master)</td>
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<td>ST 2021</td>
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<td>Development of Sociotechnical Information Systems (Master)</td>
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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 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:**

**Practical Course Sociotechnical Information Systems Development (Bachelor)**  
2512400, WS 20/21, 3 SWS, Language: German/English, [Open in study portal](#)

**Practical Course Sociotechnical Information Systems Development (Master)**  
2512401, WS 20/21, 3 SWS, Language: German/English, [Open in study portal](#)
Content
The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

Learning objectives:
- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form

Practical Course Sociotechnical Information Systems Development (Master)
2512401, WS 20/21, 3 SWS, Language: German/English, Open in study portal

Content
The aim of this course is to provide a practical introduction into developing socio-technical information systems, such as web platforms, mobile apps, or desktop applications. Course participants will create (individually or in groups) software solutions for specific problems from various practical domains. The course tasks comprise requirements assessment, system design, and software implementation. Furthermore, course participants will gain insights into software quality assurance methods and software documentation.

Learning objectives:
- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form

Advanced Lab Development of Sociotechnical Information Systems (Bachelor)
2512400, SS 2021, 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.

Development of Sociotechnical Information Systems (Master)
2512401, SS 2021, 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.
7.390 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

| ST 2021 | 2511208 | Software Quality Management | 2 SWS | Lecture / ONLINE | Oberweis |
| ST 2021 | 2511209 | Übungen zu Software-Qualitätsmanagement | 1 SWS | Practice / ONLINE | Oberweis, Frister |

Exams

| WT 20/21 | 7900027 | Software Quality Management (Registration until 08 February 2021) | Oberweis |
| ST 2021  | 7900031 | Software Quality Management (Registration until 12 July 2021)    | Oberweis |

Legend: ONLINE, Blended (On-Site/Online), On-Site, Cessed

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 2021, 2 SWS, Language: German, Open in study portal

Content

This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Learning objectives:

Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the main 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.
7.391 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

**Type**
- Written examination

**Credits**
- 4.5

**Grading scale**
- Grade to a third

**Recurrence**
- Each winter term

**Version**
- 1

### 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 in the summer semester 2021 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. 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 is not offered in the winter term 2018/19.

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

**Spatial Economics**

2561260, WS 20/21, 2 SWS, Language: English, Open in study portal

Lecture (V)

Online
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 bekanntgeben.
(Further literature will be announced in the lecture.)
### 7.392 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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<td>Each summer term</td>
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**Events**

| ST 2021 | 6233804 | Umweltverträglichkeitsstudien im Straßenwesen | 1 SWS | Lecture / 🖥 | Roos |
| ST 2021 | 6233807 | Besondere Kapitel im Straßenwesen | 1 SWS | Lecture / 🖥 | Roos |

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

**Competence Certificate**

oral exam with 15 minutes

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7 COURSES

7.393 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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<td>4.5</td>
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<td>Each term</td>
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Exams
WT 20/21 7900263 Special Topics in Information Systems Weinhardt

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
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.
### 7.394 Course: Specialization in Food Process Engineering [T-CIWVT-101875]

**Responsible:** Dr. Volker Gaukel  
**Organisation:** KIT Department of Chemical and Process Engineering  
**Part of:** M-CIWVT-101119 - Specialization in Food Process Engineering  

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**Prerequisites**
The Module "Principles of Food Process Engineering" must be passed.
Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

**Responsible:** apl. Prof. Dr. Wolf-Dieter Heller

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

**Part of:**
- M-WIWI-101638 - Econometrics and Statistics I
- M-WIWI-101639 - Econometrics and Statistics II

**Type:** Written examination

**Credits:** 4.5

**Grading scale:** Grade to a third

**Recurrence:** Each winter term

**Version:** 1

**Events**

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<td>Grade to a third</td>
<td>Each winter term</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:

**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
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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</table>

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:

Stochastic Calculus and Finance
2521331, WS 20/21, 2 SWS, Language: English, Open in study portal

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
7.397 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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**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.
7.398 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

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Exams

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Legend: 🖥️ Online, 🍪 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment.

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.
7.399 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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**Legend:** Online, 🛡 Blended (On-Site/Online), 📇 On-Site, ✗ Cancelled

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
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:
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
7.401 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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**Exams**

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<td>Wagner, Hinterstein</td>
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</table>

**Competence Certificate**

Oral examination

**Prerequisites**

none

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

**Structural and phase analysis**

2125763, WS 20/21, 2 SWS, Language: German, Open in study portal

**Organizational issues**

Die Vorlesung findet im Seminarraum am Fasanengarten (Geb. 50.35, R 101) oder online statt; erster Termin: 03.11.2020

**Literature**

1. Moderne Röntgenbeugung - Röntgendiffraktometrie für Materialwissenschaftler, Physiker und Chemiker, Spieß, Lothar / Schwarz, Robert / Behnken, Herfried / Teichert, Gerd B.G. Teubner Verlag 2005
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

<table>
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Competence Certificate

Oral examination, 20 min

Prerequisites

none

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

**Structural Ceramics**

2126775, SS 2021, 2 SWS, Language: German, Open in study portal

Literature


7.403 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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*Legends: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled*

**Competence Certificate**

oral examination (ca. 30 Minuten)

**Prerequisites**

none

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

**V** Superhard Thin Film Materials

2177618, WS 20/21, 2 SWS, Language: German, Open in study portal
**Content**
oral examination (about 30 min), no tools or reference materials

**Teaching Content:**
Introduction
Basics
Plasma diagnostics
Particle flux analysis
Sputtering and Ion implantation
Computer simulations
Properties of materials, thin film deposition technology, thin film analysis and modelling of superhard materials
Amorphous hydrogenated carbon
Diamond like carbon
Diamond
Cubic 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**
Anmeldung verbindlich bis zum 03.11.2020 unter sven.ulrich@kit.edu.
Nach der Anmeldung wird Ihnen der Link zur Vorlesung per E-Mail mitgeteilt.

**Literature**
G. Kienel (Herausgeber): Vakuumbeschichtung 1 - 5, VDI Verlag, Düsseldorf, 1994

Abbildungen und Tabellen werden verteilt; Copies with figures and tables will be distributed
7.404 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

**Responsible:** Prof. Dr. Andreas Oberweis

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

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics

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<td>Each term</td>
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**Competence Certificate**
The assessment of this course is a written examination (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

**Prerequisites**
None
### 7.405 Course: Supplement Software- and Systems Engineering [T-WIWI-110372]

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<th>Prof. Dr. Andreas Oberweis</th>
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</table>

**Competence Certificate**
The assessment consists of an 1h written exam in the first week after lecture period.

**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.
## 7.406 Course: Supplementary Claim Management [T-BGU-103428]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101888 - Project Management in Construction

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**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
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

**Type**
Written examination

**Credits**
3.5

**Grading scale**
Grade to a third

**Recurrence**
Each winter term

**Version**
1

**Events**

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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 (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:

**Supply Chain Management in the automotive industry**
2581957, WS 20/21, 2 SWS, Language: German, Open in study portal

**Content**
- Automotive industry significance
- The automotive supply chain
- Adding value structures of the automotive supply chain and mastering of the production systems as factors of success in the SCM
- Strategic procurement logistics
- Risk management
- Quality engineering and management in the automotive supply chain
- Cost engineering and management in the automotive supply chain
- Purchasing (Supplier selection, contract management)
- Performance measurement of the supply chain
- Organization

**Literature**
Wird in der Veranstaltung bekannt gegeben.
7.408 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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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).

Prerequisites

None

Recommendation

None

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

V Supply Chain Management with Advanced Planning Systems
2581961, SS 2021, 2 SWS, Language: English, Open in study portal Lecture (V) Online
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
### 7.409 Course: Sustainability in Mobility Systems [T-BGU-111057]

**Responsible:** 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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**Exams**

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**Competence Certificate**
written exam, 60 min., computer-based

**Prerequisites**
none

**Recommendation**
none

**Annotation**
none
Course: Systematic Materials Selection [T-MACH-100531]

Responsible: Dr.-Ing. Stefan Dietrich
Prof. Dr.-Ing. Volker Schulze

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101268 - Specific Topics in Materials Science

Type: Written examination
Credits: 4
Grading scale: Grade to a third
Recurrence: Each summer term
Version: 4

Events
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Legend: Online, Blended (On-Site/Online), On-Site, C 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 2021, 3 SWS, Language: German, Open in study portal

Lecture (V)
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
Vorlesungsskriptum; Übungsblätter; Lehrbuch: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);
Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen
Easy-Reading-Ausgabe. 3. Aufl., Spektrum Akademischer Verlag, 2006
ISBN: 3-8274-1762-7

Lecture notes; Problem sheets; Textbook: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.);
Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen
Easy-Reading-Ausgabe. 3. Aufl., Spektrum Akademischer Verlag, 2006
ISBN: 3-8274-1762-7
### 7.411 Course: Tax Law I [T-INFO-101315]

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<td><strong>Organisation:</strong> KIT Department of Informatics</td>
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<tr>
<td><strong>Part of:</strong> M-INFO-101216 - Private Business Law</td>
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Legend: 🌐 Online, 🧩 Blended (On-Site/Online), 📌 On-Site, ✗ Cancelled
7.412 Course: Tax Law II [T-INFO-101314]

**Responsible:** Detlef Dietrich  
**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
### 7.413 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

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<td>Seminar / 📡</td>
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**Legend:** 📡 Online, 🧩 Blended (On-Site/Online), 🗽 On-Site, ✗ Cancelled

**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 20/21, 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.
7.414 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

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**Competence Certificate**  
Alternative exam assessment.

**Prerequisites**  
None

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

**Annotation**  
See German version.
### T 7.415 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

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<td>Mitusch</td>
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#### 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.
## T.416 Course: Telecommunications Law [T-INFO-101309]

- **Responsible:** Dr. Yoan Hermstrüwer
- **Organisation:** KIT Department of Informatics
- **Part of:** M-INFO-101217 - Public Business Law

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### Events

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### Exams

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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
Course: Tendering, Planning and Financing in Public Transport [T-BGU-101005]

- **Responsible:** Prof. Dr.-Ing. Peter Vortisch
- **Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences

**Part of:**
- M-BGU-101064 - Fundamentals of Transportation
- M-BGU-101065 - Transportation Modelling and Traffic Management

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

### Events

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<tr>
<td>ST 2021</td>
<td>6232807</td>
<td>Wettbewerb, Planung und Finanzierung im ÖPNV</td>
<td>2 SWS</td>
<td>Lecture / 🖥</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
**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  
M-WIWI-101507 - Innovation Management

<table>
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**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.
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

Events

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<th>2114845</th>
<th>Tires and Wheel Development for Passenger Cars</th>
<th>2 SWS</th>
<th>Lecture / Online</th>
<th>Leister</th>
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Exams

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<th>Tires and Wheel Development for Passenger Cars</th>
<th>Leister</th>
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<tr>
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<td>Leister</td>
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Legend: 🖥 Online, ♻️ Blended (On-Site/Online), 🗣 On-Site, X Cancelled

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 2021, 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, Wheeltesting
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
7.420 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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**Exams**

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<td>7900297</td>
<td>Topics in Experimental Economics</td>
<td>Reiß</td>
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<td>WT 20/21</td>
<td>7900362</td>
<td>Topics in Experimental Economics</td>
<td>Reiß</td>
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</table>

**Competence Certificate**

The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

**Prerequisites**

None

**Recommendation**

Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

**Annotation**

The course is offered in summer 2020 for the next time, not in summer 2018.
### T.421 Course: Trademark and Unfair Competition Law [T-INFO-101313]

**Responsible:** Dr. Yvonne Matz  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101215 - Intellectual Property Law

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#### Events

| WT 20/21 | 24136 | Trademark and Unfair Competition Law | 2 SWS | Lecture / Matz |

#### Exams

| WT 20/21 | 7500061 | Trademark and Unfair Competition Law | Dreier, Matz |

Legend: 📘 Online, 🌊 Blended (On-Site/Online), 🗣 On-Site, ❌ Cancelled
7.422 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

<table>
<thead>
<tr>
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Exams

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<th>Version</th>
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<td>Traffic Engineering</td>
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Prerequisites
None

Recommendation
None

Annotation
None

Legend: Online, Blended (On-Site/Online), On-Site, Cancelled
7.423 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

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**Events**

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<th>6232804</th>
<th>Simulation von Verkehr</th>
<th>2 SWS</th>
<th>Lecture / Practice (/)</th>
<th>Vortisch, Mitarbeiter/innen</th>
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</table>

**Exams**

<table>
<thead>
<tr>
<th>WT 20/21</th>
<th>8240101800</th>
<th>Traffic Flow Simulation</th>
<th>Vortisch</th>
</tr>
</thead>
</table>

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 2021, 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
<table>
<thead>
<tr>
<th>Events</th>
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<th>6232802</th>
<th>Verkehrsmanagement und Telematik</th>
<th>2 SWS</th>
<th>Lecture / Practice</th>
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<tr>
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<td>8240101799</td>
<td>Traffic Management and Transport Telematics</td>
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| Prerequisites | None |
| Recommendation | None |
| Annotation | None |
7.425 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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**Events**

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<th>Grading scale</th>
<th>Recurrence</th>
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<td>Lecture / Online</td>
<td>Mitusch, Szimba</td>
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<td>Übung zu Transportökonomie</td>
<td>1 SWS</td>
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<td>Practice / Online</td>
<td>Mitusch, Szimba, Wisotzky</td>
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**Exams**

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<thead>
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<th>Exams</th>
<th>Code</th>
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<th>Recurrence</th>
<th>Responsible</th>
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<td>Transport Economics</td>
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</table>

**Legend:** 📱 Online, 🎮 Blended (On-Site/Online), 🟢 On-Site, ✗ Canceled

**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**

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<tr>
<th>Code</th>
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<tbody>
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**Literature**


**7.426 Course: Transportation Data Analysis [T-BGU-100010]**

**Responsible:** Dr.-Ing. Martin Kagerbauer

**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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<td>Each winter term</td>
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**Events**

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<th>Lecture / Practice</th>
<th>Credits</th>
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<td>Empirische Daten im Verkehrswesen</td>
<td>2 SWS</td>
<td>Lecture / Practice</td>
<td>Kagerbauer</td>
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**Exams**

<table>
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<th>Lecture / Practice</th>
<th>Credits</th>
<th>Grading scale</th>
<th>Recurrence</th>
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<tbody>
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<td></td>
<td>Lecture / Practice</td>
<td>Kagerbauer</td>
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</table>

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
### 7.427 Course: Transportation Systems [T-BGU-106610]

**Responsible:** Prof. Dr.-Ing. Peter Vortisch  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101064 - Fundamentals of Transportation

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#### Events

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<td>Lecture</td>
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#### Exams

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

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
7.428 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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**Exams**

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**Legend:** 📱 Online, 🌐 Blended (On-Site/Online), ⚑ On-Site, ✗ Cancelled

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
7.429 Course: Turnkey Construction I [T-BGU-111313]

**Responsible:** Prof. Dr.-Ing. Shervin Haghseno

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

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction

**Type**
- Oral examination

**Credits**
- 1.5

**Grading scale**
- Grade to a third

**Recurrence**
- Each summer term

**Expansion**
- 1 terms

**Version**
- 1

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<td>Lecture / Online</td>
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**Legend:**
- Online
- Blended (On-Site/Online)
- On-Site
- Cancelled

**Prerequisites**
- None

**Recommendation**
- None

**Annotation**
- None
7.430 Course: Turnkey Construction II [T-BGU-111210]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno

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

**Part of:**
- M-BGU-101884 - Lean Management in Construction
- M-BGU-101888 - Project Management in Construction
- M-BGU-105592 - Digitalization in Facility Management

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**Events**

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<th>Lecture / 🖥</th>
<th>Teizer, Schneider</th>
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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
# 7.431 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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**Events**

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<th>Credits</th>
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<td>1 SWS</td>
<td>Practice / 🖥️</td>
<td>Each winter term</td>
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**Exams**

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</table>

**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**

<table>
<thead>
<tr>
<th>Code</th>
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<th>Recurrence</th>
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<td>1 SWS</td>
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*Open in study portal*
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
Übungstermine freitags 15:45 Uhr - 17:15 Uhr.
Bekanntgabe der konkreten Termine erfolgt über die Institutshomepage.

Die Teilnahme ist an eine Teilnahme der Veranstaltung Globale Produktion gekoppelt. Nur mit einer Teilnahme an der Vorlesung kann die Übung wahrgenommen werden.

Lecture dates on Fridays, 15:45 h - 17:15 h, exact dates will be announced on the Homepage of the institute.

Participation is linked to participation in the course Global Production and Logistics - Part 1: Global Production. Only with a participation in the lecture the exercise can be attended.
### 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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#### Exams

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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
### 7.433 Course: Urban Water Infrastructure and Management [T-BGU-106600]

**Responsible:** 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**
- written exam, 60 min.

**Prerequisites**
- none

**Recommendation**
- none

**Annotation**
- none
### 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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Legend: 📤 Online, 📦 Blended (On-Site/Online), ⏳ On-Site, ✗ Canceled

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

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

#### Valuation

2530212, WS 20/21, 2 SWS, Language: English, Open in study portal

**Lecture (V) Online**

**Content**

Firms prosper when they create value for their shareholders and stakeholders. This is achieved by investing in projects that yield higher returns than their according cost of capital. Students are told the basic tools for firm and project valuation as well as ways to implement these tools in order to enhance a firm's value and improve its investment decisions. Among other things, the course will deal with the valuation of firms and individual projects using discounted cash flow and relative valuation approaches and the valuation of flexibility deploying real options.

**Topics:**

- Projections of cash flows
- Estimation of the cost of capital
- Valuation of the firm
- Mergers and acquisitions
- Real options

**Learning outcomes:** Students are able to

- evaluate complex investment projects by taking a financial view,
- value firms,
- assess the advantageousness of potential merger and acquisitions.

**Literature**

Weiterführende Literatur

7.435 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

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Exams

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<td>Gauterin</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
Oral Examination

Duration: 30 up 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 Comfort and Acoustics I
2113806, WS 20/21, 2 SWS, Language: German, Open in study portal

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
Kann nicht mit der Veranstaltung [2114856] kombiniert werden.
Can not be combined with lecture [2114856]
**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

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**

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.

**Literature**


2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006


Das Skript wird zu jeder Vorlesung zur Verfügung gestellt
### 7.436 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>Each summer term</td>
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#### Events

| ST 2021 | 2114825 | Vehicle Comfort and Acoustics II | 2 SWS | Lecture / 🖥 | Gauterin |
| ST 2021 | 2114857 | Vehicle Ride Comfort & Acoustics II | 2 SWS | Lecture / 🖥 | Gauterin |

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

**Competence Certificate**  
**Oral Examination**

- **Duration:** 30 up 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:*
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

Kann nicht mit der Veranstaltung [2114857] kombiniert werden.
Can not be combined with lecture [2114857]

Literature

Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.

Vehicle Ride Comfort & Acoustics II

2114857, SS 2021, 2 SWS, Language: English, Open in study portal

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
Genaue 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].

Literature
Das Skript wird zu jeder Vorlesung zur Verfügung gestellt.
The script will be supplied in the lectures.
### 7.437 Course: Vehicle Mechatronics I [T-MACH-105156]

**Responsible:** Prof. Dr.-Ing. Dieter Ammon  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- M-MACH-101264 - Handling Characteristics of Motor Vehicles  
- M-MACH-101265 - Vehicle Development

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**Competence Certificate**  
Written examination

**Duration:** 90 minutes  
**Auxiliary means:** none  

**Prerequisites**  
none
### Virtual Engineering I

**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

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**Credits:** 4

**Grading scale:** Grade to a third

**Recurrence:** Each winter term

**Version:** 2

**Exams**

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**Competence Certificate**

Written examination 90 min.

**Prerequisites**

None

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

#### Virtual Engineering I

**2121352, WS 20/21, 2 SWS, Language: English, Open in study portal**

**Lecture (V) Online**

**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 20/21, 2 SWS, Language: English, Open in study portal**

**Practice (Ü) Online**

**Content**

The theoretical Konzepts 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
### 7.439 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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**Events**

| ST 2021 | 2122378 | Virtual Engineering II | 2/1 SWS | Lecture / Practice (🖥) | Ovtcharova, Mitarbeiter |

**Exams**

| WT 20/21 | 76-T-MACH-102124 | Virtual Engineering II | Ovtcharova |

**Competence Certificate**  
Written examination 90 min.

**Prerequisites**  
None

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

**Virtual Engineering II**  
2122378, SS 2021, 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 Vorlesungsbegin bekannt gegeben / Additional practice times (1 SWS) will be announced at the beginning of the lecture.

**Literature**  
Vorlesungsfolien / Lecture slides
**7.440 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

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**Events**

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<td>Virtual Engineering Lab</td>
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<td>Project (P / 🧩)</td>
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<td>3 SWS</td>
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</table>

**Exams**

**Competence Certificate**

Assessment of another type (graded), procedure see webpage.

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

## Virtual Engineering Lab

2123350, WS 20/21, SWS, Language: German/English, Open in study portal

**Project (PRO)**

Blended (On-Site/Online)

**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

## Virtual Engineering Lab

2123350, SS 2021, 3 SWS, Language: German/English, Open in study portal

**Project (PRO)**

Blended (On-Site/Online)

**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
7.441 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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**Events**

| ST 2021 | 2121003 | Virtual Solution Methods and Processes | 4 SWS | Project (P / 🧩) | Maier |

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

**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 2021, 4 SWS, Language: German/English, Open in study portal  
Project (PRO)  
Blended (On-Site/Online)

**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.

**Organizational issues**
Siehe ILIAS und Homepage zur Lehrveranstaltung
7.442 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

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**Competence Certificate**

Assessment of another type (graded), procedure see webpage.

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

**Virtual training factory 4.X**

2123351, WS 20/21, 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 [Homepage zur Lehrveranstaltung](#)

**Literature**

Keine / None

---

**Virtual training factory 4.X**

2123351, SS 2021, 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
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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**Competence Certificate**
The assessment consists of a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

**Prerequisites**
none

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

**Warehousing and distribution systems**

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</table>

**Literature**

ARNO LD, Dieter, FURMANS, Kai (2005)
Materialfluss in Logistiksystemen, 5. Auflage, Berlin: Springer-Verlag

ARNO LD, 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, Handhaben, Lagern, Kommissionieren, Braunschweig, Wiesbaden: Vieweg

WISSER, Jens (2009)
Der Prozess Lagern und Kommissionieren im Rahmen des Distribution Center Reference Model (DCRM); Karlsruhe: Universitätsverlag

Eine ausführliche Übersicht wissenschaftlicher Paper findet sich bei:

ROODBERGEN, Kees Jan (2007)
Warehouse Literature
### Course: Wastewater Treatment Technologies for Industrial Engineers [T-BGU-111299]

**Responsible:** 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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**Wastewater Treatment Technologies**  
Lecture / Practice (🖥)

Fuchs, Hiller

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**Competence Certificate**  
presentation, appr. 15 min., term paper, appr. 10 pages

**Prerequisites**  
none

**Recommendation**  
none

**Annotation**  
none
7.445 Course: Water Chemistry and Water Technology I [T-CIWVT-101900]

**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</td>
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<td>Practice/🖥</td>
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**Exams**

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<tr>
<td>ST 2021</td>
<td>Water Chemistry and Water Technology I</td>
<td>Horn, Abbt-Braun</td>
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</table>

**Prerequisites**

T-CIWVT-103351 - Wasserchemisches Praktikum must be passed.

---

Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ☑ Cancelled
7.446 Course: Water Chemistry and Water Technology II [T-CIWVT-101901]

**Responsible:** Prof. Dr. Harald Horn

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** M-CIWVT-101122 - Water Chemistry and Water Technology II

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**Events**

| WT 20/21 | 22603 | Scientific Principles for Water Quality Assessment | 2 SWS | Lecture / 🖥 | Abbt-Braun |
| ST 2021 | 22605 | Membrane Technologies in Water Treatment | 2 SWS | Lecture / 🖥 | Horn, Saravia |

**Exams**

| WT 20/21 | 7232003 | Water Chemistry and Water Technology II | Horn, Abbt-Braun |

**Prerequisites**

The module "Water Chemistry and Water Technology I" must be passed.

**Responsible:** Jun.-Prof. Dr. Julian Thimme

**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**
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.
7.448 Course: Web Science [T-WIWI-103112]

**Responsible:** 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

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**Exams**

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<td>Web Science (Registration until 12 July 2021)</td>
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</table>

**Competence Certificate**

The exam will be offered for the last time for first-time takers in the summer semester 2021. The last opportunity to take the exam (for repeaters only) is in the winter semester 2021/22.

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

**Annotation**

The lecture is no longer offered.
## 7.449 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

**Type:** Oral examination  
**Credits:** 4  
**Grading scale:** Grade to a third  
**Recurrence:** Each winter term  
**Version:** 1

### Events

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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 20/21, 2 SWS, Language: German, Open in study portal
**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.

**Organizational issues**

Blockveranstaltung im Februar. Zur Teilnahme an der Vorlesung ist eine Anmeldung beim Dozenten per E-Mail (majid.farajian@kit.edu) bis 15.01.2021 erforderlich. Voraussichtlich wird die Vorlesung online stattfinden.

Ganztägige Vorlesungstermine:

04.02.2021

05.02.2021

11.02.2021

12.02.2021

**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.
7.450 Course: Wildcard Key Competences Seminar 1 [T-WIWI-104680]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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### 7.452 Course: Wildcard Key Competences Seminar 3 [T-WIWI-104682]

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Industrial Engineering and Management M.Sc.  
Module Handbook as of 09/04/2021
7.453 Course: Wildcard Key Competences Seminar 4 [T-WIWI-104683]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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Course: Wildcard Key Competences Seminar 5 [T-WIWI-104684]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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Organisation: University
Part of: M-WIWI-101808 - Seminar Module
### 7.456 Course: Wildcard Key Competences Seminar 8 [T-WIWI-105956]

**Organisation:** University  
**Part of:** M-WIWI-101808 - Seminar Module

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7.457 Course: Wildcard Seminar Module Master [T-WIWI-110215]

Organisation: University
Part of: M-WIWI-101808 - Seminar Module

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7.458 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

<table>
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<tr>
<td>Analyse strategischer Interaktion</td>
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<tr>
<td>(Master)</td>
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<tr>
<td>2 SWS</td>
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<tr>
<td>Seminar / Online</td>
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<td>Lindstädt</td>
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| ST 2021                          |
| 2577922                          |
| Workshop Business Wargaming -    |
| Analyse strategischer Interaktion |
| (Master)                         |
| 2 SWS                           |
| Seminar / Online                 |
| Lindstädt                       |

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<tr>
<td>Workshop Business Wargaming –</td>
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<tr>
<td>Analyzing Strategic Interactions</td>
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<tr>
<td>Lindstädt</td>
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| ST 2021                          |
| 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, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)
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.

Organizational issues
4 Blöcke mittwochs nachmittags
siehe Institusthomepage

Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)
2577922, SS 2021, 2 SWS, Language: German, Open in study portal
Organizational issues
4 Blöcke mittwochs nachmittags
siehe Institutshomepage
### 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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**Responsible:** Lindstädt

**Events**

- **WT 20/21**  
  - 2577923  
  - Workshop aktuelle Themen Strategie und Management (Master)  
  - 2 SWS  
  - Seminar / 📱  
  - Lindstädt

**Exams**

- **WT 20/21**  
  - 7900171  
  - Workshop Current Topics in Strategy and Management  
  - Lindstädt

**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:**

**Workshop aktuelle Themen Strategie und Management (Master)**

- **2577923, WS 20/21, 2 SWS, Language: German,** [Open in study portal]

**Seminar (S)**

- **Online**
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.

Organizational issues
mittwochs tba
**7.460 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

**Events**

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**Exams**

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<td>2 SWS</td>
<td>Lecture / 📲</td>
<td>Last</td>
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**Competence Certificate**
oral exam (about 20 min)

**Prerequisites**
none

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

**V X-ray optics**

2141007, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)

**Content**
The lecture covers general principles of optics as well as basics, functioning and application of reflective, refractive and diffractive X-ray optical elements and systems. Selected X-ray analytical imaging methods and the necessary optical elements are discussed including their potentials and limitations.

**Organizational issues**
Termin und Ort nach Absprache mit den Angemeldeten, bitte zur Terminabsprache für die Blockvorlesung (vier ganze Tage in einer Woche zwischen Ende Februar und Mitte April 2021) bis Ende Dezember 2020 bei arndt.last@kit.edu melden.

Interested students please contact arndt.last@kit.edu to arrange a time for the four days full day block lecture (will be between end of February and mid April 2021) until end december 2020.

**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
Content
see Institute homepage
If you are interested, please contact arndt.last@kit.edu by 24.4.2020 to make an appointment.

Organizational issues
Interessenten melden sich bitte zur Terminabsprache bis zum 20.4.2020 bei arndt.last@kit.edu