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Welcome to the new module handbook of your study programme

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!

The following contact persons are at your disposal for questions and problems at any time.

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Write to us!
2 About this handbook

2.1 Notes and rules

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

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

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

2.1.1 Begin and completion of a module

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

2.1.2 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.

2.1.3 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.

2.1.4 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.

2.1.5 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.

2.1.6 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.

2.1.7 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.

2.1.8 Further information

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).

2.2 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
3 Why Industrial Engineering and Management?

The Industrial Engineering and Management study programme is attractive for you if you want to pursue economic and technical interests during your studies. There are three main reasons why graduates have huge job opportunities:

That speaks (among other things) for the course of studies:

- Germany is a high-tech country that depends on innovation. Anyone who wants to take on responsibility in a company here benefits from an interdisciplinary course of study in economics and technology.
- In the digital society, the distinction between technical and business issues is becoming blurred. Industrial engineers understand both and can therefore assume important interface functions.
- Data and data-based decisions are becoming increasingly important in companies and research. The Industrial Engineering and Management study programme has a strong quantitative-methodological orientation and thus prepares students perfectly for these tasks.

You can find more information about the program here:

https://ranking.zeit.de/che/de/fachinfo/13

Why Industrial Engineering and Management at KIT? There are some universities in Germany where you can study Industrial Engineering and Management very well. In comparison, studying with us has three important advantages:

- Flexibility If you are study Industrial Engineering and Management at KIT, you can tailor your course content to suit your individual needs. At the beginning of your studies, you do not yet decide on a technical subject. First of all, our compulsory courses in the basic programme offer you a broad overview. In the subsequent specialisation programme, you can choose the course content in the technical subjects and economics according to your own interests and goals. Link to the module manual
- High Informatics share Digitisation permeates all sectors of the economy and technology. For this reason, Informatics content is particularly anchored in both our basic and advanced programs. As a graduate, you can play an active role in the digital transformation of business and society.
- Our own faculty The Industrial Engineering and Management study programme is the core course of studies at the KIT department of Economics. The courses in economics and Informatics are designed for your course of studies and aligned to your interests.

What else speaks for an Industrial Engineering and Management study programme at KIT? These three advantages make the Industrial Engineering and Management study programme at KIT unique. In addition, there are a number of other reasons for studying with us:

- Top positions in rankings. In surveys of students and HR managers at companies, our degree programme regularly scores very well.
- Job opportunities. After completing their studies with us, students usually quickly find a job that they like.
- Found your own business. At KIT you will find an ideal environment for starting your own business. Information on start-up activities at KIT can be found at http://kit-gruenderschmiede.de/de/gruenderschmiede/fuer-studierende/
- Student activities. At our faculty and at the KIT, students are committed to themselves and others in a variety of ways. You can find an overview under Student Life at the Department, for example.
- Sports Offer. At KIT you will find a wide range of sports activities. Examples are the KIT SC (kitsc.de/ External Link) and the University Sports Programme (www.sport.kit.edu/hochschulsport/ External Link). Campus University. The KIT has a large campus directly in the city centre of Karlsruhe.
4 The Bachelor's degree program in Industrial Engineering and Management

4.1 Qualification objectives of the Bachelor's degree in Industrial Engineering and Management

Graduates of the Bachelor’s degree in Industrial Engineering and Management are equipped with strategically oriented knowledge in economics, engineering sciences, mathematics and information technology acquired during the three-semester core program. The economics section includes business-related topics from the financial industry, company management, information industry, production management, marketing and accounting as well as economic correlations of microeconomics and macroeconomics. The math section is divided into mathematics, statistics and operations research. It includes analysis and linear algebra, descriptive and inductive statistics, elementary probability theory and optimization methods.

In the engineering field, the focus is on material and energy balances, material characterization and development, engineering mechanics and electrical engineering.

The technological area is covered by the Applied and Theoretical Computer Science. Through the comprehensive methodological basis, the graduates are in a position to acknowledge and apply specialized basic concepts, methods, models and approaches. They are also able to analyze and review economic and technological structures and processes.

Graduates can independently solve basic engineering calculations and are able to apply important mathematical concepts and methods to solve concrete tasks.

The graduates have deeper knowledge in business administration, economics, computer science, operations research and engineering. Specialization is either done in the field of business administration or engineering depending on one's wishes. Additional knowledge in statistics, law or sociology is also offered depending on one's interests. They are able to react based on this knowledge from the different subjects and disciplines. They thereby largely operate independently in economic, technical and technological topics and survey, analyze, interpret and evaluate the situations systematically.

They are able to classify specialized problems as well as model and choose appropriate methods and procedures for solving the given tasks as well as derive improvement potentials. They know how to validate, illustrate and interpret the achieved results. This practical use of their know-how also takes into account the social, scientific and ethical aspects.

Graduates of the Bachelor's degree in Industrial Engineering and Management master the basics of project management and are able to assume responsibility in interdisciplinary teams. They are in a position to argue and defend their position both before expert representatives and laypersons.

They have the ability to apply the acquired information on career-related activities in the industry, service sector or in the public management as well as take up a Master's degree program in Industrial Engineering and Management or any other related course.

4.2 Structure of the Bachelor's degree program in Industrial Engineering and Management SPO 2015

The Bachelor’s degree program in Industrial Engineering and Management entails a six-semester standard study period. The basic program in the first three semesters is systematically structured. In the fourth to fifth semesters, a more advanced, specialization program that can be structured depending on one's personal interests and goals is offered.

Figure 2 shows the course and module structure with the respective credit points as well as an example of a possible distribution of modules and courses in the basic program over the semesters, which has proven to be useful.
In the basic program (blue), the business administration, economics, informatics, operations research, engineering sciences, statistics and mathematics modules are compulsory. In the 3rd semester, one can choose between Material Transformation and Balances, Engineering Mechanics and Material Science in the engineering basic module.

In the specialization program (green), a module must be selected from each of the following areas: business administration, economics, informatics, operations research and engineering. As part of the mandatory courses, one seminar module (independent of the course) and two modules must be completed. One module can be selected from business administration or engineering subjects and the other from business administration, economics, informatics, operations research, engineering, statistics, law or sociology.

The internship can be completed before or during the Bachelor's program. The performance record of the completed internship is required for registration for the final module examination in the course.

One is free to structure his/her individual course plan as he/she wishes (taking into account the respective provisions of the study and examination regulations as well as applicable module regulations) and choose the semester he/she wishes to start and/or complete the selected modules. It is however strongly recommended to adhere to the proposal for the first three semesters. The content of the courses is interdisciplinary and coordinated accordingly; the intersection freedom of lectures and examination dates is guaranteed for the recommended study semester.

All modules of the basic and advanced program, including the various alternatives within the module, can be found in this module handbook. Seminars that can be taken up as part of the seminar module are published at the WIWi portal at https://portal.wiwi.kit.edu/Seminare.

### 4.3 Key Skills

The Bachelor's degree course in Industrial Engineering and Management at the 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. 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

---

**IMAGE:** Structure of the Bachelor's degree program in Industrial Engineering and Management SPO 2015 (recommended)
Key Skills

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 compulsory courses during the bachelor programme, namely

- Basic programme in economics and business science
- Seminar module
- Mentoring of the bachelor thesis
- Internship
- Business science, economics and informatics modules
## 5 Field of study structure

<table>
<thead>
<tr>
<th>Mandatory</th>
<th>Credits</th>
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<tbody>
<tr>
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<td>Internship</td>
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<td>Business Administration</td>
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<td>Economics</td>
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<td>Operations Research</td>
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<td>Mathematics</td>
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### 5.1 Bachelor Thesis

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**Mandatory**

M-WIWI-101601  Module Bachelor Thesis  12 CR

### 5.2 Internship

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**Mandatory**

M-WIWI-101419  Internship  10 CR
## 5.3 Business Administration

### Mandatory

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<td>M-WIWI-101578</td>
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**Election block: Specialisation Program Business Administration (at least 9 credits)**

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<td>Design, Construction and Sustainability Assessment of Buildings</td>
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<td>Management Accounting</td>
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<td>Essentials of Finance</td>
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## 5.4 Economics

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<td>Public Finance</td>
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<td>M-WIWI-101599</td>
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<td>M-WIWI-101668</td>
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## 5.5 Informatics

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**Election block: Specialisation Program Informatics (at least 9 credits)**

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<td>M-WIWI-105112</td>
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### 5.6 Operations Research

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**Election block: Specialisation Program Operations Research (1 item)**

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### 5.7 Engineering Sciences

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<td>M-MACH-101260</td>
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**Election block: Specialisation Program Engineering Sciences (at least 9 credits)**

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<td>Rail System Technology</td>
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<td>Introduction to Natural Hazards and Risk Analysis</td>
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<td>M-ETIT-102379</td>
<td>Power Network</td>
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<td>Vehicle Development</td>
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<td>Mechanical Design</td>
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<tr>
<td>M-MACH-101277</td>
<td>Material Flow in Logistic Systems</td>
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<tr>
<td>M-WIWI-101432</td>
<td>Introduction to Statistics</td>
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### 5.10 Compulsory Elective Modules

#### Credits
- **21**

**Election notes**
Within the scope of the elective compulsory area, the seminar module (independent of subject) and two modules are to be taken. One module must be chosen from the subjects Business Administration or Engineering Sciences, the other from the subjects Business Administration, Economics, Informatics, Operations Research, Engineering Sciences, Statistics, Law or Sociology.

**Election regulations**
Elections in this field must be complete.

<table>
<thead>
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**Election block: Business Administration oder Engineering Sciences (9 credits)**

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<td>Rail System Technology</td>
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<td>Design, Construction and Sustainability Assessment of Buildings</td>
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<td>Management Accounting</td>
<td>9 CR</td>
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<td>M-WIWI-101460</td>
<td>CRM and Service Management</td>
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<td>eFinance</td>
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<tr>
<td>M-WIWI-104838</td>
<td>Introduction to Natural Hazards and Risk Analysis</td>
<td>9 CR</td>
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<td>M-ETIT-102379</td>
<td>Power Network</td>
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<td>M-MACH-101264</td>
<td>Handling Characteristics of Motor Vehicles</td>
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**Election block: Business Administration (at most 9 credits)**

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**Election block: Economics (at most 9 credits)**

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**Election block: Informatics (at most 9 credits)**

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**Election block: Operations Research (at most 9 credits)**

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**Election block: Engineering Sciences (at most 9 credits)**

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<td>Introduction to Natural Hazards and Risk Analysis</td>
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<td>Handling Characteristics of Motor Vehicles</td>
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<td>Vehicle Development</td>
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<td>M-GEISTSOZ-101167</td>
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6 Modules


Responsible: Prof. Dr.-Ing. Alexander Fidlin
Dr. Volker Gaukel
Prof. Dr. Michael Hoffmann

Organisation: KIT Department of Economics and Management
Part of: Engineering Sciences (mandatory)

<table>
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<tr>
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Election block: Compulsory Elective Courses (between 3 and 5 credits)

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<td>Material Science II for Business Engineers</td>
<td>5 CR</td>
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<tr>
<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II: Dynamics</td>
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<td>Process Fundamentals by the Example of Food Production</td>
<td>3 CR</td>
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<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5 CR</td>
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Competence Certificate
See course description.

Competence Goal
See German version.

Prerequisites
None

Content
The module focuses on basic engineering topics related to materials science, engineering mechanics and food processing.

Annotation
The course T-ETIT-100534 "Electrical Engineering for Business Engineers, Part II" is only offered temporarily in the module.
It should be pointed out that "Material Science II for Business Engineers" and "Electrical Engineering for Business Engineers, Part II" are not offered in winter term, but only in summer term.

Workload
The total workload for this module is approximately 90 hours.
Competence Certificate

Due to a research semester of Professor Nickel in WS 19/20, the events 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://doli.or.kit.edu/Lehrveranstaltungen.php for further details.

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 Supply Chain Management and their respective optimization problems,
- is acquainted with classical location problem models (in the plane, on 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.

Prerequisits

At least one of the courses Facility Location and Strategic Supply Chain Management and Tactical and Operational Supply Chain Management has to be taken.

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 Supply Chain Management. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities like 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
The courses Introduction to Operations Research I and II are helpful.

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

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.3 Module: Applied Informatics [M-WIWI-105112]

**Responsible:**
Prof. Dr. Andreas Oberweis  
Prof. Dr. Ali Sunyaev  
Prof. Dr. York Sure-Vetter  
Prof. Dr. Melanie Volkamer

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

**Part of:**  
Informatics (Specialisation Program Informatics)

<table>
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<td>9</td>
<td>Each term</td>
<td>1 semester</td>
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**Election block: Advanced Programming (1 item)**

- T-WIWI-102747  
  *Advanced Programming - Java Network Programming*  
  4.5 CR  
  Ratz, Zöllner

- T-WIWI-102748  
  *Advanced Programming - Application of Business Software*  
  4.5 CR  
  Klink, Oberweis

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

- T-WIWI-110340  
  *Applied Informatics – Applications of Artificial Intelligence*  
  4.5 CR  
  Sure-Vetter

- T-WIWI-110341  
  *Applied Informatics – Database Systems*  
  4.5 CR  
  Oberweis

- T-WIWI-110342  
  *Applied Informatics – Information Security*  
  4.5 CR  
  Volkamer

- T-WIWI-110339  
  *Applied Informatics – Principles of Internet Computing: Foundations for Emerging Technologies and Future Services*  
  4.5 CR  
  Sunyaev

- T-WIWI-110338  
  *Applied Informatics – Modelling*  
  4.5 CR  
  Oberweis, Sure-Vetter

- T-WIWI-110343  
  *Applied Informatics – Software Engineering*  
  4.5 CR  
  Oberweis

**Competence Certificate**

The assessment is carried out as two partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved.

- Partial exam I: *Advanced Programming - Java Network Programming* or alternatively *Advanced Programming - Application of Business Software*
- Partial exam II: all the rest

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 capability of dealing with the practical application of the Java programming language (which is the dominating programming language in many application areas) or alternatively the ability to configure, parameterize and deploy enterprise software to enable, support and automate business processes,
- knows in depth methods and systems of a core area or a core application area of Informatics according to the contents dealt with in the lectures,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

**Content**

In this module, object-oriented programming skills using the Java programming language are further deepened. Alternatively important fundamentals of business information systems are conveyed that enable, support and accelerate new forms of business processes and organizational forms. Based on a core application area, basic methods and techniques of computer science are presented.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
6.4 Module: Applied Microeconomics [M-WIWI-101499]

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

<table>
<thead>
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<th>Election block: Compulsory Elective Courses (at least 9 credits)</th>
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<td>T-WIWI-102892</td>
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<tr>
<td>T-WIWI-102850</td>
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<td>T-WIWI-102844</td>
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<td>T-WIWI-102736</td>
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<td>T-WIWI-100005</td>
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</table>

**Compensation 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  
- are introduced to the basic theoretical analysis of strategic interaction situations and shall be able to analyze situations of strategic interaction systematically and to use game theory to predict outcomes and give advice in applied economics settings, (course "Introduction to Game Theory");  
- are exposed to the basic problems of imperfect competition and its implications for policy making; (course "Industrial Organization");  
- are provided with the basic economics of network industries (e.g., telecom, utilities, IT, and transport sectors) and should get a vivid idea of the special characteristics of network industries concerning planning, competition, competitive distortion, and state intervention, (course "Competition in Networks").

**Prerequisites**  
None.

**Content**  
The module's purpose is to extend and foster skills in microeconomic theory by investigating a variety of applications. Students shall be able to analyze real-life problems using microeconomics.

**Recommendation**  
Completion of the module Economics is assumed.

**Workload**  
The total workload for this module is approximately 270 hours. For further information see German version.
## 6.5 Module: Automotive Engineering [M-MACH-101266]

### Responsible:
Prof. Dr. Frank Gauterin

### Organisation:
KIT Department of Mechanical Engineering

### Part of:
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<thead>
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<tbody>
<tr>
<td>T-MACH-100092</td>
<td>Automotive Engineering I</td>
<td>6 CR</td>
<td>Gauterin, Unrau</td>
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<tr>
<td>T-MACH-102117</td>
<td>Automotive Engineering II</td>
<td>3 CR</td>
<td>Gauterin, Unrau</td>
</tr>
<tr>
<td>T-MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4.5 CR</td>
<td>Frey, Gauterin, Gießler</td>
</tr>
<tr>
<td>T-MACH-102116</td>
<td>Fundamentals for Design of Motor-Vehicle Bodies I</td>
<td>1.5 CR</td>
<td>Bardehle</td>
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<tr>
<td>T-MACH-102119</td>
<td>Fundamentals for Design of Motor-Vehicle Bodies II</td>
<td>1.5 CR</td>
<td>Bardehle</td>
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<tr>
<td>T-MACH-102093</td>
<td>Fluid Power Systems</td>
<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>T-MACH-108889</td>
<td>BUS-Controls - Advance</td>
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<td>Daß, Geimer</td>
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<td>T-MACH-102203</td>
<td>Automotive Engineering I</td>
<td>6 CR</td>
<td>Gauterin, Gießler</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
- 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 4 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.
6.6 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 (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<th>Version</th>
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**Election block: Wahlpflicht (between 1 and 2 items)**

<table>
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<th>T-MACH-102194</th>
<th>Combustion Engines I</th>
<th>5 CR</th>
<th>Koch, Kubach</th>
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<tr>
<td>T-MACH-105564</td>
<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines</td>
<td>4 CR</td>
<td>Koch, Kubach</td>
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</table>

**Competence 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
6.7 Module: Combustion Engines II [M-MACH-101303]

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

Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

Credits 9
Recurrence Each term
Level 4
Version 2

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-102197 Gas Engines 4 CR Golloch, Kubach
T-MACH-102199 Model Based Application Methods 4 CR Kirschbaum
T-MACH-105169 Engine Measurement Techniques 4 CR Bernhardt

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
It is only possible to choose this module in combination with the module Combustion Engines I. The module is passed only after the final partial exam of Combustion Engines I is additionally passed.
The course Combustion Engines II [2134131] has to be attended.

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
6.8 Module: Control Engineering [M-ETIT-101156]

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

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

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Engineering Sciences)

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<td>T-ETIT-100699</td>
<td>Modelling and Identification</td>
<td>4 CR</td>
<td>Hohmann</td>
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<tr>
<td>T-ETIT-101921</td>
<td>System Dynamics and Control Engineering</td>
<td>6 CR</td>
<td>Hohmann</td>
<td></td>
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</tbody>
</table>

**Competence Goal**

The students

- get familiar with the basic concepts of control theory,
- learn and understand the elements, the structure and the behavior of dynamic systems,
- have insight in the problems of control and intuition about methods available to solve those problems as well in frequency domain as in time domain,
- get familiar with the basic principles and methods for the theoretical and experimental modelling of dynamic systems.

**Prerequisites**

Successful passing of the corresponding modules of the basic program.

**Content**

This module familiarizes students with the basic elements, structures and the behavior of dynamic systems. Both time continuous and time discrete models are regarded. The students gain insight into the problems of control design and methods available to solve such problems in frequency and time domain. Above that, the students learn the basic principles and methods for the theoretical and experimental modelling of dynamic systems.
6.9 Module: CRM and Service Management [M-WIWI-101460]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

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

**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences)

<table>
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**Election block: Compulsory Elective Courses (2 Items)**

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<td>T-WIWI-102595</td>
<td>Customer Relationship Management</td>
<td>4.5 CR</td>
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<tr>
<td>T-WIWI-102597</td>
<td>Operative CRM</td>
<td>4.5 CR</td>
<td>Geyer-Schulz</td>
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</table>

**Competence Certificate**
This module will be offered for the last time in winter semester 2019/20.

The assessment is carried out as partial exams (according to § 4 (1) S. 2 2nd clause of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

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

**Competence Goal**
The student

- understands service management as the managerial foundation of customer relationship management and the resulting implications for strategic management, the organisational structure, and the functional areas of the company,
- develops and designs service concepts and service systems on a conceptual level,
- works in teams on case studies and respects project dates, integrates international literature of the discipline,
- knows the current developments in CRM in science as well as in industry,
- knows the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, ...).

**Prerequisites**
None

**Content**
In the module CRM and Service Management we teach the principles of modern customer-oriented management and its support by system architectures and CRM software packages. Choosing customer relationship management as a company’s strategy requires service management and a strict implementation of service management in all parts of the company.

For operative CRM we present the design of customer-oriented, IT-supported business processes based on business process modelling and we explain these processes in concrete application domains (e.g. marketing campaign management, call center management, sales force management, field services, ...).

Analytic CRM is dedicated to improve the use of knowledge about customers in the broadest sense for decision-making (e.g. product-mix decisions, bonus programs based on customer loyalty, ...) and for the improvement of services. A requirement for this is the tight integration of operative systems with a data warehouse, the development of customer-oriented and flexible reporting systems, and – last but not least – the application of statistical methods (clustering, regression, stochastic models, ...).

**Annotation**
The lecture Customer Relationship Management [2540508] is given in English.

**Workload**
The total amount of work for this module is approximately 270 hours (9 credits). The subdivision is based on the credits of the courses of the module.

The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam periods and the time that is required to achieve the objectives of the module as an average student with an average performance.
6.10 Module: Design, Construction and Sustainability Assessment of Buildings [M-WIWI-101467]

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

<table>
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**Mandatory**

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<tr>
<td>T-WIWI-102742</td>
<td>Design, Construction and Sustainability Assessment of Buildings I</td>
<td>4.5</td>
<td>Lützkendorf</td>
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<tr>
<td>T-WIWI-102743</td>
<td>Design, Construction and Sustainability Assessment of Buildings II</td>
<td>4.5</td>
<td>Lützkendorf</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

- knows the basics of sustainable design, construction and operation of buildings with an emphasis on building ecology
- has knowledge of building ecology assessment procedures and tools for design and assessment
- is capable of applying this knowledge to assessing the ecological advantageousness of buildings as well as their contribution to a sustainable development.

**Prerequisites**
None

**Content**
Sustainable design, construction and operation of buildings currently are predominant topics of the real estate sector, as well as "green buildings". Not only designers and civil engineers, but also other actors who are concerned with project development, financing and insurance of buildings or portfolio management are interested in these topics.

On the one hand the courses included in this module cover the basics of energy-efficient, resource-saving and health-supporting design and construction of buildings. On the other hand fundamental assessment procedures for analysing and communicating the ecological advantageousness of technical solutions are discussed. With the basics of green building certification systems the lectures provide presently strongly demanded knowledge.

Additionally, videos and simulation tools are used for providing a better understanding of the content of teaching.

**Recommendation**
The combination with the module Real Estate Management is recommended.

Furthermore a combination with courses in the area of

- Industrial production (energy flow in the economy, energy politics, emissions)
- Civil engineering and architecture (building physics, building construction)

is recommended.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
6.11 Module: eBusiness and Service Management [M-WIWI-101434]

<table>
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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 students
- understand the strategic and operative design of information and information products,
- analyze the role of information on markets,
- evaluate case studies regarding information products,
- develop solutions in teams.

Prerequisites
None

Content
This module gives an overview of the mutual dependencies of strategic management and information systems. The central role of information is exemplified by the structuring concept of the information life cycle.

The single phases of this life cycle from generation over allocation until dissemination and use of the information are analyzed from a business and microeconomic perspective, applying classical and new theories. The state of the art of economic theory on aspects of the information life cycle are presented. The lecture is complemented by exercise courses. The courses “Platform Economy”, “eFinance: Information systems in finance” and “eServices” constitute three different application domains in which the basic principles of the Internet Economy are deepened. In the core lecture “Platform Economy” the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and marketdesign. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The course “eFinance: information systems for securities trading” provides theoretically profound and also practical-oriented background about the functioning of international financial markets. The focus is placed on the economic and technical design of markets as information processing systems.

In "eServices" the increasing impact of electronic services compared to the traditional services is outlined. The Information- und Communication Technologies enable the provision of services, which are mainly characterized by interactivity and individuality. This course provides basic knowledge about the development and management of ICT-based services.

The theoretic fundamentals of Information systems can be enriched by a practical experience in Special Topics in Information Engineering and Management. Any practical Seminar at the IM can be chosen for the course Special Topics in Information systems.

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 of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Economic Policy I [M-WIWI-101668]

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

<table>
<thead>
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<th>Language</th>
<th>Level</th>
<th>Version</th>
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**Mandatory**

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<tr>
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<td>Basic Principles of Economic Policy</td>
<td>4,5</td>
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**Election block: Compulsory Elective Courses (1 item)**

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<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-109121</td>
<td>Macroeconomic Theory</td>
<td>4,5</td>
<td>Brumm</td>
</tr>
<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
<td>4,5</td>
<td>Wigger</td>
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<tr>
<td>T-WIWI-102908</td>
<td>Personnel Policies and Labor Market Institutions</td>
<td>4,5</td>
<td>Nieken</td>
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<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5</td>
<td>Mitusch</td>
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</table>

**Competence Certificate**

The module examination takes place in the form of examinations (§4(2.1 SPO) of the selected partial module performance. The examination is carried out separately for each partial module and is described there. It is possible to repeat examinations at any regular examination date.

The grades of the partial module correspond to the grades of the passed examinations. The overall grade of the module is formed from the grades of the partial performances weighted with LP.

**Competence Goal**

Students shall be given the ability to

- understand and deepen basic concepts of micro- and macroeconomic theories
- apply those theories to economic policy issues
- understand government interventions in the market and their legitimation from the perspective of economic welfare
- learn how theory-based policy recommendations are derived

**Prerequisites**

The course "Introduction to Economic Policy" is mandatory in the module.

**Content**

- Intervention in the market: micro-economic perspective
- Intervention in the market: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Carriers of economic policy: political-economic aspects

**Recommendation**

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2610012], and Economics II [2600014].

**Workload**

Total effort for 9 credit points: approx. 270 hours. The distribution is made according to the credit points of the courses of the module.
6.13 Module: Economic Theory [M-WIWI-101501]

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

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

**Part of:** Economics (Specialisation Program Economics)

**Compulsory Elective Modules (Economics)**

<table>
<thead>
<tr>
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<th>Duration</th>
<th>Language</th>
<th>Level</th>
<th>Version</th>
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**Elective block: Compulsory Elective Courses (9 credits)**

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<th>Course Title</th>
<th>Credits</th>
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<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory</td>
<td>4,5 CR</td>
<td>Mitusch</td>
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<tr>
<td>T-WIWI-102876</td>
<td>Auction &amp; Mechanism Design</td>
<td>4,5 CR</td>
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<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
<td>4,5 CR</td>
<td>Szech</td>
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<tr>
<td>T-WIWI-102850</td>
<td>Introduction to Game Theory</td>
<td>4,5 CR</td>
<td>Puppe, Reiß</td>
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<td>T-WIWI-102844</td>
<td>Industrial Organization</td>
<td>4,5 CR</td>
<td>Reiß</td>
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<td>Macroeconomic Theory</td>
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<td>Brumm</td>
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<td>T-WIWI-102610</td>
<td>Welfare Economics</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**

See German version.

**Prerequisites**

None

**Content**

The lecture Introduction to Game Theory focuses on the basics of non-cooperative game theory. Model assumptions, solution concepts and applications are discussed in detail both for simultaneous games (normal form games) and for sequential games (extensive form games). Classical equilibrium concepts like the Nash equilibrium or the subgame perfect equilibrium, but also advanced concepts will be discussed in detail. If necessary, a brief insight into cooperative game theory will also be given.

The course Auction & Mechanism Design starts with the basic theory of equilibrium behavior and yield management in single object standard auctions. After introducing the yield equivalence theorem for standard auctions, the focus shifts to mechanism design and its applications for single-object auctions and bilateral exchanges.

The course Economics and Behavior introduces fundamental topics of behavioural economics in terms of content and methodology. Students will also gain insight into the design of economic experimental studies. Students will also be introduced to the reading of and critical examination of current research in behavioural economics.

**Recommendation**

None

**Annotation**

The course T-WIWI-102609 - Advanced Topics in Economic Theory is currently not available.
6.14 Module: eFinance [M-WIWI-101402]

**Responsibility:** Prof. Dr. Christof Weinhardt

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

<table>
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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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<td>T-WIWI-102643</td>
<td>Derivatives</td>
<td>4.5 CR</td>
<td>Uhrig-Homburg</td>
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<td>T-WIWI-102646</td>
<td>International Finance</td>
<td>3 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 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:
- are able to understand and analyse the value creation chain in stock broking,
- are able to adequately identify, design and use methods and systems to solve problems in finance,
- are able to evaluate and criticize investment decisions by traders,
- are able to apply theoretical methods of econometrics,
- learn to elaborate solutions in a team.

**Prerequisites**
The course eFinance: Information Systems for Securities Trading [2540454] is compulsory and must be examined.

**Content**
The module "eFinance: Information engineering and management in finance" addresses current problems in the finance sector. It is investigated the role of information and knowledge in the finance sector and how information systems can solve or extenuate them. Speakers from practice will contribute to lectures with their broad knowledge. Core courses of the module deal with the background of banks and insurance companies and the electronic commerce of stocks in global finance markets. In addition the course Derivatives offers an insight into future and forward contracts as well as the assessment of options. Exchanges and International Finance are also alternatives which provide a supplementary understanding for capital markets.

Information management topics are in the focus of the lecture "eFinance: information engineering and management for securities trading". For the functioning of the international finance markets, it is necessary that there is an efficient information flow. Also, the regulatory frameworks play an important role. In this context, the role and the functioning of (electronic) stock markets, online brokers and other finance intermediaries and their platforms are presented. Not only IT concepts of German finance intermediaries are presented, but also international system approaches will be compared. The lecture is supplemented by speakers from the practice (and excursions, if possible) coming from the Deutsche Börse and the Stuttgart Stock Exchange.

**Annotation**
The current seminar courses for this semester, which are complementary to this module, are listed on following webpage: the http://www.iism.kit.edu/im/lehre

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
## 6.15 Module: Electives in Informatics [M-WIWI-101426]

**Responsible:** Prof. Dr. Andreas Oberweis  
Prof. Dr. Ali Sunyaev  
Prof. Dr. York Sure-Vetter  
Prof. Dr. Melanie Volkamer

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

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

<table>
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### Election block: Compulsory Elective Area (between 1 and 2 items)

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<tbody>
<tr>
<td>T-WIWI-110340</td>
<td>Applied Informatics – Applications of Artificial Intelligence</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-110341</td>
<td>Applied Informatics – Database Systems</td>
<td>4,5</td>
<td>CR</td>
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<tr>
<td>T-WIWI-110342</td>
<td>Applied Informatics – Information Security</td>
<td>4,5</td>
<td>CR</td>
</tr>
<tr>
<td>T-WIWI-110338</td>
<td>Applied Informatics – Modelling</td>
<td>4,5</td>
<td>CR</td>
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<tr>
<td>T-WIWI-110343</td>
<td>Applied Informatics – Software Engineering</td>
<td>4,5</td>
<td>CR</td>
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<td>T-WIWI-110711</td>
<td>Supplement Applied Informatics</td>
<td>4,5</td>
<td>CR</td>
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<td>T-WIWI-104679</td>
<td>Foundations of Mobile Business</td>
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### Election block: Advanced Labs (at most 1 item)

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<tr>
<td>T-WIWI-110541</td>
<td>Advanced Lab Informatics (Master)</td>
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<td>Professorenschaft des Fachbereichs Informatik</td>
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<td>T-WIWI-108439</td>
<td>Advanced Lab Security, Usability and Society</td>
<td>4,5</td>
<td>CR</td>
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<tr>
<td>T-WIWI-109786</td>
<td>Advanced Lab Security</td>
<td>4,5</td>
<td>CR</td>
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<td>T-WIWI-109271</td>
<td>Advanced Lab User Studies in Security</td>
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### Competence Certificate
The assessment is carried out as two 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.

### Competence Goal
The student

- knows and has mastered methods and systems for core topics and core application areas of computer science,
- can choose these methods and system situation adequately and can furthermore design and employ them for problem solving,
- is able to independently find strategic and creative answers in the finding of solutions to well defined, concrete, and abstract problems.

### Prerequisites
None
Content
The elective module conveys advanced knowledge in the area of applied computer science. This includes, for example, the efficient design and optimization of technical systems, the design and management of database applications or the systematic development of large software systems. Moreover, modeling of complex systems, the use of computer science methods to support knowledge management, and the design and implementation of service-oriented architectures are discussed in this module.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
### 6.16 Module: Electrical Engineering [M-ETIT-101155]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** Engineering Sciences (mandatory)

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<tr>
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</table>

**Competence Certificate**  
The assessment of the module is carried out by a written examination about the lecture *Electrical Engineering I* [23223] (according to Section 4(2), 1 of the examination regulation).  
The grade of the module corresponds to the grade of this examination.

**Competence Goal**  
The student knows and understands basic terms of electrical engineering and should be able to carry out simple calculations of DC and AC circuits.

**Content**  
Supporting the lecture, assignments to the curriculum are distributed. These are solved into additional (voluntary) tutorials.

**Workload**  
See German version.
Module: Emphasis in Fundamentals of Engineering [M-MACH-101261]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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**Election block:** Specialization in Fundamentals of Engineering (at least 9 credits)

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<tr>
<td>T-ETIT-100534</td>
<td>Electrical Engineering for Business Engineers, Part II</td>
<td>5 CR</td>
<td>Menesklo</td>
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<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5 CR</td>
<td>Hoffmann</td>
</tr>
<tr>
<td>T-MACH-102210</td>
<td>Introduction to Engineering Mechanics II : Dynamics</td>
<td>5 CR</td>
<td>Fidlin</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 examinations take place at the beginning of the recess period. 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 removed from the average of the partial examinations, with at least two partial exams need to be.

**Competence Goal**

Students acquire and deepen skills in engineering fundamentals and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

**Content**

The module content depends on the elected courses.

**Annotation**

Starting winter term 2016/1017 the course "Introduction to Engineering Mechanics II : Dynamics" [2162276] will be held in winter term.

**Workload**

See German version.
Module: Emphasis Materials Science [M-MACH-101262]

**Responsible:** Prof. Dr. Michael Hoffmann  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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**Election block: Specialization Materials Science (at least 9 credits)**

<table>
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<tr>
<td>T-MACH-102079</td>
<td>Material Science II for Business Engineers</td>
<td>5 CR</td>
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<tr>
<td>T-MACH-102141</td>
<td>Constitution and Properties of Wearresistant Materials</td>
<td>4 CR</td>
<td>Ulrich</td>
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<tr>
<td>T-MACH-100287</td>
<td>Introduction to Ceramics</td>
<td>6 CR</td>
<td>Hoffmann</td>
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<tr>
<td>T-MACH-102102</td>
<td>Physical Basics of Laser Technology</td>
<td>5 CR</td>
<td>Schneider</td>
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<td>T-MACH-102137</td>
<td>Polymer Engineering I</td>
<td>4 CR</td>
<td>Elsner</td>
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<tr>
<td>T-MACH-102138</td>
<td>Polymer Engineering II</td>
<td>4 CR</td>
<td>Elsner</td>
</tr>
<tr>
<td>T-MACH-102139</td>
<td>Failure of Structural Materials: Fatigue and Creep</td>
<td>4 CR</td>
<td>Gruber, Gumbsch</td>
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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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<td>T-MACH-102179</td>
<td>Structural Ceramics</td>
<td>4 CR</td>
<td>Hoffmann</td>
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<tr>
<td>T-MACH-102170</td>
<td>Structural and Phase Analysis</td>
<td>4 CR</td>
<td>Wagner</td>
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<td>T-MACH-100531</td>
<td>Systematic Materials Selection</td>
<td>4 CR</td>
<td>Dietrich</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 examinations take place at the beginning of the recess period. 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 removed from the average of the partial examinations, with at least two partial exams need to be.

**Competence Goal**

Students acquire and deepen skills in fundamentals of materials science and engineering and can apply them to technical problems. Specific teaching objectives are agreed with the respective coordinator of the course.

**Prerequisites**

None

**Content**

The module content depends on the elected courses.

**Workload**

The module requires an average workload of 270 hours.

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

<table>
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<td>Each winter term</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module.
The assessment of "Empirical Finance" is carried out in form of a written exam (90 minutes), the assessment of "Python for Empirical Finance" is carried out in form of six biweekly Python programming tasks and offered each winter term.
The overall grade of the module is the grade of the written exam weighted with factor 0.75 and the grade for the Python programming tasks weighted with factor 0.25. The resulting grade is truncated after the first decimal.

Competence Goal
Students learn the fundamental concepts of modern portfolio theory and their realization in Python. The course focuses on the implementation of statistical concepts in Python, such that students are able to make investment decision under uncertainty after successful completion of this module.

Content
The module covers several topics, among them:
- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns with Factor Models and ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions?

Recommendation
Prior knowledge of statistics is recommended.

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.
6.20 Module: Energy Economics [M-WIWI-101464]

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

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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<td>Introduction to Energy Economics</td>
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**Election block: Supplementary Courses (3,5 credits)**

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<td>Renewable Energy-Resources, Technologies and Economics</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) about the lecture *Introduction into Energy Economics* [2581010] and one optional lecture of the 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
- is able to understand interdependencies in energy economics and to evaluate ecological impacts in energy supply,
- is able to assess the different energy carriers and their characteristics,
- knows the energy political framework conditions,
- gains knowledge about new market-based conditions and the cost and potentials of renewable energies in particular.

**Prerequisites**
The lecture *Introduction into Energy Economics* [2581010] has to be examined.

**Content**
*Introduction to Energy Economics:* Characterisation (reserves, suppliers, cost, technologies) of different energy carriers (coal, gas, oil, electricity, heat etc.)

*Renewable Energy - Resources, Technology and Economics:* Characterisation of different renewable energy carriers (wind, solar, hydro, geothermal etc.)

*Energy Policy:* Management of energy flows, energy-political targets and instruments (emission trading etc.)

**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.

**Annotation**
Additional study courses (e.g. from other universities) can be transferred to the grade of the module on special request at the institute.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
6.21 Module: Energy Generation and Network Components [M-ETIT-101165]

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

**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences)

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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 examinations take place at the beginning of the recess period. 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 weighted average of the grades for each course and truncated after the first decimal.

**Competence Goal**

The student

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

**Prerequisites**

It is only possible to choose this module in combination with the module Power Networks [WW3INGETIT3]. The module is passed only after the final partial exam of Power Networks is additionally passed.

**Content**

The module deals with basic knowledge about the structure and operation of electrical power networks and their needed facilities. Further lectures give an insight into specific topics, such as Automation in electric power engineering or the procedures for generating electrical energy.

**Workload**

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

Responsible: Prof. Dr.-Ing. Alexander Fidlin
Organisation: KIT Department of Mechanical Engineering

Part of: Engineering Sciences (mandatory)

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Mandatory

| Mandatory | Introduction to Engineering Mechanics I: Statics and Strength of Materials | 3 CR | Fidlin |

Competence Certificate

The assessment consists of a written examination taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature

Competence Goal

The student

- knows and understands the basic elements of statics,
- is able to solve basic problems in statics independently.

Prerequisites

None

Content

Statics: force • moment • general equilibrium conditions • center of gravity • inner forces in structure • plane frameworks • adhesion

Annotation

Starting summer 2016 the course "Introduction to Engineering Mechanics I: Statics and Strength of Materials" [2162238] will be held in summer term.

Workload

The total workload for this module is approximately 90 hours

Learning type

Lecture and exercises
**6.23 Module: Essentials of Finance [M-WIWI-101435]**

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

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

**Part of:**  
- Business Administration (Specialisation Program Business Administration)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Business Administration)

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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

- has fundamental skills in modern finance
- has fundamental skills to support investment decisions on stock, bond and derivative markets
- applies concrete models to assess investment decisions on financial markets as well as corporate investment and financing decisions.

**Prerequisites**

None

**Content**

The module *Essentials of Finance* deals with fundamental issues in modern finance. The courses discuss fundamentals of the valuation of stocks. A further focus of this module is on modern portfolio theory and analytical methods of capital budgeting and corporate finance.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.24 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 (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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

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**Competence Certificate**

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

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

**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.
6.25 Module: Foundations of Informatics [M-WIWI-101417]

**Responsible:** Dr. rer. nat. Pradyumn Kumar Shukla  
Prof. Dr. York Sure-Vetter

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

**Part of:** Informatics (mandatory)

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<td>5 CR</td>
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<td>T-WIWI-102707</td>
<td>Foundations of Informatics II</td>
<td>5 CR</td>
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**Competence Certificate**
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the individual courses of this module.

The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. For a successful module assessment both partial exams have to be passed.

- Foundations of Informatics I: Written exam in the first week of the recess period (60 min)
- Foundations of Informatics II: Written exam in the first week of the recess period (90 min). It is possible to gain 0.3-0.4 additional grading points for a passed exam by successful completion of a bonus exam.

When both partial exams are passed, the overall grade of the module is the average of the grades for each course weighted by the credit points and truncated after the first decimal.

**Competence Goal**
The student

- knows the main principles, methods and systems of computer science,
- can use this knowledge for applications in advanced computer science courses and other areas for situation-adequate problem solving,
- is capable of finding strategic and creative responses in the search for solutions to well defined, concrete, and abstract problems.

The student can deepen the learned concepts, methods, and systems of computer science in advanced computer science lectures.

**Prerequisites**
None

**Content**
This module conveys knowledge about modeling, logic, algorithms, sorting and searching algorithms, complexity theory, problem specifications, and data structures. From the field of theoretical computer science, formal models of automata, languages and algorithms are presented and applied to the architecture of computer systems.

**Recommendation**
It is strongly recommended to attend the courses of the core program in the following sequence: *Introduction to Programming with Java, Foundations of Informatics I, Foundations of Informatics II*

**Workload**
The total workload for this module is approximately 300 hours.
Module: Foundations of Marketing [M-WIWI-101424]

**Responsible:** Prof. Dr. Martin Klarmann
**Organisation:** KIT Department of Economics and Management
**Part of:** Business Administration (Specialisation Program Business Administration) Compulsory Elective Modules (Business Administration oder Engineering Sciences) Compulsory Elective Modules (Business Administration)

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<td>Managing the Marketing Mix</td>
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**Election block: Supplementary Courses (at least 4,5 credits)**

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<td>Services Marketing and B2B Marketing</td>
<td>3 CR</td>
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<td>T-WIWI-102807</td>
<td>International Marketing</td>
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**Competence Certificate**

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

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

**Prerequisites**

The course *Marketing Mix* is compulsory and must be examined.

**Content**

The core course of the module is "Marketing Mix". This course is compulsory and must be examined. "Marketing Mix" contains instruments and methods that enable you to goal-oriented decisions in the operative marketing management (product management, pricing, promotion and sales management).

To deepen the marketing knowledge students can complete the courses "Services- and B2B-Marketing" and "International Marketing".

**Annotation**

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Fundamentals of Business Administration 1 [M-WIWI-101494]

 Responsible: Prof. Dr. Martin Ruckes
                     Prof. Dr. Marliese Uhrig-Homburg
                     Prof. Dr. Marcus Wouters
 Organisation: KIT Department of Economics and Management
 Part of: Business Administration (mandatory)

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<td>Each term</td>
<td>Ruckes, Uhrig-Homburg, Wouters</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 individual courses of this module. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedure of each course of this module is defined for each course 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 business administration in particular with respect to decision making and the model based view of business corporations
- masters the fundamentals of business and information management as well as the fundamentals business finance and the principles of business accounting
- is able to analyze and assess central tasks, functions and decisions in modern corporations

The knowledge of the two fundamentals modules in business administration forms the basis for the successful completion of advanced courses in the field of business administration and management.

Prerequisites
None

Content
This module provides the fundamentals of business administration and management. Further, the module focuses on the fields of management and organization, information engineering and management, investment and financing as well as of the principles of management and financial accounting.

Recommendation
It is strongly recommended to take the courses in the first semester of study.

Workload
The total workload of the module is about 210 hours. The workload is proportional to the credit points of the individual courses.
**6.28 Module: Fundamentals of Business Administration 2 [M-WIWI-101578]**

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

**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (mandatory)

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<td>4 CR Fichtner, Klarmann, Lützkendorf, Ruckes, Schultmann</td>
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<td>T-WIWI-102816</td>
<td>Financial Accounting and Cost Accounting</td>
<td>4 CR Strych</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. The examinations take place at the beginning of the recess period. Re-examinations are offered at every ordinary examination date. The assessment procedures of each course of this module is defined for each course 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 business administration in particular with respect to decision making and the model based view of business corporations
- masters the fundamentals of production and operations management and marketing as well as the fundamentals of management and financial accounting
- is able to analyze and assess central tasks, functions and decisions in modern corporations

The knowledge of the two fundamentals modules in business administration forms the basis for the successful completion of advanced courses in the field of business administration and management.

**Prerequisites**

None

**Content**

The basics of internal and external accounting and general business administration are taught as the theory of business in the company. Building on this, the focus will be on marketing and production management.

**Recommendation**

It is strongly recommended to take the courses in the second semester (Betriebswirtschaftslehre: Produktionswirtschaft und Marketing) and third semester (Rechnungswesen) of study.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
### 6.29 Module: Fundamentals of Construction [M-BGU-101004]

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

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<td>T-BGU-101675</td>
<td>Project Management</td>
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**Competence Goal**

The student

- is familiar with all substantial domains of construction
- knows and understands substantial construction methods and construction machines
- masters basic construction calculations
- knows and understands the fundamentals of project management in civil engineering
- can apply his / her knowledge in a goal-oriented manner to accomplish a construction project efficiently

**Prerequisites**

none

**Recommendation**

None

**Annotation**

We encourage students to deepen their knowledge in construction by building additional customized modules from the courses offered by TMB. Please consult with the tutors of this module. Further information is available at www.tmb.kit.edu.

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

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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

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<tr>
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<th>Course Title</th>
<th>Credits</th>
<th>Recurrence Per Term</th>
<th>Language</th>
<th>Level</th>
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<tr>
<td>T-WIWI-109938</td>
<td>Digital Services</td>
<td>4.5 CR</td>
<td>9</td>
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<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4.5 CR</td>
<td>9</td>
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<td>Practical Seminar Digital Services</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 services from different perspectives and the concept of value creation in service networks
- know about the concepts, methods and tools for the design, modelling, development and management of digital services and are able to use them
- understand the basic characteristics and effects of integrated information system as an integral element of digital services
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results
- practice skills in the English language in preparation of jobs in an international environment

**Prerequisites**

None

**Content**

Global economy is increasingly determined by services: in industrialized countries nearly 70% of gross value added is achieved in the tertiary sector. Unfortunately, for the design, development and the management of services traditional concepts focused on goods are often insufficient or inappropriate. Besides, the rapid technical advance in the information and communication technology sector pushes the economic importance of digital services even further thus changing the competition environment. ICT-based interaction and individualization open up completely new dimensions of shared value between clients and providers, dynamic and scalable "service value networks" replace established value chains, digital services are provided globally crossing geographical boundaries. This module establishes a basis for further specialization in service innovation, service economics, service design, service modelling, service analytics as well as the transformation and coordination of service networks.

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

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

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Engineering Sciences)

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**Election block: Vehicle Properties (at least 9 credits)**

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<th>Module Name</th>
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<tbody>
<tr>
<td>T-MACH-105152</td>
<td>Handling Characteristics of Motor Vehicles I</td>
<td>3 CR</td>
<td>Unrau</td>
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<tr>
<td>T-MACH-105153</td>
<td>Handling Characteristics of Motor Vehicles II</td>
<td>3 CR</td>
<td>Unrau</td>
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<tr>
<td>T-MACH-105154</td>
<td>Vehicle Comfort and Acoustics I</td>
<td>3 CR</td>
<td>Gauterin</td>
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<tr>
<td>T-MACH-105155</td>
<td>Vehicle Comfort and Acoustics II</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-105156</td>
<td>Vehicle Mechatronics I</td>
<td>3 CR</td>
<td>Ammon</td>
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<tr>
<td>T-MACH-102156</td>
<td>Project Workshop: Automotive Engineering</td>
<td>4,5 CR</td>
<td>Frey, Gauterin, Gießler</td>
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**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**
Knowledge of the content of the courses *Engineering Mechanics I* [2161238], *Engineering Mechanics II* [2162276] and *Basics of Automotive Engineering I* [2113805], *Basics of Automotive Engineering II* [2114835] is helpful.

**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.
**Module: Human Resources and Organizations [M-WIWI-101513]**

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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**Compentence 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
- knows and analyzes basic concepts, instruments, and challenges of present human resource and organizational management.
- uses the techniques he / she has learned to evaluate strategic situations which occur in human resource and organizational management.
- evaluates the strengths and weaknesses of existing structures and rules based on systematic criterions.
- Discusses and evaluates the practical use of models and methods by using case studies.
- has basic knowledge of fit and challenges of different scientific methods in the context of personnel and organizational economics.

**Prerequisites**
The course "Human Resource Management" is compulsory and must be examined.

**Content**
Students acquire basic knowledge in the field of human resource and organizational management. Strategic as well as operative aspects of human resource management practices are analyzed. The module offers an up-to-date overview over basic concepts and models. It also shows the strengths and weaknesses of rational concepts in human resources and organizational management.

The students learn to apply methods and instruments to plan, select, and manage staff. Current issues of organizational management or selected aspects of personnel politics are examined and evaluated.

The focus lies on the strategic analysis of decisions and the use microeconomic or behavioral approaches. Empirical results of field or lab studies are discussed critically.

**Recommendation**
Completion of module Business Administration is recommended.
Basic knowledge of microeconomics, game theory and statistics is recommended.

**Workload**
The total workload for this module is approximately 270 hours.
6.33 Module: Industrial Production I [M-WIWI-101437]

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

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

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**Mandatory**

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<tr>
<td>T-WIWI-102606</td>
<td>Fundamentals of Production Management</td>
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<tr>
<td>T-WIWI-102870</td>
<td>Logistics and Supply Chain Management</td>
<td>3.5 CR</td>
<td>Schultmann, Wiens</td>
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<td>Production Economics and Sustainability</td>
<td>3.5 CR</td>
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**Election block: Supplementary Courses (3,5 credits)**

**Competence Certificate**

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course “Fundamentals of Production Management” [2581950] 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 aware of the important role of industrial production and logistics for production management.
- Students shall use relevant concepts of production management and logistics in an adequate manner.
- Students shall be able to reflect on decision principles in firms and their circumstances in the light of the production management aspects studied.
- Students shall be proficient in describing essential tasks, difficulties and solutions to problems in production management and logistics.
- Students shall be able to describe relevant approaches of modeling production and logistic systems.
- Students shall be aware of the important role of material and energy-flows in production systems.
- Students shall be proficient in using exemplary methods for solving selected problems.

**Prerequisites**

The course “Fundamentals of Production Management” [2581950] and one additional activity have to be chosen.

**Content**

This module is designed to introduce students into the wide area of industrial production and logistics management. It focuses on strategic production management under the aspect of sustainability. The courses use interdisciplinary approaches of systems, also theory to describe the central tasks of industrial production management and logistics. Herein, attention is drawn upon strategic corporate planning, research and development as well as site selection. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

**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.

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

Organisation: KIT Department of Economics and Management

Part of:  
Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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<th>Version</th>
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Election block: Compulsory Elective Area ()

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<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
<th>Instructor(s)</th>
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<tbody>
<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4,5 CR</td>
<td>Mädche</td>
</tr>
<tr>
<td>T-WIWI-109936</td>
<td>Platform Economy</td>
<td>4,5 CR</td>
<td>Dorner, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-109935</td>
<td>Practical Seminar Interaction</td>
<td>4,5 CR</td>
<td>Mädche, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-106569</td>
<td>Consumer Behavior</td>
<td>4,5 CR</td>
<td>Scheibehenne</td>
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</table>

Competence Certificate

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.

The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

Competence Goal

Students

- understand the basic concepts of interactive systems as well as the economic foundations and key components of platforms
- explore the theoretical grounding of interactive systems leveraging theories from reference disciplines such as psychology
- understand business models, network effects of digital platforms and get to know different market forms and market mechanisms
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results
Content
The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the aspects of interaction between humans and information systems as well as the economic foundations of platform businesses:

- **Foundations of Interactive Systems:** Advanced information and communication technologies (ICT) make interactive systems ever-present in the users’ private and business life. They are an integral part of E-Commerce portals or social networking sites as well as at the workplace, e.g. in the form of collaboration portals or analytical dashboards. Furthermore, with the ever-increasing capabilities of ICT, the design of human-computer interaction is becoming increasingly important. The aim of this module is to introduce the foundations, related theories, key concepts, and design principles as well as current practice of contemporary interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

- **Platform Economy:** Apple, Alphabet, Amazon, Microsoft, and Facebook; five of the most valuable companies worldwide create large portions of their profits employing a digital platform model. This module teaches the key design considerations of digital platforms: their foundations in economic theory, their core components and design aspects, the adequate selection of market mechanisms for achieving certain goals and the role of user behavior in the context of digital platforms. The theoretic foundations are enriched by discussions of several real-world examples, e.g. from the finance sector. Thus, the students are enabled to a) analyze given platforms and make recommendations for improvements and b) independently design new platforms for given use cases.

- **Consumer Behavior:** Consumer decisions are ubiquitous in daily life and they can have long-ranging and important consequences for individual (financial) well-being and health but also for societies and the planet as a whole. To help people making better choices it is important to understand the factors that influence their behavior. Towards this goal, we will explore how consumer behavior is shaped by social influences, situational and cognitive constraints, as well as by emotions, motivations, evolutionary forces, neuronal processes, and individual differences. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates. The lecture will be held in English.

Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). 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.

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

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

**Part of:**  
- Business Administration (Specialisation Program Business Administration)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Business Administration)

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<th>Level</th>
<th>Version</th>
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<tr>
<td>T-WIWI-109938</td>
<td>Digital Services</td>
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<td>CR</td>
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<td>T-WIWI-110797</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>4,5</td>
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<td>Platform Economy</td>
<td>4,5</td>
<td>CR</td>
<td>Dorner, Weinhardt</td>
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<td>T-WIWI-109937</td>
<td>Practical Seminar Platforms</td>
<td>4,5</td>
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<td>Satzger, Weinhardt</td>
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</table>

**Competition Certificate**

The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.

The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competition Goal**

Students

- understand services from different perspectives, the concept of value creation in service systems as well as the economic foundations and key components or platforms  
- get familiar with concepts, methods and tools for the design, modelling, development and management of digital services and platforms  
- understand the categories and trends of platforms as providers of digital services  
- gain experience in group work as well as in the analysis of case studies and the professional presentation of research results  
- are enabled to design new platforms based on a business idea.

**Content**

The "Information Systems & Digital Business" modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the technical and economic aspects of digital services as well as their application in the platform economy:

- **Digital Services:** The global economy is increasingly determined by services: in industrialized countries, nearly 70% of gross value added is achieved in the tertiary sector. For the design, development and the management of services traditional “goods-focused” concepts are often insufficient or inappropriate – even more so, if companies reap the ample opportunities to offer digital services. The course is centered around the concepts of joint value creation within service systems. It covers the theoretical background of services and service innovation, technical and economic aspects of cloud and cloud labor services as well as webservices. It focusses on the potential to leverage data for novel digital services and business models and to form dynamic and scalable service value networks. It comprises hands-on experience to conceive and build novel digital, cloud-based services.

- **Platform Economy:** Apple, Alphabet, Amazon, Microsoft, und Facebook; five of the most valuable companies worldwide create large portions of their profits employing a digital platform model. This module teaches the key design considerations of digital platforms: their foundations in economic theory, their core components and design aspects, the adequate selection of market mechanisms for achieving certain goals and the role of user behavior in the context of digital platforms. The theoretical foundations are enriched by discussions of several real-world examples, e.g. from the finance sector. Thus, the students are enabled to a) analyze given platforms and make recommendations for improvements and b) independently design new platforms for given use cases.
**Workload**

Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). 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.

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

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

**Part of:** Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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

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<th>Course Title</th>
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<tr>
<td>T-WIWI-109938</td>
<td>Digital Services</td>
<td>4.5 CR</td>
<td>Satzger, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-109816</td>
<td>Foundations of Interactive Systems</td>
<td>4.5 CR</td>
<td>Mädche</td>
</tr>
<tr>
<td>T-WIWI-109939</td>
<td>Practical Seminar Servitization</td>
<td>4.5 CR</td>
<td>Mädche, Satzger</td>
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**Competence Certificate**
The module examination takes place in the form of partial examinations in accordance with § 4 Para. 2 No. 1 - No. 3 SPO via courses of the module amounting to a total of at least 9 LP.
The overall score of the module is formed from the credit-weighted scores of the partial examinations and truncated after the first decimal place.

**Competence Goal**
Students

- understand services from different perspectives and the concept of value creation in service systems
- get familiar with concepts, methods and tools for the design, modelling, development and management of digital services and interactive systems
- understand the basic characteristics and effects of interactive systems as an integral element of digital services – theoretically grounded in reference disciplines such as psychology
- get hands-on experience in conceptualizing and designing digital services and interactive systems in real use cases.

**Content**
The “Information Systems & Digital Business” modules of the research groups of Prof. Dr. Alexander Mädche (Information Systems & Service Design), Prof. Dr. Gerhard Satzger (Digital Service Innovation) and Prof. Dr. Christof Weinhardt (Information & Market Engineering), offer a comprehensive overview on important topics of digitalization – blending aspects of digital interaction, digital services and the platform economy.

Courses in this module cover the technical and economic aspects of digital services as well as the interaction of humans with information systems:

- **Digital Services:** The global economy is increasingly driven by services: in industrialized countries, nearly 70% of gross value added is achieved in the tertiary sector. For the design, development and the management of services traditional "goods-focused" concepts are often insufficient or inappropriate – even more so, if companies reap the ample opportunities to offer digital services. The course is centered around the concepts of joint value creation within service systems. It covers the theoretical background of services and service innovation, technical and economic aspects of cloud and cloud labor services as well as webservices. It focuses on the potential to leverage data for novel digital services and business models and to form dynamic and scalable service value networks. It comprises hands-on experience to conceive and build novel digital, cloud-based services.

- **Foundations of Interactive Systems:** Advanced information and communication technologies (ICT) make interactive systems ever-present in the users’ private and business life. They are an integral part of E-Commerce portals or social networking sites as well as at the workplace, e.g. in the form of collaboration portals or analytical dashboards. Furthermore, with the ever-increasing capabilities of ICT, the design of human-computer interaction is becoming increasingly important. The aim of this module is to introduce the foundations, related theories, key concepts, and design principles as well as current practice of contemporary interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.
Workload
Total effort for 9 credit points: approx. 270 hours. The distribution is based on the credit points of the courses of the module (120-135h for courses with 4.5 credit points). The total number of hours per course results from the effort required to attend lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.
### Module: Integrated Production Planning [M-MACH-101272]

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

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<td>9</td>
<td>9 CR</td>
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**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
6.38 Module: Internship [M-WIWI-101419]

Responsible: Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften
Organisation: KIT Department of Economics and Management
Part of: Internship

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Mandatory

| T-WIWI-102611 | Internship | 10 CR | Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften |

Competence Certificate
The assessment is carried out by the evidence of completed full-time internships of at least 12 weeks with at least 20 working hours per week and a presentation of the internship in the form of a written report on the activities. The internship is not graded.

1. Information on evidence of completed full-time internships:

The internship is proofed by the certificate of the intern's office. The certificate has to be formally correct with official corporate letterhead and handwritten countersigned by a responsible employee of the company.

The certificate must at least contain the following information:

* Company / Location
* Duration: from ... to ...
* Hours of work (weakly)
* Working interruption, indicating the vacation and sick days
* Department
* Headwords to the activities

2. Information on the presentation:

The internship report should be at least one page (typewritten, not handwritten) for each Location. It must be countersigned by a representative of the intern's office.

Competence Goal

- has general insight into the essential processes in a company,
- is in a position to identify operation correlations and has the knowledge and skills to facilitate a fast understanding of the processes in the company,
- in addition to practical professional experience and competences, also has key competences such as own initiative, ability to work in a team and communication skills as well as ability to integrate into corporate hierarchies and procedures,
- has the experience to accomplish complex IT and business tasks under realistic conditions within the framework of the relevant legal aspects and while applying the total acquired knowledge (interlaced thinking),
- has an idea of the professional development potential in the economy through pursuit of study-related activities,
- knows the technical and professional requirements in the individually targeted future occupation and can take this knowledge into account for the future planning of his/her studies and career,
- can assess and estimate own technical and professional strengths and weaknesses through his/her evaluation of the company.

Prerequisites
None
Content
The internship may be done in economic, business and/or technical companies. At best, it is done on activities which are located at the intersection of the two fields - getting to know the specific requirements of Industrial Engineering and Management. A commercial internship provides an insight into business or administrative processes of business transactions. Therefor departments such as controlling, organizing, marketing and planning appear particularly suitable.

Work experiences in the departments of engineering, work preparation and provision of material or IT cover more technical aspects of the internship. But work experiences in an engineering firm go with a technical internship.

It remains the companies and interns left, which stations and areas the intern will eventually go through. But the focus should always be in accordance with operational realities of the company.

Annotation
Internships, that were completed even before studying may be recognized, if the criteria for recognition are met. After recognition of the compulsory internship, there can be taken a semester off for a voluntary, student-related internship.

Regarding to the election of the company, in which the internship is completed, there are no specific rules. With a view to the future professional career, it is recommended to absolve the internship in a larger, possibly international company.

Vacation days are not figured into the internship.

Only three sick leave days may incurred at all. Any additional sick days are not figured into the internship.

A relevant vocational education of at least two years is accepted as a performance equivalent to the internship.

Workload
The total workload for this module is approximately 300 hours.
6.39 Module: Introduction to Economics [M-WIWI-101398]

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

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<tr>
<td>T-WIWI-102708</td>
<td>Economics I: Microeconomics</td>
<td>5 CR</td>
<td>Puppe, Reiß</td>
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<tr>
<td>T-WIWI-102709</td>
<td>Economics II: Macroeconomics</td>
<td>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. The assessment procedures of each course of this module is defined for each course separately.

Competence Goal
The student
- knows and understands basic economic problems,
- understands economic policy in globalized markets,
- is able to develop elementary solution concepts.

The lectures of this module have different focuses: In Economics I, economic problems are seen as decision problems, Economics II treats the dynamics of economic processes.

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.

Content
The basic concepts, methods and models of micro- and macroeconomics are treated. The course Economics I: Microeconomics [2600012] deals with micro-economic decision theory, questions of market theory and problems of imperfect competition and with basic principles of game theory and welfare economics. Economics II: Macroeconomics [2600014] discusses economic organization models and national accounts as well as the question of international trade and monetary policy. Furthermore, the complex growth, boom and economic speculations are dealt with.

Annotation
Notice: The lecture Economics I: Microeconomics [2600012] is part of the preliminary examination concerning § 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Retakes has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

Workload
See German version.
Module: Introduction to Natural Hazards and Risk Analysis [M-WIWI-104838]

Responsible: Prof. Dr. Michael Kunz
Organisation: KIT Department of Economics and Management
Part of: Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

Credits: 9
Recurrence: Each term
Language: German
Level: 3
Version: 3

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

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<tr>
<td>T-BGU-101500</td>
<td>Introduction to Engineering Geology</td>
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<tr>
<td>T-BGU-103541</td>
<td>Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-101681</td>
<td>Introduction to GIS for Students of Natural, Engineering and Geo Sciences</td>
<td>3 CR</td>
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<tr>
<td>T-BGU-101637</td>
<td>Systems of Remote Sensing, Prerequisite</td>
<td>1 CR</td>
<td>Hinz, Weidner</td>
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<tr>
<td>T-BGU-101638</td>
<td>Procedures of Remote Sensing, Prerequisite</td>
<td>1 CR</td>
<td>Weidner</td>
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<td>T-BGU-101636</td>
<td>Remote Sensing, Exam</td>
<td>4 CR</td>
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<tr>
<td>T-BGU-103542</td>
<td>Procedures of Remote Sensing</td>
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<tr>
<td>T-PHYS-103525</td>
<td>Geological Hazards and Risk</td>
<td>8 CR</td>
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<td>T-PHYS-105594</td>
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<td>T-BGU-101667</td>
<td>Hydraulic Engineering and Water Management</td>
<td>4 CR</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal
See German version

Prerequisites
There are no singular exams for Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66]. Therefore it not possible to choose Remote Sensing [GEOD-BFB-1] and additionally the courses Remote Sensing Systems, Remote Sensing Methods or the project Angewandte Fernerkundung [20267] (because they are already included). See also “Recommendations”.

Content
See German version

Recommendation
The courses Remote Sensing Systems [20241/42] and Remote Sensing Methods [20265/66] may be chosen as a minimal combination for the exam. However, it is recommended to choose the comprehensive combination Remote Sensing [GEOD-BFB-1], which includes Remote Sensing Systems [20241/42], Remote Sensing Methods [20265/66] and the project Angewandte Fernerkundung [20267].

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.
Module: Introduction to Operations Research [M-WIWI-101418]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management  
Part of: Operations Research (mandatory)

<table>
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### Mandatory

| T-WIWI-102758 | Introduction to Operations Research I and II | 9 CR | Nickel, Rebennack, Stein |

**Competence Certificate**
The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2). 1 of the examination regulation.

In each term (usually in March and July), one examination is held for both courses.

**Competence Goal**
The student

- names and describes basic notions of the essential topics in Operations Research (Linear programming, graphs and networks, integer and combinatorial optimization, nonlinear programming, dynamic programming and stochastic models),
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.

**Module grade calculation**
The overall grade of the module is the grade of the written examination.

**Prerequisites**
None

**Content**
This module treats the following topics: linear programming, network models, integer programming, nonlinear programming, dynamic programming, queuing theory, heuristic models.

This module forms the basis of a series of advanced lectures with a focus on both theoretical and practical aspects of Operations Research.

**Workload**
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Introduction to Programming [M-WIWI-101581]

**Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner

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

**Part of:** Informatics (mandatory)

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<td>Introduction to Programming with Java</td>
<td>5 CR</td>
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**Competence Certificate**
The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation.
The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Competence Goal**
see german version

**Prerequisites**
None

**Content**
see german version

**Workload**
The total workload for this course is approximately 150 hours. For further information see German version.
6.43 Module: Introduction to Statistics [M-WIWI-101432]

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

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

**Part of:** Statistics

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<td>Grothe, Schienle</td>
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<td>T-WIWI-102738</td>
<td>Statistics II</td>
<td>5 CR</td>
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**Competence Certificate**
The assessment of this module consists of two written examinations according to Section 4(2), 1 of the examination regulation (one for each of the courses Statistics I and II).
The overall grade of the module is the average of the grades of these two written examinations.

**Competence Goal**
See German version.

**Module grade calculation**
The overall grade of the module is the average of the grades of these two written examinations.

**Prerequisites**

**Notice:** The lecture Statistics I [25008/25009] is part of the preliminary examination concerning Section 8(1) of the examination regulation. This examination must be passed until the end of the examination period of the second semester. Any Re-examinations has to be passed until the end of the examination period of the third semester. Otherwise the examination claim will be lost.

**Content**
The module contains the fundamental methods and scopes of Statistics.

A. Descriptive Statistics: univariate and bivariate analysis
B. Probability Theory: probability space, conditional and product probabilities, transformation of probabilities, parameters of location and dispersion, most important discrete and continuous distributions, covariance and correlation, limit distributions
C. Theory of estimation and testing: sufficiency of statistics, point estimation (optimality, ML-method), internal estimations, linear regression

**Workload**
The total workload for this module is approximately 300 hours. For further information see German version.
6.44 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 (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

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<td>Machine Tools and Industrial Handling</td>
<td>9 CR</td>
<td>Fleischer</td>
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Competence Certificate
Written exam (120 minutes)

Competence Goal
The students

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

Prerequisites
None

Content
The module overviews the construction, use and application of machine tools and industrial handling equipment. A well-founded and practice-oriented knowledge is imparted about the selection, design and evaluation of machine tools. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools 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:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

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

Learning type
Lecture, exercise, excursio
Module: Management Accounting [M-WIWI-101498]

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

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

**Part of:**
- Business Administration (Specialisation Program Business Administration)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Business Administration)

**Credits:** 9

**Recurrence:** Each term

**Duration:** 2 semester

**Language:** English

**Level:** 3

**Version:** 2

### Mandatory

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**Competence Certificate**

The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. 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.
**6.46 Module: Manufacturing Technology [M-MACH-101276]**

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

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<td>Manufacturing Technology</td>
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**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: Material Flow in Logistic Systems [M-MACH-101277]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

**Credits** 9  
**Recurrence** Each winter term  
**Language** German  
**Level** 3  
**Version** 3

### 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.
6.48 Module: Materials Science [M-MACH-101260]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** Engineering Sciences (mandatory)

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**Mandatory**

| T-MACH-102078 | Materials Science I | 3 CR | Hoffmann |

**Competence Certificate**

The assessment of the module is carried out by a written examination (150 min) about the lecture Material Science [2125760] (according to Section 4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

The grade of the module corresponds to the grade of this examination.

**Competence Goal**

Students are able to specify the basics of materials science and engineering and can apply it to simple problems in various technical areas.

As major part of the module, the students know the correlation between atomic structure and bonding of solids and the macroscopic properties such as mechanical behavior or electrical conductivity. They have basic knowledge with respect to materials characterization. The students are able to analyze phase diagrams with up to two components and can derive simple correlations among composition, processing, microstructure evolution and materials properties.

**Prerequisites**

None.

**Content**

After an introduction to the atomic structure and interatomic bonding, elementary concepts of crystallography are given. Different types of crystal structures are explained and various types of imperfections in solids. Then, the mechanical behaviour and the physical properties of various types of materials (metals, polymers, ceramics) are discussed. The thermodynamic principles of solidification and the basic types of phase diagrams are given to understand the iron-carbon phase diagram and the manifold microstructures of steel and cast iron.

**Workload**

The total workload for this module is approximately 90 hours.
6.49 Module: Mathematics 1 [M-MATH-101676]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematics

<table>
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**Competence Certificate**  
The assessment consists of two written exams of 60 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed. Resit exams for both exams are offered in the first weeks of the subsequent semester.

**Competence Goal**  
Students  
- are confident with basic terms and definitions of mathematical language (propositions, sets, number systems, mappings, etc.).  
- have a basic knowledge of differentiable calculus for functions of a single variable.

**Module grade calculation**  
The examination mark for Mathematics 1 is the average of the marks obtained in the midterm exam and final exam.

**Content**  
The course Mathematics 1 is the first part of the three semester basic training in higher mathematics. Topics are  
- Propositional logic and basic set theory,  
- Combinatorics and principles of counting,  
- Number systems and basic arithmetics,  
- Systems of linear equations,  
- Convergence of sequences and series,  
- Mappings and functions,  
- Continuous functions,  
- Differentiable functions,  
- Power series and special functions,  
- Taylor’s theorem.

**Recommendation**  
There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.

**Workload**  
work load: 210 hours (7 ECTS)  
classes: 60 hours lectures + 30 hours exercises
### 6.50 Module: Mathematics 2 [M-MATH-101677]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematics

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#### Competence Certificate

The assessment consists of two written exams of 60 min each (in accordance with §4(2), 1 of the examination regulations). The first (midterm) exam takes place after half of the course, the second (final) exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are not allowed. Resit exams for both exams are offered in the first weeks of the subsequent semester.

#### Competence Goal

Students
- know basic concepts of matrix theory,
- have a basic knowledge of integral calculus in a single variable.
- have a basic knowledge of multivariate differential calculus.

#### Module grade calculation

The examination mark for Mathematics 2 is the average of the marks obtained in the midterm exam and final exam.

#### Content

The course Mathematics 2 is the second part of the three semester basic training in higher mathematics. Topics are:
- Riemann integral,
- n-dimensional vector spaces,
- scalar product, length and angle,
- linear mappings and matrices,
- determinants,
- eigenvalue theory,
- multivariate calculus.

#### Recommendation

There are no Prerequisites. We strongly recommend to attend the three maths courses in the order Mathematics 1, Mathematics 2, Mathematics 3.

#### Workload

**work load:** 210 hours (7 ECTS)  
**classes:** 60 hours lectures + 30 hours exercises
**Module: Mathematics 3 [M-MATH-101679]**

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematics

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**Mandatory**

| T-MATH-102264 | Mathematics III - Final Exam | 7 CR | Folkers, Hug, Last, Winter |

**Competence Certificate**

The assessment consists of a written exams of 105 min (in accordance with §4(2), 1 of the examination regulations). The exam takes place shortly after the end of the lectures. Auxiliary means such as literature or calculators are allowed. A resit exam is offered in the first weeks of the subsequent semester.

**Competence Goal**

Students

- are confident with important concepts in the theory of normed vector spaces.
- have some basic knowledge of ordinary differential equations.
- have some basic knowledge of Fourier analysis.

**Module grade calculation**

The examination mark for Mathematics 3 is the mark of the written exam.

**Content**

The course Mathematics 3 is the third part of the three semester basic training in higher mathematics. Topics are

- Multiple integrals,
- Implicit functions,
- General linear spaces,
- Normed vector spaces,
- Banach's fixed point theorem,
- Ordinary differential equations,
- Linear differential equations,
- Fourier analysis,
- Integral transformations.

**Workload**

- work load: 210 hours (7 ECTS)  
- classes: 60 hours lectures + 30 hours exercises
6.52 Module: Mechanical Design [M-MACH-101299]

**Responsible:** Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<td>Mechanical Design Basics I and II</td>
<td>7 CR Albers, Matthiesen</td>
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<td>T-MACH-110364</td>
<td>Mechanical Design Basics I, Tutorial</td>
<td>1 CR Albers, Matthiesen</td>
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<td>Mechanical Design Basics II, Tutorial</td>
<td>1 CR Albers, Matthiesen</td>
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**Competence Certificate**

Written examination on the contents of Mechanical Design I&II

Duration: 90 min plus reading time

Preliminary examination: Successful participation in the preliminary work in the field of Mechanical Design I&II
**Competence Goal**

Learning object springs:

- be able to recognize spring types and explain stress
- Identify and describe the properties of a resilient LSS in machine elements presented later on
- Understanding and explaining the principle of action
- Know and list areas of application for springs
- graphically illustrate the load and the resulting stresses
- be able to describe the degree of species usefulness as a means of lightweight construction
- be able to analyse different solution variants with regard to lightweight construction (use species efficiency)
- Being able to explain several springs as a circuit and calculate total spring stiffness

Learning objects Technical Systems:

- Being able to explain what a technical system is
- “Thinking in systems.”
- Using system technology as an abstraction tool for handling complexity
- Recognizing functional relationships of technical systems
- Getting to know the concept of function
- be able to use C&C²-A as a means of system technology

Learning objects Visualization:

- Ability to create and interpret schematics
- Using freehand technical drawing as a means of communication
- To be able to apply the technical basics of freehand drawing
- Derivation of 2D representations into different perspective representations of technical structures and vice versa
- Master reading of technical drawings
- Dedicated dimensioning of technical drawings
- Create sectional views of technical systems as a technical sketch

Learning objects Bearings:

- be able to recognize bearings in machine systems and explain their basic functions
- name bearings (type/type/function) and recognize them in machine systems and technical drawings
- Being able to name areas of application and selection criteria for the various bearings and bearing arrangements and explain interrelationships
- Ability to functionally explain the design of the bearing definitions in different directions radially/axially and circumferentially
- Know and describe selection as an iterative process as an example
- be able to perform dimensioning of bearing arrangements as an example of the engineer's approach to dimensioning machine elements
- Develop first ideas for probabilities in predicting the life of machine elements
- Recognise from the damage pattern whether static or dynamic overload was the cause of material failure
- Calculate equivalent static and dynamic bearing loads from the catalogue and given external forces on the bearing
- Being able to name, explain and transfer the basic equation of the dimensioning to the bearing dimensioning

Learning objectives seals:

The students...

- can discuss the basic functions of seals
- can describe the physical causes for mass transfer
- can apply the C&C-Model on seals
- can name, describe and apply the three most important classification criteria of seals
- can explain the function of a contacting seal and a non-contacting seal.
- can differentiate the seal types and organize them to the classification criteria.
- can discuss the structure and the effect of a radial shaft seal
- can evaluate radial shaft seals, compression packings, mechanical seals, gap seals and labyrinth seals
- can describe and apply the constructional principle of selffortification
- can describe the stick-slip phenomenon during the movement sequences of a reciprocating seal

Learning design:

The students...

- understand the meaning of design
- are able to recognize and implement basic rules and principles of design
- are able to design the connection of partial systems into the total system
- can name requirements of design and take them into account
- know the main groups of manufacturing methods
are able to explain the manufacturing processes
are able to depict a casted design in a drawing clearly, e.g. draft of the mold, no material accumulation, ...
know how components are designed
Know how the production of the components has an effect on their design
Know the requirements and boundary conditions on design

Learning bolted connections:
The students...

- can list and explain various bolt applications.
- can recognize bolt types and explain their function
- can build a C&C² model of a bolted joint and discuss the influences on its function
- can explain the function of a bolted connection with the help of a spring model
- can reproduce, apply and discuss the screw equation.
- Can estimate the load-bearing capacity of low-loaded bolted joints for dimensioning purposes
- Can indicate which bolted joint is to be calculated and which only roughly dimensioned.
- Can carry out the dimensioning of bolted connections as flange connections
- Can create, explain and discuss the force deflection diagram of a bolted connection

Prerequisites
None

Content
MKL I:
Introduction to product development
Tools for visualization (technical drawing)
Product creation as a problem solution
Technical Systems Product Development

- Systems theorie
- Contact and Channel Approach C&C²-A

Basics of selected construction and machine elements

- Federn
- bearings and fence
- sealings

The lecture is accompanied by exercises with the following content:
gear workshop
Tools for visualization (technical drawing)
Technical Systems Product Development

- Systemtheorie
- Contact and Channel Approach C&C²-A

Exercises for springs
Exercises for bearings and fence

MKL II:

- sealings
- design
- dimensioning
- component connections
- bolts

Recommendation
An in-depth study of machine design (parts 3 + 4) can be carried out as part of the "Extracurricular Module in Engineering".
Workload
MKL1:
Attendance at lectures (15 VL): 22.5h
Presence exercises (8 exercises): 12h
Attendance (3x 2h) and preparation (3x3h) Workshop sessions: 15h
Preparation and execution of online test: 6h
Personal preparation and follow-up of lecture and exercise: 34.5h

MKL1:
Attendance lectures (15 VL): 22.5h
Presence exercises (7 ÜB): 10.5h
Personal preparation and follow-up of lecture and exercise, incl. prerequisite and preparation for the exam: 117h

Learning type
Lecture
Tutorial
Project work during the semester
Online-test
6.53 Module: Methodical Foundations of OR [M-WIWI-101414]

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

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**Election block: Compulsory Elective Courses (at least 1 item as well as between 4,5 and 9 credits)**

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<td>4,5 CR</td>
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<td>T-WIWI-103638</td>
<td>Global Optimization I and II</td>
<td>9 CR</td>
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<td>Nonlinear Optimization I</td>
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**Election block: Supplementary Courses ()**

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<td>4,5 CR</td>
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<td>T-WIWI-102727</td>
<td>Global Optimization II</td>
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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>4,5 CR</td>
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**Competence Certificate**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The 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 optimization methods, in particular from nonlinear and from global optimization,
- 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.

**Prerequisites**

At least one of the courses Nonlinear Optimization I [2550111] and Global Optimization I [2550134] has to be examined.

**Content**

The module focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous decision variables. The lectures on nonlinear programming deal with local solution concepts, whereas the lectures on global optimization treat approaches for global solutions.

**Recommendation**

The courses Introduction to Operations Research I and II are helpful.

**Annotation**

The planned lectures and courses for the next three years are announced online (http://www.ior.kit.edu).

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Microsystem Technology [M-MACH-101287]

**Responsibility:** Prof. Dr. Jan Gerrit Korvink

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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### Election block: Mikrosystemtechnik (at least 9 credits)

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<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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<td>T-MACH-100968</td>
<td>BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III</td>
<td>3 CR</td>
<td>Guber</td>
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<td>T-MACH-102172</td>
<td>Bionics for Engineers and Natural Scientists</td>
<td>3 CR</td>
<td>Hölscher</td>
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<tr>
<td>T-MACH-105182</td>
<td>Introduction to Microsystem Technology I</td>
<td>3 CR</td>
<td>Badili, Jouda, Korvink</td>
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<td>T-MACH-105183</td>
<td>Introduction to Microsystem Technology II</td>
<td>3 CR</td>
<td>Jouda, Korvink</td>
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<td>T-MACH-101910</td>
<td>Microactuators</td>
<td>3 CR</td>
<td>Kohl</td>
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<td>T-MACH-102080</td>
<td>Nanotechnology with Clusterbeams</td>
<td>3 CR</td>
<td>Gspann</td>
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<td>T-MACH-102152</td>
<td>Novel Actuators and Sensors</td>
<td>4 CR</td>
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<td>T-MACH-100530</td>
<td>Physics for Engineers</td>
<td>6 CR</td>
<td>Dienwiebel, Gumbsch, Nesterov-Müller, Weygand</td>
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<td>T-MACH-102164</td>
<td>Practical Training in Basics of Microsystem Technology</td>
<td>3 CR</td>
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### Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 1-3 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

Successful passing of the corresponding modules of the basic program.

### Content

The module offers courses in microsystem technology. Knowledge is imparted in various fields like basics in construction and production of e. g. mechanical, optical, fluidic and sensory microsystems.

### Workload

270 hours
### Module: Mobile Machines [M-MACH-101267]

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

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<td>9 CR</td>
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<td>T-MACH-102093</td>
<td>Fluid Power Systems</td>
<td>5 CR</td>
<td>Geimer, Pult</td>
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<td>T-MACH-105307</td>
<td>Drive Train of Mobile Machines</td>
<td>4 CR</td>
<td>Geimer, Wydra</td>
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<tr>
<td>T-MACH-105311</td>
<td>Design and Development of Mobile Machines</td>
<td>4 CR</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-108887</td>
<td>Design and Development of Mobile Machines - Advance</td>
<td>0 CR</td>
<td>Geimer, Siebert</td>
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<tr>
<td>T-MACH-102150</td>
<td>BUS-Controls</td>
<td>3 CR</td>
<td>Becker, Geimer</td>
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<td>BUS-Controls - Advance</td>
<td>0 CR</td>
<td>Daiß, Geimer</td>
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<tr>
<td>T-MACH-105172</td>
<td>Simulation of Coupled Systems</td>
<td>4 CR</td>
<td>Geimer, Xiang</td>
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<tr>
<td>T-MACH-108888</td>
<td>Simulation of Coupled Systems - Advance</td>
<td>0 CR</td>
<td>Geimer, Xiang</td>
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<tr>
<td>T-MACH-105160</td>
<td>Fundamentals in the Development of Commercial Vehicles I</td>
<td>1.5 CR</td>
<td>Zürn</td>
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<td>T-MACH-105161</td>
<td>Fundamentals in the Development of Commercial Vehicles II</td>
<td>1.5 CR</td>
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#### Competence Certificate

The assessment is carried out as a general oral exam (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module.

The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

The overall grade of the module is the grade of the oral examination.

The assessment may be carried out as partial oral exams (according to Section 4(2), 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. In this case the overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

The assessment procedures are described for each course of the module separately.

#### Competence Goal

The student

- knows and understands the basic structure of the machines  
- masters the basic skills to develop the selected machines

#### Prerequisites

Knowledge in the field of fluid technology is assumed.

#### Content

In the module of Mobile Machines [WI14INGMB15] the students will learn the structure of the machines and deepen the knowledge of the subject for developing the machines. After conclusion the module the student will know the latest developments in mobile machines and is able to evaluate the concepts and the trends of developments. The module is practically orientated and supported by industry partners.

#### Recommendation

We recommend that you attend the Fluidpower [2114093] event before.

#### Workload

360 hours
Learning type

- Research-oriented teaching
- lectures
- exercises
6.56 Module: Mobility and Infrastructure [M-BGU-101067]

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

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

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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<td>T-BGU-101791</td>
<td>Mobility and Infrastructure</td>
<td>9 CR</td>
<td>Roos, Vortisch</td>
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</table>

**Prerequisites**

none

**Recommendation**

For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.

**Annotation**

none
6.57 Module: Module Bachelor Thesis [M-WIWI-101601]

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

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

**Part of:** Bachelor Thesis

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<td>T-WIWI-103067</td>
<td>Bachelor Thesis</td>
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**Competence Certificate**
The Bachelor Thesis is a written exam which shows that the student can autonomously investigate a scientific problem in Industrial Engineering and Management. The Bachelor Thesis is described in detail in § 11 (SPO 2007) and § 14 (SPO 2015) of the examination regulation. The review is carried out:

- according to SPO 2007 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.
- according to SPO 2015 by at least two examiners of the Department of Economics and Management.

The regular processing time takes three/six months (SPO 2007/SPO2015). On a reasoned request of the student, the examination board can extend the processing time of a maximum of on month. If the Bachelor 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 Bachelor 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 overall grade of the module is the grade of the Bachelor Thesis.

**Competence Goal**
The student can independently work on a relevant topic in accordance with scientific criteria within the specified time frame. He/she is in a position to research, analyze the information, abstract and identify basic principles and regulations from less structured information.

He/she reviews the task ahead, can select scientific methods and techniques and apply them to solve a problem or identify further potential. 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 clearly structure a research paper and communicate in writing using the technical terminology.

**Prerequisites**
Prerequisites for admission to the Bachelor Thesis:

- according to SPO 2007: the student is in the 3rd Academic year (5th and 6th semester) and has not been completed at most one of the exams of the basic program.
- according to SPO 2015: A minimum of 120 credits must be earned. All module examinations of the basic program must be passed.

At the request of the student, the examination committee decides on exceptions to these regulations.

It is recommended to begin the Bachelor Thesis in the 5th or 6th Semester.

A written confirmation of the examiner about supervising the Bachelor’s Thesis is required. Please pay regard to the institute specific rules for supervising a Bachelor Thesis.

The Bachelor 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 are marked as this.” If this declaration is not given, the Bachelor Thesis will not be accepted.
Content
The Bachelor Thesis is the first major scientific work. The topic of the Bachelor 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 360 hours. For further information see German version.
Module: Optimization under Uncertainty [M-WIWI-103278]

**Responsible:** Prof. Dr. Steffen Rebennack

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

**Part of:** Operations Research (Specialisation Program Operations Research)

Compulsory Elective Modules (Operations Research)

- **Credits:** 9
- **Recurrence:** Each term
- **Duration:** 1 semester
- **Language:** German
- **Level:** 3
- **Version:** 4

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

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<td>4.5</td>
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<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
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**Election block: Supplementary Courses (at most 1 item)**

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<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
<td>4.5</td>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5</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

- denominates and describes basic notions for optimization methods under uncertainty, in particular from stochastic optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems under uncertainty 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, in particular of stochastic optimization problems.

**Prerequisites**
At least one of the courses *Introduction to Stochastic Optimization* and *Optimization approaches under uncertainty* has to be taken.

**Content**
The module focuses on modeling and analyzing mathematical optimization problems where certain data is not fully present at the time of decision-making. The lectures on the introduction to stochastic optimization deal with methods to integrate distribution information into the mathematical model. The lectures on the optimization approaches under uncertainty offer alternative approaches such as robust optimization.

**Recommendation**
Knowledge from the lectures "Introduction to Operations Research I" and "Introduction to Operations Research II" are helpful.

**Annotation**
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 of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.59 Module: Power Network [M-ETIT-102379]

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

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

**Part of:** Engineering Sciences (Specialisation Program Engineering Sciences)
Compulsory Elective Modules (Business Administration oder Engineering Sciences)
Compulsory Elective Modules (Engineering Sciences)

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<td>Electric Energy Systems</td>
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<tr>
<td>T-ETIT-100830</td>
<td>Power Network</td>
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</table>
Module: Product Lifecycle Management [M-MACH-101270]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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**Election block: Product Lifecycle Management (Kernbereich) (1 item)**

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<td>Product Lifecycle Management</td>
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**Election block: Product Lifecycle Management (2 items)**

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<td>PLM-CAD Workshop</td>
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<td>T-MACH-102181</td>
<td>PLM for Product Development in Mechatronics</td>
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<td>T-MACH-102209</td>
<td>Information Engineering</td>
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<td>T-MACH-106744</td>
<td>Agile Product Innovation Management - Value-driven Planning of New Products</td>
<td>4 CR</td>
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<td>I4.0 Systems Platform</td>
<td>4 CR</td>
<td>Maier, Ovtcharova</td>
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<td>T-MACH-102083</td>
<td>Integrated Information Systems for Engineers</td>
<td>4 CR</td>
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<td>T-MACH-102155</td>
<td>Product, Process and Resource Integration in the Automotive Industry</td>
<td>4 CR</td>
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<td>T-MACH-102149</td>
<td>Virtual Reality Practical Course</td>
<td>4 CR</td>
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<tr>
<td>T-MACH-102187</td>
<td>CAD-NX Training Course</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**
The students should:

- have basic knowledge about the challenges in product and process data management regarding the whole product lifecycle;
- have understanding about challenges and functional concepts of product lifecycle management;
- be able to rudimental operate common PLM/CAx/VR - systems,
- develop and present prototype solutions in teams of different domains.

**Prerequisites**
None

**Content**
Product Lifecycle Management (PLM), Generation and management of information, Architecture and functionality of information systems, Industry 4.0, CAx and VR-systems.

**Workload**
270 hours
6.61 Module: Public and Civil Law [M-INFO-105084]

**Responsible:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** Compulsory Elective Modules (Law or Sociology)

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<td>5 CR</td>
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<tr>
<td>T-INFO-110300</td>
<td>Public Law I &amp; II</td>
<td>6 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 in every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

**Prerequisites**

None

**Workload**

See German version.
6.62 Module: Public Finance [M-WIWI-101403]

**Responsible:** Prof. Dr. Berthold Wigger

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

**Part of:** Economics (Specialisation Program Economics)

**Compulsory Elective Modules (Economics)**

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

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<td>Introduction to Public Finance</td>
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<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
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<td>Public Revenues</td>
<td>4.5 CR</td>
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<td>T-WIWI-109590</td>
<td>Public Sector Finance</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

**Competence Goal**
See German version.

**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. Special fields of Public Finance are public revenues, i.e. taxes and public debt, public expenditures for publicly provided goods, and welfare programs.

**Recommendation**
It is recommended to attend the course 2560129 after having completed the course 2560120.

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

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
### 6.63 Module: Rail System Technology [M-MACH-101274]

**Responsible:** Prof. Dr.-Ing. Peter Gratzfeld  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
- Engineering Sciences (Specialisation Program Engineering Sciences)  
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
- Compulsory Elective Modules (Engineering Sciences)

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<td>T-MACH-102143</td>
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<td>9 CR Gratzfeld</td>
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#### 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, power networks, filling stations
8. History (optional)
9. Vehicle system technology: structure and main systems of rail vehicles
10. Car body: functions, requirements, design principles, crash elements, interfaces
11. Bogies: forces, running gears, axle configuration
12. Drives: vehicle with/without contact wire, dual-mode vehicle
13. Brakes: tasks, basics, principles, blending, brake control
14. Train control management system: definitions, networks, bus systems, components, examples
15. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Annotation
A bibliography is available for download (Ilias-platform).
The lectures can be attended in the same term.

Workload

1. Regular attendance: 42 hours
2. Self-study: 42 hours
3. Exam and preparation: 186 hours

Learning type
Lectures
6.64 Module: Real Estate Management [M-WIWI-101466]

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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<tr>
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<td>Real Estate Management II</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  
- possesses an overview concerning the different facets and interrelationships within the real estate business, the important decision points in real estate lifecycle and the different views and interests of the actors concerned, and  
- is capable of applying basic economic methods and procedures to problems within the real estate area.  

**Prerequisites**  
None

**Content**  
The real estate business offers graduates very interesting jobs and excellent work- and advancement possibilities. This module provides an insight into the macroeconomic importance of this industry, discusses problems concerned to the administration of real estate and housing companies and provides basic knowledge for making decisions both along the lifecycle of a single building and the management of real estate portfolios. Innovative operating and financing models are illustrated, as well as the current development when looking at real estate as an asset-class.  
This module is also suitable for students who want to discuss macroeconomic, business-management or financial problems in a real estate context.

**Recommendation**  
The combination with the module *Design Constructions and Assessment of Green Buildings* is recommended.  
Furthermore a combination with courses in the area of  
- Finance  
- Insurance  
- Civil engineering and architecture (building physics, building construction, facility management)  
is recommended.

**Workload**  
The total workload for this module is approximately 270 hours. For further information see German version.
6.65 Module: Seminar Module [M-WIWI-101816]

**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:** Compulsory Elective Courses (3 credits)

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<tr>
<td>T-WIWI-103486</td>
<td>Seminar in Business Administration (Bachelor)</td>
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<tr>
<td>T-WIWI-103485</td>
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<td>T-WIWI-108763</td>
<td>Seminar in Engineering Science Master (approval)</td>
<td>3 CR</td>
<td>Fachvertreter ingenieurwissenschaftlicher Fakultäten</td>
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<td>T-MATH-102265</td>
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<td>Folkers, Last</td>
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<tr>
<td>T-WIWI-103488</td>
<td>Seminar in Operations Research (Bachelor)</td>
<td>3 CR</td>
<td>Nickel, Rebennack, Stein</td>
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<tr>
<td>T-INFO-101997</td>
<td>Seminar: Legal Studies I</td>
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<td>Dreier</td>
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<tr>
<td>T-WIWI-103489</td>
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<td>Grothe, Schienle</td>
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<tr>
<td>T-WIWI-103487</td>
<td>Seminar in Economics (Bachelor)</td>
<td>3 CR</td>
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<tr>
<td>T-MACH-102135</td>
<td>Conveying Technology and Logistics</td>
<td>3 CR</td>
<td>Furmans, Pagani</td>
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<tr>
<td>T-MACH-109062</td>
<td>Seminar Production Technology</td>
<td>3 CR</td>
<td>Fleischer, Lanza, Schulze</td>
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<tr>
<td>T-MACH-108737</td>
<td>Seminar Data-Mining in Production</td>
<td>3 CR</td>
<td>Lanza</td>
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</table>

**Competence Certificate**

**SPO 2015:** The modul examination consists of one seminar (according to §4 (3), 3 of the examination regulation). A detailed description of the assessment is given in the specific course characterization.

**SPO 2007:** 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). As key qualification one of the following courses must be chosen: Academic Learning HoC (2-3 credits), Key Qualifikations ZAK (1-3 credits), Elective „Educational development for student teachers“ (2-3 credits) or language courses SpZ. A detailed description of every singled assessment is given in the specific course characterization.

**Competence Goal**

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the 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**

All modules of the basic program should be completed. For further information see German version.

**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
See German version.

**Responsible:** Prof. Dr. Gerd Nollmann

**Organisation:** KIT Department of Humanities and Social Sciences

**Part of:** Compulsory Elective Modules (Law or Sociology)

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<td>T-GEISTSOZ-109047</td>
<td>Analalysis of Social Structures (WiWi)</td>
<td>3 CR</td>
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<td>T-GEISTSOZ-109048</td>
<td>Social Science A (WiWi)</td>
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<tr>
<td>T-GEISTSOZ-109049</td>
<td>Social Science B (WiWi)</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
- Is able to apply acquired knowledge practically
- Is able to present work results in a precise and clear way

**Content**

This module offers students the possibility to get to know research problems and to answer these theoretically as well as empirically. For example: Who does earn how much in his job and why? How do subcultures emerge? Why are boys' grades in school always worse than those of girls? Do divorces have negative influences on the development of children? How does mass consumption influence the individual? Is there a world society emerging? In addition, this module contains courses on sociological methods that are essential to answer such questions scientifically.

The lecture on social structure analysis gives an overview of large social structures such as the education system, labour market, institutions, demography, etc. for Germany and in international comparison. The content of the social research seminars is determined individually by the lecturers. Students are free to choose one seminar each for Social Research A/B.
6.67 Module: Specialization in Customer Relationship Management [M-WIWI-101422]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

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

**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences)

<table>
<thead>
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<td>4,5 CR</td>
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**Election block: Supplementary Courses (1 item)**

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<th>Course Name</th>
<th>Credits</th>
<th>Lecturer</th>
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<tr>
<td>T-WIWI-102596</td>
<td>Analytical CRM</td>
<td>4,5 CR</td>
<td>Geyer-Schulz</td>
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<tr>
<td>T-WIWI-109938</td>
<td>Digital Services</td>
<td>4,5 CR</td>
<td>Satzger, Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-100005</td>
<td>Competition in Networks</td>
<td>4,5 CR</td>
<td>Mitsch</td>
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**Competence Certificate**

This module will be offered for the last time in winter semester 2019/20. The assessment is carried out as partial exams (according to Section 4(1), S. 2 2nd clause 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 the scientific methods (from business administration, statistics, informatics) which are most relevant for analytic CRM and he autonomously applies these methods to standard cases,
- gains an overview of the market for CRM software,
- designs, implements, and analyzes operative CRM processes in concrete application domains (e.g. campaign management, call center management, ...),
- is aware of the problems of protecting the privacy of customers and the implications of privacy law.

**Prerequisites**

The course “Operative CRM” is compulsory.

It is only possible to choose this module in combination with the module CRM and Servicemanagement. The module is passed only after the final partial exam of CRM and Servicemanagement is additionally passed.

**Content**

In this module, analysis methods and techniques for the management and improvement of customer relations are presented. Furthermore, modelling, implementation, introduction, change, analysis and valuation of operative CRM processes are treated. Regarding the first part, we teach analysis methods and techniques suitable for the management and improvement of customer relations. For this goal we treat the principles of customer- and service-oriented management as the foundation of successful customer relationship management. In addition, we show how knowledge of the customer can be used for decision-making at an aggregate level (e.g. planning of sortiments, analysis of customer loyalty, ...). A basic requirement for this is the integration and collection of data from operative processes in a suitably defined data-warehouse in which all relevant data is kept for future analysis. The process of transferring data from the operative systems into the data warehouse is known as the ETL process (Extract / Transform / Load). The process of modelling a data-warehouse as well as the so-called extraction, transformation, and loading process for building and maintaining a data-warehouse are discussed in-depth. The data-warehouse serves as a base for flexible management reporting. In addition, various statistic methods (e.g. cluster analysis, regression analysis, stochastic models, ...) are presented which help in computing suitable key performance indicators or which support decision-making.

Regard the operative part, we emphasize the design of operative CRM processes. This includes the modelling, implementation, introduction and change, as well as the analysis and evaluation of operative CRM processes. Petri nets and their extensions are the scientific foundation of process modelling. The link of Petri nets to process models used in industry as e.g. UML activity diagrams is presented. In addition, a framework for process innovation which aims at a radical improvement of key business processes is introduced. The following application areas of operative CRM processes are presented and discussed:

- Strategic marketing processes
- Operational marketing processes (campaign management, permission marketing, ...)
- Customer service processes (sales force management, field services, call center management, ...)

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Workload
The total amount of work for this module is approximately 270 hours (9 credits). The subdivision is based on the credits of the courses of the module.
The total number of hours per course results from the time of visiting the lectures and exercises, as well as from the exam periods and the time that is required to achieve the objectives of the module as an average student with an average performance.
6.68 Module: Specialization in Production Engineering [M-MACH-101284]

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

Part of: 
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

Credits | Recurrence | Language | Level | Version
--- | --- | --- | --- | ---
9 | Each term | German | 3 | 3

Election block: Vertiefung der Produktionstechnik (at least 9 credits)

| T-MACH-110176 | Digitalization from Production to the Customer in the Optical Industry | 4 CR | Wawerla |
| T-MACH-105188 | Integrative Strategies in Production and Development of High Performance Cars | 4 CR | Schlichtenmayer |
| T-MACH-105783 | Learning Factory "Global Production" | 4 CR | Lanza |
| T-MACH-108878 | Laboratory Production Metrology | 4 CR | Häfner |
| T-MACH-110318 | Product- and Production-Concepts for modern Automobiles | 4 CR | Kienzle, Steegmüller |
| T-MACH-102107 | Quality Management | 4 CR | Lanza |
| T-MACH-105185 | Control Technology | 4 CR | Gönnheimer |
| T-MACH-105177 | Metal Forming | 3 CR | Herlan |
| T-MACH-102148 | Gear Cutting Technology | 4 CR | Klaiber |

Competence Certificate
Oral exams: duration approx. 5 min per credit point
Written exams: duration approx. 20 - 25 min per credit point
Amount, type and scope of the success control can vary according to the individually choice.

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
6.69 Module: Statistics and Econometrics [M-WIWI-101599]

Responsibility: Prof. Dr. Oliver Grothe
Prof. Dr. Melanie Schienle

Organisation: KIT Department of Economics and Management

Part of: Economics (Specialisation Program Economics)
Compulsory Elective Modules (Economics)
Compulsory Elective Modules (Statistics)

Election block: Compulsory Elective Courses (1 item)
- T-WIWI-102736 Economics III: Introduction in Econometrics 5 CR Schienle
- T-WIWI-106623 Technical Conditions Met 0 CR

Election block: Supplementary Courses (between 1 and 2 items)
- T-WIWI-103063 Analysis of Multivariate Data 4.5 CR Grothe
- T-WIWI-103066 Data Mining and Applications 4.5 CR Nakhaeizadeh
- T-WIWI-103064 Financial Econometrics 4.5 CR Schienle
- T-WIWI-103065 Statistical Modeling of Generalized Regression Models 4.5 CR Heller

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 advanced understanding of Econometric techniques and statistical model building.
- is able to develop Econometric models for applied problems based on available data
- is able to apply techniques and models with statistical software, to interpret results and to judge on different approaches with appropriate statistical criteria.

Prerequisites
The course "Economics III: Introduction in Econometrics" is compulsory and must be examined. In case the course "Economics III: Introduction in Econometrics" has already been examined within the module "Applied Microeconomics", the course "Economics III: Introduction in Econometrics" is not compulsory.

Content
The courses provide a solid Econometric and statistical foundation of techniques necessary to conduct valid regression, time series and multivariate analysis.

Workload
The total workload for this module is approximately 270 hours.
Module: Strategy and Organization [M-WIWI-101425]

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

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<td>T-WIWI-102630</td>
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<tr>
<td>T-WIWI-102871</td>
</tr>
<tr>
<td>T-WIWI-102629</td>
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</tbody>
</table>

Competence Certificate
Erfolgreicher Abschluss aller fachlich entsprechenden Module aus dem Grundlagenprogramm.

Competence Goal
- The student describes both central concepts of strategic management as well as concepts and models for the design of organizational structures.
- He / she evaluates the strengths and weaknesses of existing organizational structures and regulations on the basis of systematic criteria.
- The management of organizational changes discusses and examines the students by means of case studies to what extent the models can be used in practice and what conditions must apply to them.
- In addition, students plan to use IT to support corporate governance.

Content
The module has a practical and action-oriented structure and provides the student with an up-to-date overview of basic skills concepts and models of strategic management and a realistic picture of possibilities and limitations rational design approaches of the organization.
The focus is firstly on internal and external strategic analysis, concept and sources of competitive advantage, Formulation of competitive and corporate strategies as well as strategy assessment and implementation. Secondly strengths and weaknesses of organizational structures and regulations are assessed on the basis of systematic criteria. Concepts for the organization of organizational structures, the regulation of organizational processes and the control organizational changes are presented.

Workload
The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
6.71 Module: Supply Chain Management [M-WIWI-101421]

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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<th>Level</th>
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<tr>
<td>T-WIWI-109936</td>
<td>Platform Economy</td>
<td>4.5 CR</td>
<td>Dorner, Weinhardt</td>
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**Election block: Supplementary Courses (1 item)**

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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5 CR</td>
<td>Nickel</td>
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**Competence Certificate**

This module is only available in the elective field. In the specialization program Business Administration, the election is not permitted.

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 students

- are able to understand and evaluate the control of cross-company supply chains based on a strategic and operative view,
- are able to analyse the coordination problems within the supply chains,
- are able to identify and integrate adequate information system infrastructures to support the supply chains,
- are able to apply theoretical methods from the operations research and the information management,
- learn to elaborate solutions in a team

**Prerequisites**

The course T-WIWI-107506 "Platform Economy" has to be taken.

**Content**

The module "Supply Chain Management" gives an overview of the mutual dependencies of information systems and of supply chains spanning several enterprises. The specifics of supply chains and their information needs set new requirements for the operational information management. In the core lecture "Platform Economy" the focus is set on markets between two parties that act through an intermediary on an Internet platform. Topics discussed are network effects, peer-to-peer markets, blockchains and market design. The course is held in English and teaches parts of the syllabus with the support of a case study in which students analyze a platform.

The module is completed by an elective course addressing appropriate optimization methods for the Supply Chain Management and for modern logistic approaches.

**Annotation**

The planned lectures in the next terms can be found on the websites of the respective institutes IISM, IFL and IOR.

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
Module: Technical Logistics [M-MACH-101279]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

**Credits** 9

**Recurrence** Each winter term

**Language** German

**Level** 3

**Version** 3

**Mandatory**

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<td>Basics of Technical Logistics I</td>
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<tr>
<td>T-MACH-109920</td>
<td>Basics of Technical Logistics II</td>
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<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
Module: Topics in Finance I [M-WIWI-101465]

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

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

**Part of:** Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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

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<td>Derivatives</td>
<td>4,5 CR</td>
<td>Uhrig-Homburg</td>
</tr>
<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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<td>Financial Accounting for Global Firms</td>
<td>4,5 CR</td>
<td>Luedecke</td>
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<td>Financial Intermediation</td>
<td>4,5 CR</td>
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<td>T-WIWI-102626</td>
<td>Business Strategies of Banks</td>
<td>3 CR</td>
<td>Müller</td>
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<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4,5 CR</td>
<td>Gutekunst, Wigger</td>
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<td>International Finance</td>
<td>3 CR</td>
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<td>Strategic Finance and Technology Change</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 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

- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

**Prerequisites**

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

In addition to that it is possible to choose the module Topics in Finance II.

**Content**

The module Topics in Finance I is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**

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

**Workload**

The total workload of the module is about 240 hours. The workload is proportional to the credit points of the individual courses.
**6.74 Module: Topics in Finance II [M-WIWI-101423]**

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

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

**Part of:**  
Business Administration (Specialisation Program Business Administration)  
Compulsory Elective Modules (Business Administration oder Engineering Sciences)  
Compulsory Elective Modules (Business Administration)

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

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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 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

- has advanced skills in modern finance
- is able to apply these skills in practice in the fields of finance and accounting, financial markets and banking

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

In addition to that it is possible to choose the module Topics in Finance I.

**Content**
The module Topics in Finance II is based on the module Essentials of Finance. The courses deal with advanced issues concerning the fields of finance and accounting, financial markets and banking from a theoretical and practical point of view.

**Annotation**
The course T-WIWI-102790 "Special Taxation" will no longer be offered in the module as of winter semester 2018/1019.

**Workload**
The total workload for this module is approximately 270 hours.
6.75 Module: Vehicle Development [M-MACH-101265]

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

Part of:
- Engineering Sciences (Specialisation Program Engineering Sciences)
- Compulsory Elective Modules (Business Administration oder Engineering Sciences)
- Compulsory Elective Modules (Engineering Sciences)

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Election block: Vehicle Development (at least 9 credits)

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Compétence 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).

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

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.
7 Courses

7.1 Course: Advanced Lab Informatics (Master) [T-WIWI-110541]

- **Responsible:** Professorenschaft des Fachbereichs Informatik
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101426 - Electives in Informatics

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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

**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:*
Linked Data and the Semantic Web

2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Notes
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as ‘Block-Seminar’.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

Project lab Cognitive automobiles and robots

2512501, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Notes
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.
Notes
The ISE project course is based on the summer semester lecture "Information Service Engineering". 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
- M. Sc. Rima Türker
- M. Sc. Russa Biswas
- M. Sc. Fabian Hoppe
- M. Sc. Genet Asefa Gesese
- B. Sc. Tabea Tietz

Lab Business Information Systems: Realisation of innovative services (Bachelor)
2512204, SS 2020, 3 SWS, Language: German, Open in study portal

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

Further information can be found on the ILIAS page of the lab.

Development of Sociotechnical Information Systems (Bachelor)
2512400, SS 2020, 3 SWS, Language: German/English, Open in study portal

Notes
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.
7.2 Course: Advanced Lab Security [T-WIWI-109786]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101426 - Electives in Informatics
M-WIWI-101628 - Emphasis in Informatics
M-WIWI-101630 - Electives in Informatics

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Competence Certificate

The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

Prerequisites

None

Recommendation

Knowledge from the lecture "Information Security" is recommended.

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

Security

2512100, WS 19/20, 4 SWS, Language: German, Open in study portal

Notes

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
**7.3 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-101426 - Electives in Informatics

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**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None

**Recommendation**

Knowledge from the lecture "Information Security" is recommended.

**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 lab Security, Usability and Society**

2512551, WS 19/20, 3 SWS, [Open in study portal](#)

**Notes**

Kick-off Meeting (compulsory attendance) on 18.10.2019 at 11:00 in room 3A-11.2
### 7.4 Course: Advanced Lab User Studies in Security [T-WIWI-109271]

**Responsible:** Prof. Dr. Melanie Volkamer  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101426 - Electives in Informatics  
- M-WIWI-101628 - Emphasis in Informatics  
- M-WIWI-101630 - Electives in Informatics

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**Competence Certificate**

The alternative exam assessment consists of:

- a practical work
- a presentation and possibly
- a written seminar thesis

Practical work, presentation and written thesis are weighted according to the course.

**Prerequisites**

None
7 COURSES

Course: Advanced Programming - Application of Business Software [T-WIWI-102748]

7.5 Course: Advanced Programming - Application of Business Software [T-WIWI-102748]

Responsible: Prof. Dr. Stefan Klink
Prof. Dr. Andreas Oberweis

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101399 - Emphasis Informatics
M-WIWI-105112 - Applied Informatics

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Competence Certificate
The success control takes place in the form of a written examination in the amount of 90 minutes. The examination is offered every semester and can be repeated at any regular examination date.

The prerequisite for taking the exam is successful participation in a computer lab. Attendance is compulsory for individual dates of the lab. More detailed information on participation in the exercises and labs will be announced in the first lecture hour and on the lecture homepage.

Admission can only be acquired in the winter semester and is valid indefinitely.

Prerequisites
This course cannot be taken together with Advanced Programming - Java Network Programming.

Recommendation
Knowledge of the course "Grundlagen der Informatik I und II" are helpful.

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

Advanced Programming - Application of Business Software
2511026, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)
Notes
Business information systems enable, support, and accelerate new forms of business processes and forms of organisation. They are the central infrastructure of the economy in the age of eBusiness. Thus, basic knowledge is given in lectures, in exercises and in the computer lab which deals with installation, configuration and parameterization of business information systems. The course communicates profound knowledge in following topics:

- Analysis of cooperation scenarios and business process scenarios
- Selection of modelling methods according to defined criteria
- Implementation of business process models and cooperation models with the help of standard software
- Identification and assessment of challenges during the installation of information systems
- Economical evaluation of business information systems.

This course cannot be taken together with Advanced Programming - Java Network Programming [2511020].

Learning objectives:
Students

- explain basic concepts and principles of enterprise information systems,
- describe the components of enterprise information systems,
- assess economical aspects of such systems,
- apply standard software for modelling business processes and for analysing them to given criteria.

Recommendations:
Knowledge of the course "Grundlagen der Informatik I und II" are helpful.

Workload:

- Lecture 30h
- Exercise course 17h
- Review and preparation of lectures 23h
- Review and preparation of exercises 10h
- Computer Lab 30h
- Exam preparation 26h
- Exam 1h
- Total 150 h
- Exercise courses are done by student tutors (size about 50 students)
7.6 Course: Advanced Programming - Java Network Programming [T-WIWI-102747]

**Responsible:** Prof. Dr. Dietmar Ratz
Prof. Dr.-Ing. Johann Marius Zöllner

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

**Part of:** M-WIWI-101399 - Emphasis Informatics
M-WIWI-105112 - Applied Informatics

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**Exams**

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**Competence Certificate**

At the end of the lecture period, a written examination (90 min.) (according to§4(2), 1 SPO) will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

This course cannot be taken together with Advanced Programming - Application of Business Software [2511026].

**Annotation**

The registration for the participation in the computer lab (precondition for the exam participation) already takes place in the first lecture week!

---

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

**Advanced Programming - Java Network Programming**

2511020, SS 2020, 2 SWS, Language: German, [Open in study portal](#)
Notes
In the lecture, the exercises and computer labs to this course the practical handling with the programming language Java dominating within the range of economical applications is obtained. The basis for this is the current language standard. The knowledge from the lecture Introduction to Programming with Java will be deepened and extended. This is done, among other things, by addressing commercially relevant topics such as object-oriented modeling and programming, class hierarchy and inheritance, threads, applications and applets, AWT and Swing components for graphical user interfaces, exception and event processing, lambda expressions, input/output via streams, applications in networks, Internet communication, client and server programming, remote method invocation, servlets, Java Server Pages and Enterprise Java Beans.

This course cannot be taken together with Advanced Programming - Application of Business Software [2540886/2590886].

Learning objectives:

- Students learn the practical use of the object-oriented programming language Java and are enabled to design and implement component-based Internet applications using the latest technologies and tools.
- The ability to select and design these methods and systems appropriate to the situation and to use them for solving problems is imparted.
- Students are empowered to find strategic and creative answers in the search for solutions to well-defined, concrete and abstract problems.

Workload:
The total workload for this course is approximately 150 hours.
7 COURSES

Course: Advanced Topics in Economic Theory [T-WIWI-102609]

7.7 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-101501 - Economic Theory

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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 2020, 2 SWS, Language: English, Open in study portal

Learning Content
The course deals with basic elements of modern economic theory. It is divided into two parts. The first part introduces the microeconomic foundations of general equilibrium à la Debreu ("The Theory of Value", 1959) and Hildenbrand/Kirman ("Equilibrium Analysis", 1988). The second part deals with asymmetric information and introduces the basic techniques of contract theory.

The course is largely based on the textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.

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

Literature
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.
7.8 Course: Agile Product Innovation Management - Value-driven Planning of New Products [T-MACH-106744]

**Responsible:** Dr.-Ing. Roland Kläger

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**

Oral examination, 20 min.

**Prerequisites**

None
### 7.9 Course: Analysis of Social Structures (WiWi) [T-GEISTSOZ-109047]

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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### 7.10 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

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#### Exams

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**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 2020, 2 SWS, Language: German, Open in study portal**

**Description**  
**Media:**
Lecture with Powerpoint slides

**Learning Content**  
The students get involved in the application of different measurement techniques in the field of exhaust gas and lubricating oil analysis. The functional principles of the systems as well as the application areas of the latter are discussed. In addition to a general overview of standard applications, current specific development and research activities are introduced.

**Workload**  
regular attendance: 24 hrs  
self study: 96 hrs

**Literature**  
The lecture documents are distributed during the courses.
7.11 Course: Analysis of Multivariate Data [T-WIWI-103063]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101599 - Statistics and Econometrics

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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. The exam is offered every semester. Re-examinations are offered only for repeaters.

**Prerequisites**
None

**Recommendation**
Attendance of the courses Statistics 1 [2600008] and Statistics 2 [2610020] is recommended.

**Annotation**
The lecture is not offered regularly. The courses planned for three years in advance can be found online.

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

**V 2550550, WS 19/20, 2 SWS, Open in study portal**

**Learning Content**
Multivariate Data
Basics of multivariate estimating and testing
Correlation Analysis
Variance Analysis
Factor- and Principal Component Analysis
Discriminant function analysis
Cluster Analysis

**Literature**
Comprehensive lecture notes
### 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

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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:*

**Analysis tools for combustion diagnostics**
2134134, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Learning Content**
- energy balance at the engine  
- energy conversion in the combustion chamber  
- thermodynamics of the combustion process  
- flow velocities  
- flame propagation  
- special measurement techniques

**Workload**
- regular attendance: 24 hours  
- self-study: 96 hours

**Literature**
Lecture notes available in the lectures
7 COURSES
Course: Analytical CRM [T-WIWI-102596]

7.13 Course: Analytical CRM [T-WIWI-102596]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101422 - Specialization in Customer Relationship Management
M-WIWI-101460 - CRM and Service Management

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Competence Certificate
The exam will be offered for first time writers for the last time 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
We expect knowledge about data models and the UML modelling language concerning information systems.

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

Analytical CRM
2540522, SS 2020, 2 SWS, Language: German, Open in study portal
Notes
The course Analytical CRM deals with methods and techniques for analysis concerning the management and improvement of customer relationships. Knowledge about customers is aggregated and used for enterprise decision problems like product line planning, customer loyalty, etc. A necessary precondition for these analyses is the transformation of data stemming from operative systems into a common data warehouse that assembles all necessary information. This requires transformation of data models and processes for creating and managing a data warehouse, like ETL processes, data quality and monitoring. The generation of customer-oriented and flexible reports for different business purposes is covered. The course finally treats several different statistical analysis methods like clustering, regression etc. that are necessary for generating important indicators (like customer lifetime value, customer segmentation). As external data source, customer surveys are introduced.

Learning objectives:
The Student
- understands the principal scientific methods from statistics and informatics used in analytical CRM and their application to enterprise decision problems and independently applies these methods to standard cases,
- understands the components for creating and managing a data warehouse from operative system sources including the processes and steps involved and applies these methods to a simple example, and
- uses his knowledge to conduct a standard CRM analysis on enterprise data for a business decision problem and deduces and justifies a recommendation for appropriate action.

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.
The exam is passed, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 5) 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
7 COURSES

Course: Applied Informatics – Applications of Artificial Intelligence [T-WIWI-110340]

**7.14 Course: Applied Informatics – Applications of Artificial Intelligence [T-WIWI-110340]**

**Responsible:** Prof. Dr. York Sure-Vetter

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

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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<td>Prüfung (PR)</td>
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**Competence Certificate**

Written Examination (60 min) according to §4, Abs. 1 of the examination regulations or oral examination of 20 minutes according to §4, Abs. 2, 2 of the examination regulations. The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**

None.

**Recommendation**

Basics in logic, e.g. from lecture Foundations of Informatics 1 are important.

**Annotation**

Replaces from winter semester 2019/2020 T-WIWI-109263 "Applications of Artificial Intelligence".

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

**Applications of Artificial Intelligence**

2511314, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)
Notes
The lecture provides insights into the fundamentals of artificial intelligence. Basic methods of artificial intelligence and their applications in industry are presented.

Applications of the AI is a sub-area of computer science dealing with the automation of intelligent behavior. In general, it is a question of mapping human intelligence. Methods of artificial intelligence are presented in various areas such as, for example, question answering systems, speech recognition and image recognition.

The lecture gives an introduction to the basic concepts of artificial intelligence. Essential theoretical foundations, methods and their applications are presented and explained.

This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

Learning objectives:
The students
- consider current research topics in the field of artificial intelligence and in particular learn about the topics of knowledge modeling, machine learning, text mining and uninformed search.
- interdisciplinary thinking.
- technological approaches to current problems.

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

Notes
The exercises are oriented on the lecture applications of AI.

Multiple exercises are held that capture the topics, held in the lecture Applications of AI and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

This lecture aims to provide students with a basic knowledge and understanding of the structure, analysis and application of selected methods and technologies on artificial intelligence. The topics include, among others, knowledge modeling, machine learning, text mining, uninformed search, and intelligent agents.

Learning objectives:
The students
- consider current research topics in the field of artificial intelligence and in particular learn about the topics of knowledge modeling, machine learning, text mining and uninformed search.
- interdisciplinary thinking.
- technological approaches to current problems.
7 COURSES


**负责教师:** Prof. Dr. Andreas Oberweis

**组织单位:** KIT Department of Economics and Management

**包含于:** M-WIWI-101426 - Electives in Informatics

M-WIWI-105112 - Applied Informatics

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### 竞争力证书

评估由写作文考（60分钟）组成，于第一周后讲义结束后进行。

### 模拟条件

以下条件必须满足:

1. 课程 T-WIWI-102660 - Database Systems 不得开始。

### 标注

替换自2020年夏季学期 T-WIWI-102660 "Database Systems"。

下文列出了与本课程相关的事件摘录:

**Applied Informatics - Database Systems**

2511200, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)
Notes
Database systems (DBS) play an important role in today's companies. Internal and external data is stored and processed in databases in every company. The proper management and organization of data helps to solve many problems, enables simultaneous queries from multiple users and is the organizational and operational base for the entire working procedures and processes of the company. The lecture leads in the area of the database theory, covers the basics of database languages and database systems, considers basic concepts of object-oriented and XML databases, conveys the principles of multi-user control of databases and physical data organization. In addition, it gives an overview of business problems often encountered in practice such as:

- Correctness of data (operational, semantic integrity)
- Restore of a consistent database state
- Synchronization of parallel transactions (phantom problem).

Learning objectives:
Students

- are familiar with the concepts and principles of data base models, languages and systems and their applications and explain it,
- design and model relational data bases on the basis of theoretical foundations,
- create queries for relational databases,
- know how to handle enhanced data base problems occurring in the enterprises.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h

Notes
Database systems (DBS) play an enormously important role in today's companies. The internal and external data is stored and processed in the database of the respective company. The correct management and organization of this data helps to solve numerous problems, enables simultaneous queries by several users and is the organizational and operational basis for the entire workflows and processes of the company.

The lecture introduces the field of database theory, covers the basics of database languages and database systems, teaches the principles of multi-user database control and physical data organization. In addition, it provides an overview of database problems often encountered in business practice, such as the correctness of data (operational, semantic integrity), the recovery of a consistent database state, and the synchronization of parallel transactions.
### 7.16 Course: Applied Informatics – Information Security [T-WIWI-110342]

**Responsible:** Prof. Dr. Melanie Volkamer  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101426 - Electives in Informatics  
M-WIWI-105112 - Applied 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.

The exam takes place every semester and can be repeated at every regular examination date.

**Modeled Conditions**

The following conditions have to be fulfilled:

1. The course T-WIWI-108387 - Information Security must not have been started.

**Annotation**

Replaces from summer term 2020 T-WIWI-108387 "Information Security".

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

**Applied Informatics - Information Security**

2511550, SS 2020, 2 SWS, [Open in study portal](Open in study portal)  
Lecture (V)
Notes

- Basics and concepts of information security
- Understanding the protection objectives of information security and various attack models (including associated assumptions)
- Introduction of measures to achieve the respective protection goals, taking into account different attack models
- Note: In contrast to the IT Security lecture, measures such as encryption algorithms are treated only abstractly, i.e. the idea of the measure, assumptions to the attacker and the deployment environment.
- Presentation and analysis of problems of information security arising from human-machine interaction and presentation of the Human Centered Security by Design approach.
- Introduction into organisational protective measures and standards to be observed for companies

Learning objectives:

The student

- can explain the basics of information security
- knows suitable measures to achieve different protection goals
- can assess the quality of organisational protective measures, i.e. among other things knows what has to be taken into account when using the individual measures
- understands the differences between information security in the organisational and in the private context
- knows the areas of application of different standards and knows their weaknesses
- knows and can explain the problems of information security that which arise from human-machine interaction
- is able to deal with messages concerning found security problems in a critical way.
### Course: Applied Informatics – Modelling [T-WIWI-110338]

**Responsible:** Prof. Dr. Andreas Oberweis  
Prof. Dr. York Sure-Vetter

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

**Part of:**  
M-WIWI-101426 - Electives in Informatics  
M-WIWI-105112 - Applied Informatics

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**Competence Certificate**

The assessment consists of a written examination (60 min) in the first week after lecture period (according to Section 4 (2),1 of the examination regulation).

**Prerequisites**

None

**Annotation**

Replaces from winter semester 2019/2020 T-WIWI-102652 "Applied Informatics I - Modeling".

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

**Applied Informatics - Modelling**

2511030, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)
Notes
In the context of complex information systems, modelling is of central importance, e.g. – in the context of systems to be developed – for a better understanding of their functionality or in the context of existing systems for supporting maintenance and further development.

Modelling, in particular modelling of information systems, forms the core part of this lecture. The lecture is organized in two parts. The first part mainly covers the modelling of static aspects, the second part covers the modelling of dynamic aspects of information systems.

The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and description logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

Learning objectives:
Students
- explain the strengths and weaknesses of various modeling approaches for Information Systems and choose an appropriate method for a given problem,
- create UML models, ER models and Petri nets for given problems,
- model given problems in Description Logics and apply description logic rules,
- describe the main ontology concepts and languages and explain SPARQL queries,
- create and evaluate a relational database schema and express queries in relational algebra.

Workload:
- Total effort: 120-150 hours
- Presence time: 45 hours
- Self study: 75-105 hours

Exercises to Applied Informatics - Modelling
2511031, WS 19/20, 1 SWS, Language: German, Open in study portal

Notes
The exercises are related to the lecture Applied Informatics I - Modelling.

Multiple exercises are held that capture the topics, held in the lecture Applied Informatics I - Modelling, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

The lecture sets out with a definition of modelling and the advantages of modelling. After that, advanced aspects of UML, the Entity Relationship model (ER model) and description logics as a means of modelling static aspects will be explained. This will be complemented by the relational data model and the systematic design of databases based on ER models. For modelling dynamic aspects, different types of petri-nets together with their respective analysis techniques will be introduced.

Learning objectives:
Students
- explain the strengths and weaknesses of various modeling approaches for Information Systems and choose an appropriate method for a given problem,
- create UML models, ER models and Petri nets for given problems,
- model given problems in Description Logics and apply description logic rules,
- describe the main ontology concepts and languages and explain SPARQL queries,
- create and evaluate a relational database schema and express queries in relational algebra.

**Responsible:** Prof. Dr. Ali Sunyaev

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

**Part of:**
- M-WIWI-101426 - Electives in Informatics
- M-WIWI-101628 - Emphasis in Informatics
- M-WIWI-101630 - Electives in Informatics
- M-WIWI-105112 - Applied Informatics

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**Exams**

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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. 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:
Notes
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.

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101426 - Electives in Informatics  
- M-WIWI-105112 - Applied Informatics

**Type**  
Written examination  
**Credits**  
4.5  
**Recurrence**  
Each summer term  
**Version**  
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| SS 2020 | 2511206 | Applied Informatics - Software Engineering | 2 SWS | Lecture (V) | Oberweis  
| SS 2020 | 2511207 | Übungen zu Angewandte Informatik - Software Engineering | 1 SWS | Practice (Ü) | Oberweis, Fritsch  

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| WS 19/20 | 7900026 | Applied Informatics - Software Engineering | Prüfung (PR) | Oberweis

**Competence Certificate**  
The assessment consists of an 1h written exam in the first week after lecture period.

**Modeled Conditions**  
The following conditions have to be fulfilled:

1. The course T-WIWI-100809 - Software Engineering must not have been started.

**Annotation**  

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

**Applied Informatics - Software Engineering**  
2511206, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)
Notes
The course deals with fundamental aspects of the systematically development of huge software systems. The course covers topics such as:

- software developing process models
- methods and tools for the development phases: requirements analysis, system specification, system design, programming and testing.

Learning objectives:
Students

- are familiar with the concepts and principles of software engineering and can discuss it,
- know common software development process models and their strengths and weaknesses and can discuss it,
- know methods for requirements analysis and can use it and can model and evaluate use case models,
- know models for systems structuring and controlling as well as architecture principles of software systems and can discuss it,
- can model and evaluate component diagrams
- are familiar with basic concepts of software quality management and are able to apply software test and evaluation methods in concrete situations.

Workload:

- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h
### 7.20 Course: Auction & Mechanism Design [T-WIWI-102876]

**Responsibility:** Prof. Dr. Nora Szech  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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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.

A bonus can be earned through successful participation in the exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**
None

**Recommendation**
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

**Annotation**
The lecture will be held in English.

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

#### Auction and Mechanism Design
2560550, SS 2020, 2 SWS, Language: English, [Open in study portal](#)  
**Lecture (V)**
Notes
The course starts with the basic theory of equilibrium behavior and revenue management in one object standard auctions. The revenue equivalence theorem for standard auctions is introduced. Thereafter, the course focuses on mechanism design and its applications to one object auctions and bilateral trade.

The students
- learn to analyze strategic behavior in auctions;
- learn to compare auction formats with regard to efficiency and revenue;
- are familiarized with the basic theory of (Bayesian) mechanism design;
- learn to master the revenue equivalence theorem for standard auctions;
- learn to apply mechanism design to one object auctions and bilateral trade.

The lecture will be held in English.

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.

Through successful participation in the Exercise, students can earn a bonus. If the grade on the written exam is between 4.0 and 1.3 the bonus improves the grade by one step (0.3 or 0.4). Details will be announced during the lecture.

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

Recommendations:
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Literature
7.21 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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| 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 19/20, 4 SWS, Language: English, [Open in study portal]

**Lecture (V)**

**Notes**
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".
Learning 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

Workload
regular attendance: 45 hours
self-study: 195 hours

Literature
7.22 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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<th>Expansion</th>
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**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 19/20, 4 SWS, Language: German, Open in study portal

**Lecture (V)**

**Notes**
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":
Learning 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

Workload
regular attendance: 45 hours
self-study: 195 hours

Literature

Automotive Engineering I
2113809, WS 19/20, 4 SWS, Language: English, Open in study portal

Notes
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".

Learning 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

Workload
regular attendance: 45 hours
self-study: 195 hours
**Literature**


7.23 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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<td>SS 2020 2114855 Automotive Engineering II</td>
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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:*

### Notes

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.

**Learning 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

**Workload**

regular attendance: 22.5 hours
self-study: 97.5 hours
Automotive Engineering II
2114855, SS 2020, 2 SWS, Language: English, Open in study portal

Notes

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.

Learning 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

Literature


Elective literature:


7 COURSES
Industry Engineering and Management B.Sc.
Module Handbook as of 18.02.2020
7.24 Course: Bachelor Thesis [T-WIWI-103067]

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

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

**Part of:** M-WIWI-101601 - Module Bachelor Thesis

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**Final Thesis**
This course represents a final thesis. The following periods have been supplied:

- **Submission deadline**: 6 months
- **Maximum extension period**: 1 months
- **Correction period**: 6 weeks
7.25 Course: Basic Principles of Economic Policy [T-WIWI-103213]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101668 - Economic Policy I

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<td>Basic Principles of Economic Policy</td>
<td>2 SWS Lecture (V) Ott</td>
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<td>1 SWS Practice (Ü) Ott, Scheu, Bälz</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. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2610012], and Economics II [2600014].
Annotation

Description:
Theory of general economic policy and discussion of current economic policy topics:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

Learning objectives:
Students learn:

- To apply basic concepts of micro- and macroeconomic theories to economic policy issues.
- to develop arguments on how state intervention in the market can be legitimized from a welfare economic perspective
- to derive theory-based policy recommendations.

Learning content:

- Market interventions: microeconomic perspective
- Market interventions: macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Economic policy makers: Political-economic aspects

Workload:

- Total effort at 4.5 LP: approx. 135 hours
- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

Media:
See course announcement

References:
See course announcement

Below you will find excerpts from events related to this course:
Notes
The lecture deals with theories of general economic policy and discussion of current economic policy topics:

- Goals of economic policy,
- Instruments and institutions of economic policy,
- Triad of regional, national and European economic policies,
- special fields of economic policy, in particular growth, employment, provision of public infrastructure and climate policy.

Learning objectives:
Students shall be given the ability to

- apply basic concepts of micro- and macroeconomic theories to economic policy issues
- develop arguments on how state intervention in the market can be legitimized from a welfare economic perspective
- derive theory-based policy recommendations

Recommendations:
Basic micro- and macroeconomic knowledge is required, especially as taught in the courses Economics I [2610012] and Economics II [2600014].

Workload:
Total effort at 4.5 LP is approx. 135 hours and consists of:

- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

Assessment:
The examination takes place in the form of a written examination (60min) (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date.

Learning Content

- Market interventions: microeconomic and macroeconomic perspective
- Institutional economic aspects
- Economic policy and welfare economics
- Economic policy makers: Political-economic aspects

Workload

- Total effort at 4.5 LP: approx. 135 hours
- Presence time: approx. 30 hours
- Self-study: approx. 105 hours

Literature

- Lecture slides
- Exercises

Exercises of Basic Principles of Economic Policy
2560281, SS 2020, 1 SWS, Language: German, Open in study portal

Practice (Ü)

Literature

- Lecture slides
- Exercises
7.26 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-101403 - Public Finance  
M-WIWI-101423 - Topics in Finance II  
M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**

The assessment consists of a written exam (90 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**

None

**Recommendation**

Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course "Öffentliche Einnahmen" beforehand.

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

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

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<td>2560134, WS 19/20, 3 SWS, Language: German</td>
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**Notes**

**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.
7.27 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

---

### Type

-Written examination

### Credits

-4

### Recurrence

-Each winter term

### Version

-1

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**Events**

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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.

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**Prerequisites**

none

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

### Basics of Technical Logistics

2117095, WS 19/20, 3 SWS, Language: German, [Open in study portal](#)

---

**Description**

**Media:**

supplementary sheets, presentations, blackboard

**Learning 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

**Annotation**

Basics knowledge of technical mechanics is preconditioned

---

**Workload**

- presence: 48h
- rework: 132h

---

**Literature**

Recommendations during lessons
7.28 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

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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.

**Prerequisites**

none
Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II [T-MACH-100967]

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

Part of: M-MACH-101287 - Microsystem Technology

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Events

| Events | SS 2020 | 2142883 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II | 2 SWS | Lecture (V) | Guber |

Exams

| Events | WS 19/20 | 76-T-MACH-100967 | BioMEMS - Microsystems Technologies for Life-Sciences and Medicine II | Prüfung (PR) | 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 2020, 2 SWS, Language: German, [Open in study portal](#)

**Description**
**Media:**
Lecture script

**Notes**
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
LabCD, Protein Crystallisation
Microarrays
Tissue Engineering
Cell Chip Systems
Drug Delivery Systems
Micro reaction technology
Microfluidic Cells for FTIR-Spectroscopy
Microsystem Technology for Anesthesia, Intensive Care and Infusion
Analysis Systems of Person’s Breath
Neurobionics and Neuroprosthesis
Nano Surgery
Learning Content
Examples of use in Life-Sciences and biomedicine: Microfluidic Systems:
- LabCD, Protein Crystallisation
- Microarrays
- Tissue Engineering
- Cell Chip Systems
- Drug Delivery Systems
- Micro reaction technology
- Microfluidic Cells for FTIR-Spectroscopy
- Microsystem Technology for Anesthesia, Intensive Care and Infusion
- Analysis Systems of Person’s Breath
- Neurobionics and Neuroporthesis
- Nano Surgery

Workload
- Literature: 20 h
- Lessons: 21 h
- Preparation and Review: 50 h
- Exam preparation: 30 h

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
Course: BioMEMS - Microsystems Technologies for Life-Sciences and Medicine III [T-MACH-100968]

**Responsible:** Prof. Dr. Andreas Guber

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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<td>Guber</td>
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**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 2020, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture script

**Notes**

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

**Learning 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

**Workload**

Literature: 20 h
Lessons: 21 h
Preparation and Review: 50 h
Exam preparation: 30 h

Industrial Engineering and Management B.Sc.
Module Handbook as of 18.02.2020

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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
7.31 Course: Bionics for Engineers and Natural Scientists [T-MACH-102172]

**Course Information**

- **Responsible:** PD Dr. Hendrik Hölscher
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101287 - Microsystem Technology

**Events**

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<th>76-T-MACH-102172</th>
<th>Bionics for Engineers and Natural Scientists</th>
<th>Prüfung (PR)</th>
<th>Hölscher</th>
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</thead>
</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 2020, 2 SWS, Language: German, [Open in study portal]

**Description**

**Media:**

- Slides of the lectures

**Notes**

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

lectures 30 h
self study 30 h
preparation for examination 30 h

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

**Learning 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.

**Workload**

- lectures 30 h
- self study 30 h
- preparation for examination 30 h

**Literature**

### 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  
M-MACH-101267 - Mobile Machines

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**Competence Certificate**
The assessment consists of an oral exam (20 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108889 must have been passed.

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

The number of participants is limited. A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

**Annotation**
The students will get an overview of the theoretic and practical functioning of different bus systems. After the practical oriented lessons the students will be able to visualize the communication structure of different applications, design basic systems and evaluate the complexity of programming of the complete system. Hereunto the students program in the practical orientated lessons IFM-controllers using the programming environment CoDeSys.

**Content:**
- Knowledge of the basics of data communication in networks  
- Overview of the operating mode of current field buses  
- Explicit observation of the operating mode and application areas of CAN buses  
- Practical programming of an example application (hardware is provided)

**Literature:**

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

Learning 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)

Annotation
The course will be replenished by interesting lectures of professionals.

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

Literature
Elective literature:
**7.33 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  
M-MACH-101267 - Mobile Machines

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**Competence Certificate**  
Creation of control program

**Prerequisites**  
none
7.34 Course: Business Administration: Finance and Accounting [T-WIWI-102819]

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

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101494 - Fundamentals of Business Administration 1

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Competence Certificate

The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The assessment 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:

Business Administration: Finance and Accounting

2610026, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content

- Investment and Finance:
  - Valuation of Bonds and Stocks
  - Capital Budgeting
  - Portfolio Theory
- Financial Accounting
- Management Accounting

Annotation

Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course. Each part of the course is taught by instructors specialised in the field of that part.

Workload

The total workload for this course is approximately 120 hours. For further information see German version.

Literature

Extensive bibliographic information will be given in the materials to the lecture.
7.35 Course: Business Administration: Production Economics and Marketing [T-WIWI-102818]

**Responsible:**
- Prof. Dr. Wolf Fichtner
- Prof. Dr. Martin Klarmann
- Prof. Dr.-Ing. Thomas Lützkendorf
- Prof. Dr. Martin Ruckes
- Prof. Dr. Frank Schultmann

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

**Part of:**
M-WIWI-101578 - Fundamentals of Business Administration 2

**Type:** Written examination
**Credits:** 4
**Recurrence:** Each summer term
**Version:** 1

### Events

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<td>Business Administration: Production Economics and Marketing (2 SWS)</td>
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Competence Certificate
The assessment consists of a written exam (90 minutes) according to Section 4(2), 1 of the examination regulation.

**Prerequisites**
None

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

**Business Administration: Production Economics and Marketing**

2600024, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Description**

1. **Marketing**

Marketing is an organizational function to handle situations, activities, and processes for creating, communicating, and delivering value to customers in a best way. (Customer) relationship management comprises collecting, aggregating, and analyzing information (e.g., developments in the society, changing conditions of markets, alterations w.r.t. buying behavior) to benefit different target groups.

Main topics will deal with market research and optimized application of marketing mix instruments with emphasis on ‘marketing and the web’, ‘innovation management’, and ‘international marketing’.

2. **Production economics**

In the part of production economics the student will learn basics in the field of production theory, procurement and resource acquisitions, production and operations management and industrial engineering.

Aspects of electrical engineering industry, technological foreseights, construction industry and real estate markets will be treated.

3. **Information systems**

In today’s economy, information is a competitive factor that calls for an interdisciplinary investigation from economics and business administration, informatics and law. In this part of the lecture, selected topics from information engineering and management and their impact in market competition are presented.

Topics include: Information in a company, Information processing: From an agent to business networks, social networks, service value networks, market engineering.
Learning Content
The course is made up of the following topics:

Marketing
- Foundations of marketing
- Strategic marketing
- Consumer behaviour
- Product
- Price
- Promotion
- Sales
- Marketing Metrics

Production economics
In the part of production economics the student will learn basics in the field of production theory, procurement and resource acquisitions, production and operations management and industrial engineering.

Aspects of energy economics, technological foresights, construction industry and real estate markets will be treated.

Annotation
Key qualifications can be shown in an active participation through presentations of solutions and discussions in the tutorials which accompany the course.

Each part of the course is taught by instructors specialised in the field of that part.

Workload
The total workload for this course is approximately 120 hours. For further information see German version.

Literature
Further literature references are announced in the materials to the lecture.
Course: Business Administration: Strategic Management and Information Engineering and Management [T-WIWI-102817]

**Responsible:** Prof. Dr. Petra Nieken  
Prof. Dr. Martin Ruckes  

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

**Part of:** M-WIWI-101494 - Fundamentals of Business Administration 1

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</table>

**Competence Certificate**  
The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The assessment takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**  
None
7.37 Course: Business Strategies of Banks [T-WIWI-102626]

Responsibility: Prof. Dr. Wolfgang Müller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101423 - Topics in Finance II
M-WIWI-101465 - Topics in Finance I

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Exams

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Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

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

Business Strategies of Banks

2530299, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Description
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 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.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.
Literature

Elective literature:

- A script is disseminated chapter by chapter during the course of the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 6th edition, Springer
7.38 Course: CAD-NX Training Course [T-MACH-102187]

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

**Part of:** M-MACH-101270 - Product Lifecycle Management

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<td>Prüfung (PR)</td>
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**Prerequisites**  
None

**Recommendation**  
Dealing with technical drawings is required.

**Annotation**  
For the practical course compulsory attendance exists.

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

**CAD-NX training course**  
2123357, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**  
The participant will learn the following knowledge:

- Overview of the functional range
- Introduction to the work environment of NX
- Basics of 3D-CAD modelling
- Feature-based modelling
- Freeform modelling
- Generation of technical drawings
- Assembly modelling
- Finite element method (FEM) and multi-body simulation (MBS) with NX

**Annotation**  
For the practical course compulsory attendance exists.

**Workload**  
Regular attendance: 35 hours,  
Self-study: 12 hours

**Literature**  
Practical course skript
Learning Content
The participant will learn the following knowledge:

- Overview of the functional range
- Introduction to the work environment of NX
- Basics of 3D-CAD modelling
- Feature-based modelling
- Freeform modelling
- Generation of technical drawings
- Assembly modelling
- Finite element method (FEM) and multi-body simulation (MBS) with NX

Annotation
For the practical course compulsory attendance exists.

Workload
Regular attendance: 35 hours,
Self-study: 12 hours

Literature
Practical course skript
### 7.39 Course: Civil Law for Beginners [T-INFO-103339]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101187 - Elective Module Law  
- M-INFO-105084 - Public and Civil Law

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7 COURSES
Course: Climatology [T-PHYS-101092]

7.40 Course: Climatology [T-PHYS-101092]

Responsible: Prof. Dr. Joaquim José Ginete Werner Pinto
Katharina Maurer

Organisation: KIT Department of Physics

Part of: M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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Prerequisites
none
7.41 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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Events

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<td>Prüfung (PR)</td>
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</table>

Competence Certificate

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

Prerequisites

none

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

Combustion Engines I

2133113, WS 19/20, 4 SWS, Language: German, Open in study portal

Notes

Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment

Learning Content

Introduction, History, Concepts  
Working Principle and Applications  
Characteristic Parameters  
Engine Parts  
Drive Train  
Fuels  
Gasoline Engines  
Diesel Engines  
Exhaust Gas Aftertreatment
Workload
regular attendance: 32 hours
self-study: 88 hours
7.42 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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**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:*

**Combustion Engines II**
2134151, SS 2020, 3 SWS, Language: German, [Open in study portal](#)

**Learning Content**
- Emissions
- Fuels
- Drive Train Dynamics
- Engine Parts
- Boosting
- Alternative Powertrain Concepts
- Special Engine Concepts

**Workload**
regular attendance: 31.5 hours  
self-study: 90 hours
### Course: Competition in Networks [T-WIWI-100005]

**Responsible:** Prof. Dr. Kay Mitusch  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101422 - Specialization in Customer Relationship Management  
- M-WIWI-101499 - Applied Microeconomics  
- M-WIWI-101668 - Economic Policy I

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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**

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

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

### Competition in Networks

**2561204, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)**

**Description**

Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture.

**Workload**

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

**Literature**

Will be announced in the lecture.
Course: Constitution and Properties of Wearresistant Materials [T-MACH-102141]

**Responsible:** Prof. Dr. Sven Ulrich

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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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 Wear resistant materials**

2194643, SS 2020, 2 SWS, Language: German, [Open in study portal](#)
Notes
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

Learning 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

Workload
regular attendance: 22 hours
self-study: 98 hours

Literature
Schneider, J.: Schneidkeramik, Verlag moderne Industrie, Landsberg am Lech, 1995

Copies with figures and tables will be distributed
### Course: Construction Technology [T-BGU-101691]

**Responsible:** Prof. Dr.-Ing. Shervin Haghsheno  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:** M-BGU-101004 - Fundamentals of Construction

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#### Exams

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**Competence Certificate**  
written exam with 90 minutes

**Prerequisites**  
None

**Recommendation**  
None

**Annotation**  
None
### 7.46 Course: Consumer Behavior [T-WIWI-106569]

**Responsible:** Benjamin Scheibehenne  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-104911 - Information Systems & Digital Business: Interaction

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**Type:** Written examination  
**Recurrence:** Once  
**Version:** 2

**Competence Certificate**  
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**  
None.

**Annotation**  
For further information, please contact the research group Marketing and Sales (http://marketing.iism.kit.edu/).

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

**Consumer Behavior**  
2572174, SS 2020, 3 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**
Notes

Goal

The goal of the class is to gain a better understanding of the situational, biological, cognitive, and evolutionary factors that drive consumer behavior. We will address these questions from an interdisciplinary perspective, including relevant theories and empirical research findings from Psychology, Marketing, Cognitive Science, Biology, and Economics.

Description

Consumer decisions are ubiquitous in daily life and they can have long-ranging and important consequences for individual (financial) well-being and health but also for societies and the planet as a whole. To help people making better choices it is important to understand the factors that influence their behavior. Towards this goal, we will explore how consumer behavior is shaped by social influences, situational and cognitive constraints, as well as by emotions, motivations, evolutionary forces, neuronal processes, and individual differences. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates.

The lecture will be held in English.

Grading

There will be a written exam at the last day of class. The exam will cover the content of the lecture and the literature listed in the required reading list that will be made available to enrolled students on the first day of class. The exam questions will be in English. You are allowed to bring a language dictionary into the exam but you are not allowed to bring notes.

Workload

The total workload for this course is approximately 135 hours.

Presence time: 30 hours
Preparation and wrap-up of the course: 45 hours
Exam and exam preparation: 60 hours

Comment

This lecture features a "double down" format: There will be two lecture sessions in a row during the first half of the semester. Thus, you will be finished with this class after 7 weeks.
7.47 Course: Control Technology [T-MACH-105185]

**Responsible:** Christoph Gönnheimer  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**

Written Exam (60 min)

**Prerequisites**

none

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

**Control Technology**

2150683, SS 2020, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**

**Media:**

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
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

Learning 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

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
7.48 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-101816 - Seminar Module

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**Competence Certificate**

alternative test achievement (graded):
- written elaboration (workload of at least 80 h)
- oral presentation (approx. 30 min)

**Prerequisites**

none
### 7.49 Course: Customer Relationship Management [T-WIWI-102595]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101460 - CRM and Service Management

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#### Exams

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#### Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

#### Prerequisites

None

---

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

#### Customer Relationship Management

**2540508, WS 19/20, 2 SWS, Language: English, Open in study portal**

**Lecture (V)**

---

**Learning Content**

The course begins with an introduction into Service Management as the strategic concept which also covers all CRM applications. The course is divided in the basics of Service Management as well as different topics within this concept like external and internal marketing, quality management and organizational requirements.

**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
Literature

Elective literature:
### Course: Data Mining and Applications [T-WIWI-103066]

- **Responsible:** Rheza Nakhaeizadeh
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101599 - Statistics and Econometrics

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#### Events

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<th>2520375</th>
<th>Data Mining and Applications</th>
<th>2/4 SWS</th>
<th>Lecture (V)</th>
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### Competence Certificate

- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation (app. 45 minutes)

### Prerequisites

None

---

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

### Data Mining and Applications

2520375, SS 2020, 2/4 SWS, Language: German, [Open in study portal](#)

### Notes

#### 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
Learning Content

Part one: Data Mining

Why 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

The total workload for this course is approximately 135 hours. For further information see German version.

Literature


- 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
Course: Decision Theory [T-WIWI-102792]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101499 - Applied Microeconomics

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Exams

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Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Prerequisites
None

Recommendation
Knowledge in mathematics and statistics is required.
7.52 Course: Derivatives [T-WIWI-102643]

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

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

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each summer term

**Version**
- 1

**Events**

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<td>Derivatives</td>
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**Competence Certificate**
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**
None

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

**Derivatives**

**Description**
The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

**Learning Content**
The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

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

**Literature**
- Elective literature:
Course: Design and Development of Mobile Machines [T-MACH-105311]

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

**Organisation:** KIT Department of Mechanical Engineering

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

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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.

A registration is mandatory, the details will be announced on the webpages of the Institute of Vehicle System Technology / Institute of Mobile Machines. In case of too many applications, attendance will be granted based on pre-qualification.

The course will be replenished by interesting lectures of professionals from leading hydraulic companies.

**Prerequisites**
Required for the participation in the examination is the preparation of a report during the semester. The partial service with the code T-MACH-108887 must have been passed.

**Recommendation**
Knowledge in Fluid Power Systems (LV 2114093)

**Annotation**
After completion of the lecture, students can:

- design working and travel drive train hydraulics of mobile machines and can derive characteristic key factors.
- choose and apply suitable state of the art designing methods successfully
- analyse a mobile machines and break its structure down from a complex system to subsystems with reduced complexity
- identify and describe interactions and links between subsystems of a mobile machine
- present and document solutions of a technical problem according to R&D standards

The number of participants is limited.

**Content:**
The working scenario of a mobile machine depends strongly on the machine itself. Highly specialised machines, e.g. pavers are also as common as universal machines with a wide range of applications, e.g. hydraulic excavators. In general, all mobile machines are required to do their intended work in an optimal way and satisfy various criteria at the same time. This makes designing mobile machines to a great and interesting challenge. Nevertheless, usually key factors can be derived for every mobile machine, which affect all other machine parameters. During this lecture, those key factors and designing mobile machines accordingly will be addressed. To do so, an exemplary mobile machine will be discussed and designed in the lecture an as a semester project.

**Literature:**
See german recommendations

*Below you will find excerpts from events related to this course:*
Design and Development of Mobile Machines
2113079, WS 19/20, 2 SWS, Language: German, Open in study portal

Learning Content
Wheel loaders and excavators are highly specialized mobile machines. Their function is to detach, pick up and deposit materials near by. Significant size for dimensioning of the machines is the content of their standard shovel. In this lecture the main steps in dimensioning a wheel loader or excavator are being thought. This includes among others:

- Defining the size and dimensions,
- the dimensioning of the electric drive train,
- the dimensioning of the primary energy supply,
- Determining the kinematics of the equipment,
- the dimension of the working hydraulics and
- Calculations of strength

The entire design process of these machines is strongly influenced by the use of standards and guidelines (ISO/DIN-EN). Even this aspect is dealt with.

The lecture is based on the knowledge from the fields of mechanics, strength of materials, machine elements, propulsion and fluid technique. The lecture requires active participation and continued collaboration.

Workload
- regular attendance: 21 hours
- self-study: 99 hours

Literature
None.
### Course: Design and Development of Mobile Machines - Advance [T-MACH-108887]

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

**Organisation:** KIT Department of Mechanical Engineering  

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

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**Competence Certificate**
Preparation of semester report

**Prerequisites**
none
7.55 Course: Design and Operation of Power Transformers [T-ETIT-101925]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried
 Michael Schäfer

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

**Part of:** M-ETIT-101165 - Energy Generation and Network Components

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7 COURSES

Course: Design, Construction and Sustainability Assessment of Buildings I [T-WIWI-102742]

T  7.56 Course: Design, Construction and Sustainability Assessment of Buildings I [T-WIWI-102742]

Responsible: Prof. Dr.-Ing. Thomas Lützkendorf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101467 - Design, Construction and Sustainability Assessment of Buildings

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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 two times only in the semester in which the lecture is taken place (winter semester). Re-examinations are offered at every ordinary examination date.

Prerequisites

None

Recommendation

A combination with the module Real Estate Management and with engineering science modules in the area of building physics and structural design is recommended.

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

V Design and Construction of Buildings
2586404, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Description

Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process. Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.
Notes
Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process. Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.

Recommendations:
A combination with the module Real Estate Management [WW3BWLUO1] and with engineering science modules in the area of building physics and structural design is recommended.

The student
- has an in-depth knowledge of aspects of energy-saving, resource-saving and health-oriented design, construction and operation of buildings (design for environment)
- has a critical understanding of the essential requirements, concepts and technical solutions for green buildings
- is able to integrate aspects of energy-saving, resource-saving and health-conscious construction into a holistic environmental design approach and to assess the advantages and disadvantages of different individual solutions.

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

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

Learning Content
Taking low-energy buildings as an example the course is an introduction to cheap, energy-efficient, resource-saving and health-supporting design, construction and operation of buildings. Questions of the implementation of the principles of a sustainable development within the building sector are discussed on the levels of the whole building, its components, building equipment as well as the materials. Besides technical interrelationships basics dimensioning and various approaches to ecological and economical assessment play a role during the lectures, as well as the different roles of people involved into the building process. Topics are the integration of economical and ecological aspects into the design process, strategies of energy supply, low-energy and passive buildings, active and passive use of solar energy, selection and assessment of construction details, selection and assessment of insulation materials, greened roofs plus health and comfort.

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

Literature
Elective literature:
See german version.
7.57 Course: Design, Construction and Sustainability Assessment of Buildings II [T-WIWI-102743]

**Responsibility:** Prof. Dr.-Ing. Thomas Lützkendorf

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

**Part of:** M-WIWI-101467 - Design, Construction and Sustainability Assessment of Buildings

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<td>Übung zu Bauökologie II</td>
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<td>2</td>
<td>Lecture (V)</td>
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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 two times only in the semester in which the lecture is takes place (summer semester). Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

A combination with the module Real Estate Management and with engineering science modules from the areas building physics and structural design is recommended.

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

**Sustainability Assessment of Buildings**

2585404, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Description**

The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.
Notes
The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.

Recommendations:
A combination with the module Real Estate Management [WW3BWLOOW2] and with engineering science modules from the areas building physics and structural design is recommended.

The student
- has an in-depth knowledge of the classification of environmental design and construction of buildings within the overall context of sustainability
- has a critical understanding of the main theories and methods of assessing the environmental performance of buildings
- is able to use methods and tools to evaluate the environmental performance in design and decision processes or to interpret existing results

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

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Re-examinations are offered at every ordinary examination date.

Learning Content
The course identifies problems concerning the economical and environmental assessment of buildings along their lifecycle and discusses suitable procedures and tools supporting the decision making process. For example, the course addresses topics like operating costs, heat cost allocation, comparisons of heating costs, applied economical assessment methods, life cycle assessment as well as related design and assessment tools (e.g. element catalogues, databases, emblems, tools) and assessment procedures (e.g. carbon footprint, MIPS, KEA), which are currently available.

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

Literature
Elective literature:
See german version.
7.58 Course: Digital Services [T-WIWI-109938]

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

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

**Part of:**
- M-WIWI-101422 - Specialization in Customer Relationship Management
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-102752 - Fundamentals of Digital Service Systems
- M-WIWI-104913 - Information Systems & Digital Business: Servitization

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<td>Lecture (V)</td>
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**Exams**

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**Competence Certificate**

The assessment consists of a written exam (60 min) (§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**

see below

**Annotation**

This course replaces T-WIWI-105771 “Foundations of Digital Services A" as of winter semester 2019/2020.

Students who wish to register for the examination in the summer semester 2019 please select the examination "Foundations of Digital Services A".

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

**Digital Services**

2595466, SS 2020, 2 SWS, Language: English, Open in study portal

**Description**

The world is moving more and more towards "service-led" economies: in developed countries services already account for around 70% of gross value added. In order to design, engineer, and manage services, traditional "goods-oriented"models are often inappropriate. In addition, the rapid development of information and communication technology (ICT) pushes the economic importance of services that are rendered electronically (eServices) and, thus, drives competitive changes: increased interaction and individualization open up new dimensions of "value co-creation" between providers and customers; dynamic and scalable service value networks replace static value chains; digital services can be globally delivered and exchanged across today's geographic boundaries; Building on a systematic categorization of (e)Services and on the general notion of "value co-creation", we cover concepts and foundations for engineering and managing IT-based services, allowing for further specialization in subsequent KSRI courses. Topics include service innovation, service economics, service modeling as well as the transformation and coordination of service value networks. In addition, case studies, hands-on exercises and guest lectures will illustrate the applicability of the concepts. English language is used throughout the course to acquaint students with international environments.
Learning Content
The world is moving more and more towards "service-led" economies: in developed countries services already account for around 70% of gross value added. In order to design, engineer, and manage services, traditional "goods-oriented" models are often inappropriate. In addition, the rapid development of information and communication technology (ICT) pushes the economic importance of services that are rendered electronically (eServices) and, thus, drives competitive changes: increased interaction and individualization open up new dimensions of "value co-creation" between providers and customers; dynamic and scalable service value networks replace static value chains; digital services can be globally delivered and exchanged across today's geographic boundaries.

Building on a systematic categorization of (e)Services and on the general notion of "value co-creation", we cover concepts and foundations for engineering and managing IT-based services, allowing for further specialization in subsequent KSRI courses. Topics include service innovation, service economics, service modeling as well as the transformation and coordination of service value networks.

In addition, case studies, hands-on exercises and guest lectures will illustrate the applicability of the concepts. English language is used throughout the course to acquaint students with international environments.

Annotation
Former title "Foundations of Digital Services A"

Workload
The total workload for this course is approximately 135 hours. For further information see German version.

Literature
- Stauss, B. et al. (Hrsg.) (2007), Service Science – Fundamentals Challenges and Future Developments.
- Teboul, (2007), Services is Front Stage.
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

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Competence Certificate
Alternative test achievement (graded):
- Processing and presentation (ca. 15 min) of a case study with weighting 20%
- Oral exam (ca. 20 min) with weighting 80%

Prerequisites
none

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

**Lecture (V)**

**Digitalization from Production to the Customer in the Optical Industry**
2149701, WS 19/20, 2 SWS, Language: English, [Open in study portal]

Description
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
Notes
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
7.60 Course: Drive Train of Mobile Machines [T-MACH-105307]

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

**Organisation:** KIT Department of Mechanical Engineering

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

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**Competence Certificate**
The final assessment will be an oral examination (20 min) taking place during the recess period. The examination will be offered in every semester and can be repeated at any regular examination date.

**Prerequisites**
none

**Recommendation**
- General principles of mechanics engineering
- Basic knowledge of hydraulics
- Interest in mobile machinery

**Annotation**
At the end of the lecture, participants can explain the structure and function of all discussed drive trains of mobile machines. They can analyze complex gearbox schematics and synthesize simple transmission functions using rough calculations.

**Content:**
In this course the different drive trains of mobile machinery will be discussed. The focus of this course is:

- mechanical gears
- torque converter
- hydrostatic drives
- power split drives
- electrical drives
- hybrid drives
- axles
- terra mechanics

**Media:** projector presentation

**Literature:** Download of lecture slides from ILIAS. Further literature recommendations during lectures.

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

**Drive Train of Mobile Machines**
2113077, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)
Description
Media:
projector presentation

Learning Content
In this course will be discussed the different drive train of mobile machinery. The focus of this course is:
- improve knowledge of fundamentals
- mechanical gears
- torque converter
- hydrostatic drives
- continuous variable transmission
- electrical drives
- hybrid drives
- axles
- terra mechanic

Workload
• regular attendance: 21 hours
• self-study: 89 hours

Literature
download of scriptum via ILIAS
7.61 Course: Economics and Behavior [T-WIWI-102892]

**Responsible:** Prof. Dr. Nora Szech

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

**Part of:**
- M-WIWI-101499 - Applied Microeconomics
- M-WIWI-101501 - Economic Theory

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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. A bonus can be earned through successful participation in the exercise. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

**Annotation**

The lecture will be held in English.

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

**Economics and Behavior**

2560137, WS 19/20, 2 SWS, Language: English, Open in study portal
Notes
The course covers topics from behavioral economics with regard to contents and methods. In addition, the students gain insight into the design of economic experiments. Furthermore, the students will become acquainted with reading and critically evaluating current research papers in the field of behavioral economics.

The students
- gain insight into fundamental topics in behavioral economics;
- get to know different research methods in the field of behavioral economics;
- learn to critically evaluate experimental designs;
- get introduced to current research papers in behavioral economics;
- become acquainted with the technical terminology in English.

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.

The grade will be determined in a final written exam. Students can earn a bonus to the final grade by successfully participating in the exercises.

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

The lecture will be held in English.

Recommendations:
Basic knowledge of microeconomics and statistics are recommended. A background in game theory is helpful, but not absolutely necessary.

Literature
7.62 Course: Economics I: Microeconomics [T-WIWI-102708]

Responsible: Prof. Dr. Clemens Puppe
Prof. Dr. Johannes Philipp Reiß

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101398 - Introduction to Economics

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Competence Certificate

The assessment consists of a written exam (120 min) following §4, Abs. 2, 1 of the examination regulation.

There may be offered a practice exam in the middle of the semester. The results of this exam may be used to improve the grade of the main exam. 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). A detailed description of the examination modalities will be given by the respective lecturer.

The main exam takes place subsequent to the lecture. The re-examination is offered at the same examination period. As a rule, only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

Prerequisites
None

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

Economics I: Microeconomics
2610012, WS 19/20, 3 SWS, Language: German, Open in study portal

Description

The students learn the basic concepts in Microeconomics and some basics in game theory. The student will understand the working of markets in modern economies and the role of decision making. Furthermore, she should be able to understand simple game theoretic argumentation in different fields of Economics.

In the two main parts of the course problems of microeconomic decision making (household behavior, firm behavior) and problems of commodity allocation on markets (market equilibria and efficiency of markets) as well are discussed. In the final part of the course basics of imperfect competition (oligopolistic markets) and of game theory are presented.
Notes
The students learn the basic concepts in Microeconomics and some basics in game theory. The student will understand the working of markets in modern economies and the role of decision making. Furthermore, she should be able to understand simple game theoretic argumentation in different fields of Economics.

In the two main parts of the course problems of microeconomic decision making (household behavior, firm behavior) and problems of commodity allocation on markets (market equilibria and efficiency of markets) as well are discussed. In the final part of the course basics of imperfect competition (oligopolistic markets) and of game theory are presented.

It is the main aim of this course to provide basic knowledge in economic modelling. In particular, the student should be able to analyze market processes and the determinants of market results. Furthermore, she should be able to evaluate the effects of economic policy measures on market behavior and propose alternative, more effective policy measures.

In particular, the student should learn

- to apply simple microeconomic concepts,
- to analyze the structure of real world economic phenomena,
- to judge the possible effects of economic policy measures on the behavior of economic agents (in simple decision problems),
- to suggest alternative policy measures,
- to analyze as a participant of a tutorial simple economic problems by solving written exercises and to present the results of the exercises on the blackboard,
- to become familiar with the basic literature on microeconomics.

The student should gain basic knowledge in order to help in practical problems

- to analyze the structure of microeconomics relationships and to present own problem solutions,
- solve simple economic decision problems.

The assessment consists of a written exam (120 min) following §4, Abs. 2, 1 of the examination regulation. The main exam takes place subsequent to the lecture.

The re-examination is offered at the same examination period. Usually, only repeating candidates are entitled for taking place the re-examination. For a detailed description on the exam regulations see the information of the respective chair.

The total workload for this course is approximately 150 hours.

Workload
The total workload for this course is approximately 150 hours.

Literature

- Pindyck, Robert S./Rubinfeld, Daniel L., Mikroökonomie, 6. Aufl., Pearson. Münschen, 2005
7.63 Course: Economics II: Macroeconomics [T-WIWI-102709]

**Responsible:** Prof. Dr. Berthold Wigger

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

**Part of:** M-WIWI-101398 - Introduction to Economics

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**Competence Certificate**

The assessment consists of a written exam (120 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:

**Economics II: Macroeconomics**

2600014, SS 2020, 4 SWS, Language: German, [Open in study portal](#)
Notes
Classical Theory of Macroeconomic Production
Chapter 1: Gross domestic product
Chapter 2: Money and Inflation
Chapter 3: Open Economy I
Chapter 4: Unemployment

Growth: The economy in the long term
Chapter 5: Growth I
Chapter 6: Growth II

Business cycle: The economy in the short term
Chapter 7: Economy and aggregate demand I
Chapter 8: Economy and aggregate demand II
Chapter 9: Open Economy II
Chapter 10: Macroeconomic supply

Advanced topics of macroeconomics
Chapter 11: Dynamic model of the economy as a whole
Chapter 12: Microeconomic foundations
Chapter 13: Macroeconomic economic policy

Learning goals:
The students…
- can name the basic indicators, technical terms and concepts of macroeconomics.
- can use models to reduce complex relationships to their basic components.
- can analyse economic policy debates and form their own opinion on them.

Workload:
Total effort for 5 credit points: approx. 150 hours
Presence time: 45 hours
Before and after the LV: 67.5 hours
Exam and exam preparation: 37.5 hours
Learning Content
Classical Theory of Macroeconomic Production
Chapter 1: Gross domestic product
Chapter 2: Money and Inflation
Chapter 3: Open Economy I
Chapter 4: Unemployment

Growth: The economy in the long term
Chapter 5: Growth I
Chapter 6: Growth II

Business cycle: The economy in the short term
Chapter 7: Economy and aggregate demand I
Chapter 8: Economy and aggregate demand II
Chapter 9: Open Economy II
Chapter 10: Macroeconomic supply

Advanced topics of macroeconomics
Chapter 11: Dynamic model of the economy as a whole
Chapter 12: Microeconomic foundations
Chapter 13: Macroeconomic economic policy

Workload
Total effort for 5 credit points: approx. 150 hours
Presence time: 45 hours
Before and after the LV: 67.5 hours
Exam and exam preparation: 37.5 hours

Literature
This lecture is based on the well-known textbook "Macroeconomics" by Greg Mankiw from Schäffer Poeschel Verlag in the current version.
7.64 Course: Economics III: Introduction in Econometrics [T-WIWI-102736]

**Responsible:** Prof. Dr. Melanie Schienle
**Organisation:** KIT Department of Economics and Management
**Part of:**
- M-WIWI-101499 - Applied Microeconomics
- M-WIWI-101599 - Statistics and Econometrics

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**Competence Certificate**
The assessment consists of a 1h written exam according to Section 4(2), 1 of the examination regulation.

**Prerequisites**
None

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

**Economics III: Introduction to Econometrics**
2520016, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Notes**

**Learning objectives:**
- Familiarity with the basic concepts and methods of econometrics
- Preparation of simple econometric surveys

**Content:**
- Simple and multiple linear regression (estimating parameters, confidence interval, testing, prognosis, testing assumptions)
- Model assessment

**Requirements:**
Knowledge of the lectures Statistics I + II is required.

**Workload:**
Total workload for 5 CP: approx. 150 hours
Attendance: 30 hours
Preparation and follow-up: 120 hours

**Learning Content**
Simple and multiple linear regression (estimating parameters, confidence interval, testing, prognosis, testing assumptions)
Multi equation models
Dynamic models

**Workload**
180 hours (6.0 Credits)
Literature


Elective literature:
Additional literature will be suggested in course
### Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]

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

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

**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-101465 - Topics in Finance I

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**Course Details**

**Type:** Lecture (V)

**Credits:** 4.5

**Recurrence:** Each winter term

**Version:** 1

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<td>WS 19/20</td>
<td>7900182</td>
<td>eFinance: Information Engineering and Management for Securities Trading</td>
<td>Prüfung (PR)</td>
<td>Weinhardt</td>
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</table>

**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

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

**eFinance: Information Systems for Securities Trading**

2540454, WS 19/20, 2 SWS, Language: English, Open in study portal

**Description**

The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

**Learning Content**

The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market micro structure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

**Workload**

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


Elective literature:

### 7.66 Course: Electric Energy Systems [T-ETIT-101923]

**Responsible:** Prof. Dr.-Ing. Thomas Leibfried

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

**Part of:** M-ETIT-102379 - Power Network

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<td>2307393</td>
<td>Übungen zu 2307391 Elektroenergiesysteme</td>
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#### Exams

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<td>Electric Energy Systems</td>
<td>Prüfung</td>
<td>Leibfried</td>
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</table>

#### Prerequisites

none
## 7.67 Course: Electrical Engineering for Business Engineers, Part I [T-ETIT-100533]

### Responsible:
Dr. Wolfgang Menesklou

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

### Part of:
M-ETIT-101155 - Electrical Engineering

### Type
Written examination

### Credits
3

### Recurrence
Each winter term

### Version
1

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<td>Electrical Engineering for Business Engineers, Part I</td>
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<td>WS 19/20</td>
<td>2304225</td>
<td>Electrical Engineering for Business Engineers, Part I (Tutorial to 2304223)</td>
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<td>Electrical Engineering for Business Engineers, Part I</td>
<td>Prüfung (PR)</td>
<td>Menesklou</td>
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<tr>
<td>SS 2020</td>
<td>7304223</td>
<td>Electrical Engineering for Business Engineers, Part I</td>
<td>Prüfung (PR)</td>
<td>Menesklou</td>
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</table>
### 7.68 Course: Electrical Engineering for Business Engineers, Part II [T-ETIT-100534]

**Responsible:** Dr. Wolfgang Menesklou  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-MACH-101261 - Emphasis in Fundamentals of Engineering  
M-WIWI-101839 - Additional Fundamentals of Engineering

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<td>Electrical Engineering for Business Engineers, Part II</td>
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| SS 2020       |         |            | Prüfung (PR)          | Menesklou|
|               | 7304224 |            |                       |          |
|               | Electrical Engineering for Business Engineers, Part II | |                      |          |
Course: Empirical Finance [T-WIWI-110216]

**7.69 Course: Empirical Finance [T-WIWI-110216]**

**Responsible:** Prof. Dr Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105035 - Empirical Finance

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**Exams**

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<td>7900008</td>
<td>Empirical Finance</td>
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<td>Ulrich</td>
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**Competence Certificate**
The assessment consists of a written exam (90 minutes) according to §4(2) of the examination regulation.

**Prerequisites**
None.

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

**Empirical Finance**

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<td>4 SWS, Language: English, <a href="#">Open in study portal</a></td>
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</table>

**Description**
The aim of this course is to introduce the student to empirical data work in financial economics and investments. Students will learn and implement modern portfolio theory and the most important concepts to estimate expected returns and volatility.

**Notes**
The aim of this course is to introduce the student to empirical data work in financial economics and investments. Students will learn and implement modern portfolio theory and the most important concepts to estimate expected returns and volatility.

The course covers several topics, among them:
- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns: Factor Models, ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions

At the core of this lecture is the work on modern portfolio theory of Markowitz. Students will learn how to allocate investment opportunities to an optimal portfolio under investment constraints. To obtain the necessary inputs to this framework, students will revisit statistical concepts such as linear regression and maximum likelihood estimation to estimate expected returns and volatilities with econometric time series models.

The total workload for this course is approximately 180 hours.

**Learning Content**
The course covers several topics, among them:
- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns: Factor Models, ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions

**Workload**
The total workload for this course is approximately 180 hours.
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

Type: Oral examination  
Credits: 4  
Recurrence: Each winter term  
Version: 1

Events

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<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines</td>
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<td>Energy Conversion and Increased Efficiency in Internal Combustion Engines</td>
<td>Prüfung (PR)</td>
<td>Koch, Kubach</td>
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Competence Certificate
oral exam, 25 minutes, no auxillary means

Prerequisites
none

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

Energy Conversion and Increased Efficiency in Internal Combustion Engines
2133121, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
1. Introduction
2. Thermodynamics of combustion engines
3. Fundamentals
4. gas exchange
5. Flow field
6. Wall heat losses
7. Combustion in gasoline engines
8. Pressure Trace Analysis
9. Combustion in Diesel engines
10. Waste heat recovery
Learning Content
1. Introduction
2. Thermodynamics of combustion engines
3. Fundamentals
4. gas exchange
5. Flow field
6. Wall heat losses
7. Combustion in gasoline engines
8. Pressure Trace Analysis
9. Combustion in Diesel engines
10. Waste heat recovery

Workload
regular attendance: 24 hours, self-study: 96 hours
Below you will find excerpts from events related to this course:

Energy Policy
2581959, SS 2020, 2 SWS, Language: German, Open in study portal

Description
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

Notes
The availability of cheap, environmentally friendly and secure energy is crucial for human welfare. However, the increasing scarcity of resources and increasing environmental pressures, with a particular focus on climate change, threaten human welfare through economic action. Energy contributes significantly to environmental pollution. The energy industry is characterised by high regulation and a significant influence of political decisions.

At the beginning of the lecture different perspectives on energy policy will be presented and the analysis of political decision-making processes will be discussed. Then the current energy policy challenges in the area of environmental pollution, regulation and the role of energy for households and industry will be discussed. Then the actors of energy policy and energy responsibilities in Europe will be discussed. The economic approaches from traditional environmental economics and sustainability as a new policy approach will then be discussed. Finally, energy policy instruments such as the promotion of renewable energies or energy efficiency are discussed in detail and how they can be evaluated.

The lecture emphasizes the relationship between theory and practice and presents some case studies.

Learning Content
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.
Literature
Will be announced in the lecture.
7.72 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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<td>Engine Measurement Techniques</td>
<td>Prüfung (PR)</td>
<td>Koch</td>
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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:

**Learning Content**
Students get to know state-of-the-art measurement techniques for combustion engines. In particular basic techniques for measuring engine operating parameters such as torque, speed, power and temperature.

Furthermore measurement errors and aberrations are discussed.

Workload
regular attendance: 21 hours
self-study: 100 hours

**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
**7.73 Course: Exam on Climatology [T-PHYS-105594]**

**Responsible:** Prof. Dr. Joaquim José Ginete Werner Pinto

**Organisation:** KIT Department of Physics

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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<td>Each summer term</td>
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### 7.74 Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

- **Responsible:** Prof. Dr. Stefan Nickel
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101413 - Applications of Operations Research
  - M-WIWI-101414 - Methodical Foundations of OR
  - M-WIWI-101421 - Supply Chain Management

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**Competence Certificate**

Due to a research semester of Professor Nickel in WS 19/20, the course "Facility Location and Strategic Supply Chain Management" does NOT take place in WS 19/20. In particular, neither WS 19/20 nor SS 20 will offer an exam for the lecture. The follow-up exam to the lecture in WS 18/19 takes place in SS 19 and is exclusively for students in the second examination.

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.

Prerequisite for admission to examination is the successful completion of the online assessments.

**Prerequisites**

Prerequisite for admission to examination is the successful completion of the online assessments.

**Recommendation**

None

**Annotation**

The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.
7.75 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-101262 - Emphasis Materials Science

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**Exams**

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<td>Kraft, Weygand, Gumbsch</td>
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**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:*
Notes

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.

Learning 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

Workload
Regular attendance: 22.5 hours
Self-study: 97.5 hours

Literature

- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relatively simple but yet comprehensive overview of metallic materials
7.76 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-101262 - Emphasis Materials Science

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<td>Failure of Structural Materials: Fatigue and Creep</td>
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**Competence Certificate**
oral exam ca. 30 minutes  
no tools or reference materials

**Prerequisites**
one

**Recommendation**
preliminary knowledge in mathematics, mechanics and materials science

**Below you will find excerpts from events related to this course:**
Notes
1 Fatigue
1.1 Introduction
1.2 Lifetime
1.3 Fatigue Mechanisms
1.4 Material Selection
1.5 Notches and Shape Optimization
1.6 Case Studies: ICE-Accidents

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological DEsciption of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

The student
- has the basic understanding of mechanical processes to explain the relationships between externally applied load and materials strength.
- can describe the main empirical materials models for fatigue and creep and can apply them.
- has the physical understanding to describe and explain phenomena of failure.
- can use statistical approaches for reliability predictions.
- can use its acquired skills, to select and develop materials for specific applications.

preliminary knowlegde in mathematics, mechanics and materials science recommended
regular attendance: 22.5 hours
self-study: 97.5 hours

The assessment consists of an oral examination (ca. 30 min) according to Section 4(2), 2 of the examination regulation.

Learning Content
1 Fatigue
1.1 Introduction
1.2 Statistical Aspects
1.3 Lifetime
1.4 Fatigue Mechanisms
1.5 Material Selection
1.6 Thermomechanical Loading
1.7 Notches and Shape Optimization
1.8 Case Study: ICE-Desaster

2 Creep
2.1 Introduction
2.2 High Temperature Plasticity
2.3 Phänomenological DEsciption of Creep
2.4 Creep Mechanisms
2.5 Alloying Effects

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature
- Bruchvorgänge in metallischen Werkstoffen, D. Aurich (Werkstofftechnische Verlagsgesellschaft Karlsruhe), relatively simple but yet comprehensive overview of metallic materials
- Fatigue of Materials, Subra Suresh (2nd Edition, Cambridge University Press); standard work on fatigue, all classes of materials, extensive, for beginners and advanced student
Course: Financial Accounting and Cost Accounting [T-WIWI-102816]

**Responsible:** Dr. Jan-Oliver Strych
**Organisation:**
- KIT Department of Informatics
- KIT Department of Economics and Management
**Part of:** M-WIWI-101578 - Fundamentals of Business Administration 2

**Type:** Written examination  
**Credits:** 4  
**Recurrence:** Each winter term  
**Version:** 1

| Events | | | |
|--------|----------------|---|  |
| WS 19/20 | 2600002 | 2 SWS | Lecture (V) | Strych |
| WS 19/20 | 2600003 | 2 SWS | Übung zu Rechnungswesen | Strych |

| Exams | | | |
|--------|----------------|---|  |
| WS 19/20 | 7900304 | Financial Accounting and Cost Accounting | Prüfung (PR) | Ruckes |

**Competence Certificate**
The assessment consists of a written exam following §4, Abs. 2.1 of the examination regulation. The examination 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:

- **2600002, WS 19/20, 2 SWS, Open in study portal**

**Learning Content**
1. Introduction to accounting standards (IFRS, HGB)
2. Annual report and financial statements
3. Selected topics in financial accounting
4. Operational efficiency analysis
5. Financial Statement Analysis
6. Value-based management
7. Taxes
8. Creative accounting and compliance
9. Budgeting and benchmarking
10. Reporting

**Annotation**
It is recommended to have some skills about financial accounting on an introductory level.

**Workload**
The total workload for this course is approximately 120 hours. For further information see German version.
7.78 Course: Financial Accounting for Global Firms [T-WIWI-107505]

**Responsible:** Dr. Torsten Luedecke

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

**Part of:**
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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<td>Financial Accounting for Global Firms</td>
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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.

**Prerequisites**
None

**Recommendation**
Basic knowledge in corporate finance and accounting.

**Annotation**
New lecture in the winter term 2017/18.

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

**Financial Accounting for Global Firms**

2530242, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

**Description**
Increasing globalization coupled with related regulations continues to put pressure on moving towards a common global accounting framework - International Financial Reporting Standards (IFRS). Currently, more than 100 countries use IFRS, so if a firm's business include global transactions, it is critical to know about the impact of IFRS on the financial reporting process and business. In the EU, IFRS are compulsory for listed companies's consolidated statements but have also gained factual significance for companies without statutory duty to use IFRS. The course introduces the conceptual framework of IFRS, discuss the primary financial statements according to IFRS and explains the underlying principles, concepts, and methods to prepare the financial statements. Special focus is given to some more complex accounting issues related to revenue recognition from contracts with customers, consolidation of different types of intercorporate investments, and foreign currency translation.
Learning Content
The lecture covers the following topics:

- The context of financial accounting for global firms
- The mechanics of financial accounting
- Accounting frameworks and concepts
- Content and presentation of financial statements
- Preparing financial statements
- Revenue recognition from contracts
- Tangible and intangible non-current assets
- Financial assets, liabilities, and equity
- Consolidation and the assessment of control
- Investment in associates and joint arrangements
- Business combinations
- Foreign currency translation

Literature
### Course: Financial Econometrics [T-WIWI-103064]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101599 - Statistics and Econometrics

**Type**: Written examination  
**Credits**: 4.5  
**Recurrence**: Irregular  
**Version**: 2

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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...

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

**Financial Econometrics**  
2520022, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Lecture (V)**

**Notes**

**Learning objectives:**  
The student

- shows a broad knowledge of financial econometric estimation and testing techniques  
- is able to apply his/her technical knowledge using software in order to critically assess empirical problems

**Content:**  
ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises

**Requirements:**  
It is recommended to attend the course Economics III: Introduction to Econometrics [2520016] prior to this course.

**Workload:**  
Total workload for 4.5 CP: approx. 135 hours  
Attendance: 30 hours  
Preparation and follow-up: 65 hours  
Exam preparation: 40 hours

**Learning Content**  
ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises
Workload
The total workload for this course is approximately 135 hours (4.5 credits).
regular attendance: 30 hours
self-study: 65 hours
exam preparation: 40 hours
7.80 Course: Financial Intermediation [T-WIWI-102623]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101423 - Topics in Finance II
M-WIWI-101465 - Topics in Finance I

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Competence Certificate

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Prerequisites

None

Recommendation

None

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

Financial Intermediation

2530232, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Description

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Competition in the banking sector
- Stability of the financial system
- The macroeconomic role of financial intermediation

Learning Content

- 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

Workload

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

Literature

Elective literature:

Course: Financial Management [T-WIWI-102605]

**Responsible:** Prof. Dr. Martin Ruckes

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

**Part of:** M-WIWI-101435 - Essentials of Finance

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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. The exam takes place at every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Recommendation**
Knowledge of the content of the course Business Administration: Finance and Accounting [25026/25027] is recommended.

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

**Financial Management**

2530216, SS 2020, 2 SWS, Language: German, Open in study portal

**Description**
Analytical methods and theories in the field 'Capital investments and financing' with the main focus on:

- Capital Structure
- Dividend policy
- Essentials of valuation
- Investment decisions
- Short term/long term finance
- Working Capital Management

**Learning Content**
Analytical methods and theories in the field of corporate finance with the main focus on:

- Liquidity and Working Capital Management
- Sources of short term/long term finance
- Capital Structure
- Dividend policy

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

**Literature**

- Elective literature:
7.82 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
M-MACH-101267 - Mobile Machines

Type: Written examination
Credits: 5
Recurrence: Each winter term
Version: 2

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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 19/20, 2 SWS, Language: German, Open in study portal

Learning 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.

Workload

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

Literature

Scritum for the lecture Fluidtechnik
Institute of Vehicle System Technology
downloadable
7.83 Course: Foundations of Informatics I [T-WIWI-102749]

**Responsible:** Prof. Dr. York Sure-Vetter

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

**Part of:** M-WIWI-101417 - Foundations of Informatics

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**Competence Certificate**

The assessment consists of an 1h written exam according to Section 4 (2), 1 of the examination regulation. The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

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

**Foundations of Informatics I**

2511010, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Notes**

The lecture provides an introduction to basic concepts of computer science and software engineering. Essential theoretical foundations and problem-solving approaches, which are relevant in all areas of computer science, are presented and explained, as well as shown in practical implementations.

The following topics are covered:

- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

**Learning objectives:**

The student

- is able to formalise tasks in the domain of informatics and is able to identify solution methods
- knows the basic terminology of computer science and is capable of applying these terms to different problems.
- knows basic programming structures and is able to apply them (particularly simple data structures, object interaction and implementation of basic algorithms).

**Workload:**

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours
Notes
The exercises are related to the lecture Foundations of Informatics I.
Multiple exercises are held that capture the topics, held in the lecture Foundations of Informatics I, 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:

- Object Oriented Modeling
- Logic (Propositional Calculus, Predicate Logic, Boolean Algebra)
- Algorithms and Their Properties
- Sort-and Search-Algorithms
- Complexity Theory
- Problem Specification
- Dynamic Data Structures

Learning objectives:
The student

- is able to formalise tasks in the domain of informatics and is able to identify solution methods
- knows the basic terminology of computer science and is capable of applying these terms to different problems.
- knows basic programming structures and is able to apply them (particularly simple data structures, object interaction and implementation of basic algorithms).
### 7.84 Course: Foundations of Informatics II [T-WIWI-102707]

**Responsible:** Dr. rer. nat. Achim Rettinger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101417 - Foundations of Informatics

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**Competence Certificate**

The assessment consists of a written exam (90 min.) according to Section 4(2), 1 of the examination regulation. The grade of the exam can be improved by successfully participating in the tutorials. The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

It is recommended to attend the course "Foundations of Informatics I" beforehand. 
Active participation in the practical lessons is strongly recommended.

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

### V Foundations of Informatics II

**Code:** 2511012, **WS 19/20**, **3 SWS**, **Language:** German, [Open in study portal](#)  
**Type:** Lecture (V)

**Notes**

The lecture deals with formal models for automata, languages and algorithms as well as real instances of these models, i.e. computer architecture and organization (hardware development, computer arithmetic, architecture models), programing languages (different language levels, from microprogramming to higher programming languages, as well as compiling and execution), operating systems and modes (architecture and properties of operating systems, operating system tasks, client-server systems), data organization and management (types of data organization, primary and secondary organization).

**Learning objectives:**

- Students acquire vast knowledge of methods and concepts in theoretical computer science and computer architectures.
- Based on the acquired knowledge and skills, students are capable of choosing and applying the appropriate methods and concepts for well-defined problem instances.
- Active participation in the tutorials enables students to acquire the necessary knowledge for developing appropriate solutions cooperatively.

**Recommendations:**

It is recommended to attend the course *Foundations of Informatics I* [2511010] beforehand. 
Active participation in the practical lessons is strongly recommended.

**Workload:**

The total workload for this course is approximately 150 hours.
7.85 Course: Foundations of Interactive Systems [T-WIWI-109816]

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

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

**Part of:**
- M-WIWI-101434 - eBusiness and Service Management
- M-WIWI-102752 - Fundamentals of Digital Service Systems
- M-WIWI-104913 - Information Systems & Digital Business: Servitization

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**Events**

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<th>Foundations of Interactive Systems</th>
<th>3 SWS</th>
<th>Lecture (V)</th>
<th>Mädche, Loewe</th>
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| SS 2020    |         | Foundational concepts, theories, practices and methods for the design of interactive systems. The students get the foundational knowledge to guide the design of interactive systems in business and private life.
Course: Foundations of Mobile Business [T-WIWI-104679]

**Responsible:** Prof. Dr. Andreas Oberweis

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

**Part of:** M-WIWI-101399 - Emphasis Informatics

M-WIWI-101426 - Electives in Informatics

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**Competence Certificate**

The assessment of this course is a written (60 min.) or (if necessary) oral examination according to §4(2) of the examination regulation.

**Prerequisites**

None

**Annotation**

Lecture and exercises are integrated.

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

1. **Grundlagen für mobile Business**
   - Event ID: 2511226, SS 2020, 2 SWS, Language: German, [Open in study portal]

   **Lecture (V)**

**Notes**

The lecture covers the basics of mobile business with a focus on (information) technical basics. These are interlinked with the economic background in Germany.

Contents are:

1. organizational matters
2. introduction & definitions
3. mobile devices
4. mobile radio technology
5. mobile communications market
6. mobile applications
7. digital radio technologies
8. location & context

Note: The teaching units listed above each have a different scope.

**Learning objectives:**

If you are confronted with a question in your job which affects "Mobile Business", you should be able to provide answers quickly and competently:

- Market structures
- technique
- Possibilities for applications
- lawsuits
- issues

**Workload:**

The total workload for this course unit is approx. 135 hours (4.5 credit points).
7.87 Course: Fuels and Lubricants for Combustion Engines [T-MACH-105184]

**Responsible:** Dr.-Ing. 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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**Competence Certificate**
oral examination, Duration: ca. 25 min., no auxiliary means

**Prerequisites**
none

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

**Notes**
Introduction and basics

Fuels for Gasoline and Diesel engines

Hydrogen

Lubricants for Gasoline and Diesel engines

Coolants for combustion engines

**Learning Content**

Introduction and basics

Fuels for Gasoline and Diesel engines

Hydrogen

Lubricants for Gasoline and Diesel engines

Coolants for combustion engines

**Workload**
regular attendance: 24 hours
self-study: 96 hours

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Industrial Engineering and Management B.Sc.
Module Handbook as of 18.02.2020

249
Literature
 Lecturer notes
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 19/20, 1 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Notes**
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.
**Learning 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

**Workload**
regular attendance: 10.5 hours
self-study: 49.5 hours

**Literature**
1. Automobiltechnische Zeitschrift ATZ, Friedr. Vieweg & Sohn Verlagsges. mbH, Wiesbaden
2. Automobil Revue, Bern (Schweiz)
3. Automobil Produktion, Verlag Moderne Industrie, Landsberg
7.89 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

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Competence Certificate

Oral group examination

Duration: 30 minutes

Auxiliary means: none

Prerequisites

none

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

Fundamentals for Design of Motor-Vehicle Bodies II

2114840, SS 2020, 1 SWS, Language: German, Open in study portal

Notes

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.
**Learning 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.

**Workload**
regular attendance: 10.5 hours
self-study: 49.5 hours

**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:** Prof. Dr. Jörg Zürn  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:**  
M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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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 19/20, 1 SWS, Language: German, Open in study portal

**Notes**  
1. Introduction, definitions, history  
2. Development tools  
3. Complete vehicle  
4. Cab, bodyshell work  
5. Cab, interior fitting  
6. Alternative drive systems  
7. Drive train  
8. Drive system diesel engine  
9. Intercooled diesel engines

**Learning Objectives:**  
The students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers.

The students are able to develop parts and components. Furthermore they have knowledge about different cab concepts, the interior and the interior design process. Consequently they are ready to analyze and to judge concepts of commercial vehicles as well as to participate competently in the commercial vehicle development.
Learning Content
1. Introduction, definitions, history
2. Development tools
3. Complete vehicle
4. Cab, bodyshell work
5. Cab, interior fitting
6. Alternative drive systems
7. Drive train
8. Drive system diesel engine
9. Intercooled diesel engines

Learning Objectives:
The students have proper knowledge about the process of commercial vehicle development starting from the concept and the underlying original idea to the real design. They know that the customer requirements, the technical realisability, the functionality and the economy are important drivers.
The students are able to develop parts and components. Furthermore they have knowledge about different cab concepts, the interior and the interior design process. Consequently they are ready to analyze and to judge concepts of commercial vehicles as well as to participate competently in the commercial vehicle development.

Workload
regular attendance: 10.5 hours
self-study: 49.5 hours

Literature
7.91 Course: Fundamentals in the Development of Commercial Vehicles II [T-MACH-105161]

**Responsible:** Prof. Dr. Jörg Zürn

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development  
M-MACH-101267 - Mobile Machines

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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 II**

2114844, SS 2020, 1 SWS, Language: German, [Open in study portal](#)

**Notes**

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 front axle 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.
Learning 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 front axle 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.

Workload
regular attendance: 10.5 hours
self-study: 49.5 hours

Literature
**7.92 Course: Fundamentals of Automobile Development I [T-MACH-105162]**

**Responsible:** Dipl.-Ing. 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 19/20, 1 SWS, Language: German, Open in study portal

**Notes**

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.

**Learning 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
Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons

**Principles of Whole Vehicle Engineering I**
2113851, WS 19/20, 1 SWS, Language: English, Open in study portal

Notes
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.

Learning 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

Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons
7.93 Course: Fundamentals of Automobile Development II [T-MACH-105163]

**Responsible:** Dipl.-Ing. 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 II**

2114842, SS 2020, 1 SWS, Language: German, [Open in study portal](#)

**Notes**

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 vehicle

**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.
Learning 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

Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons.

Principles of Whole Vehicle Engineering II
2114860, SS 2020, 1 SWS, Language: English, Open in study portal

Notes
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.

Learning 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

Workload
regular attendance: 10,5 hours
self-study: 49,5 hours

Literature
The scriptum will be provided during the first lessons.
## Course: Fundamentals of Catalytic Exhaust Gas Aftertreatment [T-MACH-105044]

**Responsible:** Prof. Dr. Olaf Deutschmann  
Prof. Dr. Jan-Dierk Grunwaldt  
Dr.-Ing. Heiko Kubach  
Prof. Dr.-Ing. Egbert Lox

**Organisation:** KIT Department of Mechanical Engineering

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

### Type
- Oral examination

### Credits
- 4

### Recurrence
- Each summer term

### Version
- 1

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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

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### Learning Content
1. kind and source of emissions  
2. emission legislation  
3. principal of catalytic exhaust gas aftertreatment (EGA)  
4. EGA at stoichiometric gasoline engines  
5. EGA at gasoline engines with lean mixtures  
6. EGA at diesel engines  
7. economical basic conditions for catalytic EGA

### Workload
- regular attendance: 36 hours  
- self-study: 84 hours
Literature
Lecture notes available in the lectures

### Course: Fundamentals of Production Management [T-WIWI-102606]

**Responsible:** Prof. Dr. Frank Schultmann  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101437 - Industrial Production I

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<td>7981950</td>
<td>Fundamentals of Production Management</td>
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**Competence Certificate**  
The assessment consists of a written exam (90 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

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

#### Fundamentals of Production Management  
2581950, SS 2020, 2 SWS, Language: German, [Open in study portal](#)  

**Description**  
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success.

In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

Medien und Pflichtliteratur: können aus der alten Fassung übernommen werden.

**Notes**  
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success. In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems.

**Learning Content**  
This lecture focuses on strategic production management with respect to various economic aspects. Interdisciplinary approaches of systems theory will be used to describe the challenges of industrial production. This course will emphasize the importance of R&D as the central step in strategic corporate planning to ensure future long-term success.

In the field of site selection and planning for firms and factories, attention will be drawn upon individual aspects of existing and greenfield sites as well as existing distribution and supply centres. Students will obtain knowledge in solving internal and external transport and storage problems with respect to supply chain management and disposal logistics.

**Workload**  
Total effort required will account for approximately 165h (5.5 credits).
Literature
will be announced in the course
7.96 Course: Gas Engines [T-MACH-102197]

**Responsible:** Dr.-Ing. Rainer Golloch
Dr.-Ing. Heiko Kubach

**Organisation:** KIT Department of Mechanical Engineering

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

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**Exams**

| SS 2020 | 76-T-MACH-102197 | Gas Engines | Prüfung (PR) | Koch |

**Competence Certificate**

Oral examination, duration 25 min., no auxiliary means

**Prerequisites**

none
7.97 Course: Gear Cutting Technology [T-MACH-102148]

Responsible: Dr.-Ing. Markus Klaiber
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101284 - Specialization in Production Engineering

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**Exams**

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**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

none

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

**Gear Technology**  
2149655, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

Lecture notes will be provided in Ilias (https://ilia.studium.kit.edu/)

**Notes**

Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

**Learning Outcomes:**

The students...

- can describe the basic terms of gearings and are able to explain the imparted basics of the gearwheel and gearing theory.
- are able to specify the different manufacturing processes and machine technologies for producing gearings. Furthermore they are able to explain the functional principles and the dis-/advantages of these manufacturing processes.
- can apply the basics of the gearing theory and manufacturing processes on new problems.
- are able to read and interpret measuring records for gearings. are able to make an appropriate selection of a process based on a given application
- can describe the entire process chain for the production of toothed components and their respective influence on the resulting workpiece properties.

**Workload:**

regular attendance: 21 hours
self-study: 99 hours
Learning Content
Based on the gearing theory, manufacturing processes and machine technologies for producing gearings, the needs of modern gear manufacturing will be discussed in the lecture. For this purpose, various processes for various gear types are taught which represent the state of the art in practice today. A classification in soft and hard machining and furthermore in cutting and non-cutting technologies will be made. For comprehensive understanding the processes, machine technologies, tools and applications of the manufacturing of gearings will be introduced and the current developments presented. For assessment and classification of the applications and the performance of the technologies, the methods of mass production and manufacturing defects will be discussed. Sample parts, reports from current developments in the field of research and an excursion to a gear manufacturing company round out the lecture.

Workload
regular attendance: 21 hours
self-study: 99 hours
### 7 COURSES

**Course: Geological Hazards and Risk [T-PHYS-103525]**

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<tr>
<th>Responsible</th>
<th>Dr. Ellen Gottschämmer</th>
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<tr>
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#### Events

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#### Exams

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7.99 Course: Global Optimization I [T-WIWI-102726]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
          M-WIWI-101414 - Methodical Foundations of OR

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Competence Certificate
Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO).
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.
7 COURSES

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-101414 - Methodical Foundations of OR

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Competence Certificate

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. 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.
7.101 Course: Global Optimization II [T-WIWI-102727]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR

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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 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.
7.102 Course: Handling Characteristics of Motor Vehicles I [T-MACH-105152]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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**Competence Certificate**
Verbally

Duration: 30 up to 40 minutes

Auxiliary means: none

**Prerequisites**
none

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

**Handling Characteristics of Motor Vehicles I**
2113807, WS 19/20, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**Notes**
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.
Learning 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

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature


7 COURSES

Course: Handling Characteristics of Motor Vehicles II [T-MACH-105153]

**Responsible:** Dr.-Ing. Hans-Joachim Unrau

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101264 - Handling Characteristics of Motor Vehicles

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**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 2020, 2 SWS, Language: German, [Open in study portal](#)

**Notes**

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.

**Learning 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

**Workload**

regular attendance: 22.5 hours
self-study: 97.5 hours
Literature
7.104 Course: High Performance Powder Metallurgy Materials [T-MACH-102157]

Responsible: Dr. Günter Schell
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101262 - Emphasis Materials Science

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Events

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<td>Advanced powder metals</td>
<td>2 SWS</td>
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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 2020, 2 SWS, Language: German, [Open in study portal]

Learning Content
The lecture gives an overview on production, properties and application of structural and functional powder metallurgy material. The following groups of materials are presented: PM High Speed Steels, Cemented Carbides, PM Metal Matrix Composites, PM Specialities, PM Soft Magnetic and Hard Magnetic Materials.

Workload
regular attendance: 22 hours
self-study: 98 hours

Literature
- R.M. German. "Powder metallurgy and particulate materials processing. Metal Powder Industries Federation, 2005

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101513 - Human Resources and Organizations

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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. 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**
Completion of module Business Administration is recommended. Basic knowledge of microeconomics, game theory, and statistics is recommended.

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

**Human Resource Management**
2573005, WS 19/20, 2 SWS, Language: German, Open in study portal

**Notes**
The students acquire basic knowledge in the fields of human resource planning, selection and talent management. Different processes and instruments and their link to corporate strategy are evaluated based on microeconomic and behavioral approaches. The results are tested and discussed based on empirical data.

**Aim**
The student

- understands the processes and instruments of human resource management.
- analyzes different methods of human resource planning and selection and evaluates their usefulness.
- analyzes different processes of talent management and evaluates the strengths and weaknesses.
- understands the challenges of human resource management and its link to corporate strategy.

**Workload**
The total workload for this course is approximately 135 hours.
Lecture: 32h  
Preparation of lecture: 52h  
Exam preparation: 51h.

**Literature**
- Personnel Economics in Practice, Lazear & Gibbs, John Wiley & Sons, 2014
- Strategic Human Resources. Frameworks for General Managers, Baron & Kreps, John Wiley & Sons, 1999
### 7.106 Course: Hydraulic Engineering and Water Management [T-BGU-101667]

- **Responsible:** Prof. Dr. Franz Nestmann
- **Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences
- **Part of:**
  - M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
  - M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
  - M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

**Type:**
- Written examination

**Credits:**
- 4

**Recurrence:**
- Each winter term

**Version:**
- 1

#### Events

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**Competence Certificate**
- written exam with 60 minutes

**Prerequisites**
- None

**Recommendation**
- None

**Annotation**
- None
7.107 Course: Hydrology [T-BGU-101693]

**Responsible:** Prof. Dr.-Ing. Erwin Zehe

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

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

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|--------|--------|------------------|---------|
| WS 19/20 | 6200513 | Hydrologie       | 2 SWS   | Lecture (V)      |
| WS 19/20 | 6200514 | Übungen zu Hydrologie | 1 SWS | Practice (Ü)     |

**Exams**

|        |        |                  |         |                  |
|--------|--------|------------------|---------|
| WS 19/20 | 8230101693 | Hydrology | Prüfung (PR)   | Wienhöfer, Zehe |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.108 Course: I4.0 Systems Platform [T-MACH-106457]

**Responsible:** Dipl.-Ing. Thomas Maier
Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**

Alternative exam assessment (project work)

**Prerequisites**

None

**Annotation**

Limited number of participants.

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

**I4.0 Systems platform**

2123900, SS 2020, 4 SWS, Language: German, [Open in study portal](#)

**Project (PRO)**

**Notes**

Number of participants limited to 15 people. There is a participant selection process.

**Learning Content**

Industry 4.0, IT systems for fabrication (e.g.: CAx, PDM, CAM, ERP, MES), process modelling and execution, project work in teams, practice-relevant I4.0 problems, in automation, manufacturing industry and service.
### 7.109 Course: Industrial Organization [T-WIWI-102844]

**Responsible:** Prof. Dr. Johannes Philipp Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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#### Exams

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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

Completion of the module Economics [WW1VWL] is assumed.

#### Annotation

This course is not given in summer 2017.

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

#### Learning Content

This course introduces the theory of industrial organization using game theoretical models. The course is divided into two parts: The first part reviews standard market forms (monopoly, oligopoly, perfect competition). The second part discusses more advanced topics including price discrimination, strategic product differentiation, cartel formation, market entry, and research and development.

#### Workload

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

#### Literature

**Compulsory Textbook:**


**Additional Literature:**

7.110 Course: Information Engineering [T-MACH-102209]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**

Alternative exam assessment (written composition and speech)

**Prerequisites**

None
Course: Integrated Information Systems for Engineers [T-MACH-102083]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

**Type**
- Oral examination

**Credits**
- 4

**Recurrence**
- Each summer term

**Version**
- 2

### Events

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**Competence Certificate**
- Oral examination 20 min.

**Prerequisites**
- None

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

### Integrated Information Systems for engineers

**2121001, SS 2020, 3 SWS, Language: German, Open in study portal**

**Learning Content**
- Information systems, information management
- CAD, CAP and CAM systems
- PPS, ERP and PDM systems
- Knowledge management and ontology
- Process modeling

**Workload**
- Regular attendance: 31.5 hours, self-study: 108 hours

**Literature**
- Lecture slides
### 7.112 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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<td>Prüfung (PR)</td>
<td>Lanza</td>
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**Competence Certificate**  
Written Exam (120 min)

**Prerequisites**  
"T-MACH-108849 - Integrierte Produktionsplanung im Zeitalter von Industrie 4.0" as well as "T-MACH-102106 Integrierte Produktionsplanung" must not be commenced.

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

**Integrated Production Planning in the Age of Industry 4.0**  
2150660, SS 2020, 6 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**  
Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
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

Learning 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

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- 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.
Workload
MACH:
regular attendance: 63 hours
self-study: 177 hours
WING:
regular attendance: 63 hours
self-study: 207 hours

Literature
Lecture Notes
7.113 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

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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 (V)

2150601, SS 2020, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/).

Description

Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/).
Notes
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

Learning 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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- 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

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Lecture Slides
7 COURSES

Course: International Finance [T-WIWI-102646]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg
**Organisation:** KIT Department of Economics and Management
**Part of:**
- M-WIWI-101402 - eFinance
- M-WIWI-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

See German version.

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

**International Finance**

2530570, SS 2020, 2 SWS, Language: German, Open in study portal

**Description**

The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

**Learning Content**

The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**

Elective literature:

### 7.115 Course: International Marketing [T-WIWI-102807]

**Responsible:** Dr. Sven Feurer  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101424 - Foundations of Marketing

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#### Events

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<th>Code</th>
<th>Course</th>
<th>SWS</th>
<th>Type</th>
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<tbody>
<tr>
<td>WS 19/20</td>
<td>2572155</td>
<td>International Marketing</td>
<td>1</td>
<td>Lecture (V)</td>
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<tr>
<td>WS 19/20</td>
<td>7900123</td>
<td>International Marketing</td>
<td>Prüfung (PR)</td>
<td>Klarmann</td>
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</table>

#### Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

#### 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:

#### International Marketing

2572155, WS 19/20, 1 SWS, Language: English, [Open in study portal](#)  
Lecture (V)
Notes

Doing marketing abroad creates a number of significant new challenges for firms. This class is intended to prepare you for meeting these challenges. In the first session, we will discuss the peculiarities of international marketing. The next five sessions will then be dedicated to methods that can be used to address them. For instance, we will look at the following issues:

- Internationalization strategies
- Market entry strategies
- Standardization vs. individualization (e.g. regarding products, prices, and communication)
- Measurement equivalence in international market research

In the final session, we will apply this knowledge to the case of Wal Mart. In particular, Wal Mart, despite being the largest retailing company worldwide, failed to successfully enter the German Market. We will discuss Wal Mart's failure using the methods taught in the weeks before.

Students

- know the characteristics of international marketing
- are familiar with the Hofstede's cultural dimensions theory
- understand basic concepts of cultural learning (the concept of acculturation, the psychic distance paradox)
- know different concepts that explain international buying behavior (e.g. country-of-origin effects)
- comprehend different concepts for market entries in an international context ("waterfall"-strategy, "sprinkler"-strategy, method of analogy, chain ratio method)
- understand what needs to be considered regarding international market research (dealing with ethical dilemmas, challenges regarding primary and secondary data sources, testing measurement equivalence, linguistic equivalence, differences in the response styles of questionnaires)
- know the particularities of international product policy (standardization vs. differentiation, challenge of branding, fight against product plagiarism, brand counterfeiting and product piracy, protection of intellectual property)
- are familiar with the particularities in the international price policy (BigMac Index, how to deal with price demand functions to achieve profit maximization, arbitrage, price corridor, standardization vs. differentiation of prices, how to deal with currency risks, inflation, exchange rates and different willingness to pay)
- know the characteristics of the international communication policy (different laws, problems regarding international standardized campaigns)
- know particularities of the international sales policy (international channels, differences of contract negotiations)
- are able to organize international marketing departments and subsidiaries
- know the problems of marketing in emerging markets

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

The total workload for this course is approximately 45.0 hours. For further information see German version.

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
## 7.116 Course: Internship [T-WIWI-102611]

<table>
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</table>

**Competence Certificate**
see module description

**Prerequisites**
Kein
Course: Introduction to Ceramics [T-MACH-100287]

 Responsible: Prof. Dr. Michael Hoffmann
 Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101262 - Emphasis Materials Science

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Exams

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<td>Prüfung (PR)</td>
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<td>Hoffmann, Schell, Wagner</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:

Introduction to Ceramics
2125757, WS 19/20, 3 SWS, Language: German, Open in study portal

Description

Media:
Slides for the lecture:
available under http://www.iam.kit.edu/km

Learning Content
After a short introduction to interatomic bonding, fundamental concepts of crystallography, the stereographic projection and the most important symmetry elements will be given. Different types of crystal structures are explained and the relevance of imperfections are analysed with respect to the mechanical and electrical properties of ceramics. Then, the impact of surfaces, interfaces and grain boundaries for the preparation, microstructural evolution and the resulting properties is discussed. Finally, an introduction is given to ternary phase diagrams.

The second part of the course covers structure, preparation and application aspects of nonmetallic inorganic glasses, followed by an introduction to the properties and processing methods of fine-grained technical powders. The most relevant shaping methods, such as pressing, slip casting, injection moulding and extrusion are introduced. Subsequently, the basics of science of sintering and the mechanisms for normal and abnormal grain growth are discussed. Mechanical properties of ceramics are analysed using basic principles of linear elastic fracture mechanics, Weibull statistics, concepts for subcritical crack growth and creep models to explain the behaviour at elevated temperatures. Furthermore it is demonstrated that mechanical properties can be significantly enhanced by various types of microstructural toughening mechanisms. The electronic and ionic conductivity of ceramic materials are explained based on defect-chemical considerations and band structure models. Finally, the characteristics of a dielectric, pyroelectric, and piezoelectric behaviour is discussed.

Workload
regular attendance: 45 hours
self-study: 135 hours
Literature

- Kingery, Bowen, Uhlmann, “Introduction To Ceramics”, Wiley
- Y.-M. Chiang, D. Birnie III and W.D. Kingery, “Physical Ceramics”, Wiley
7.118 Course: Introduction to Energy Economics [T-WIWI-102746]

Responsible: Prof. Dr. Wolf Fichtner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101464 - Energy Economics

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<td>2581011</td>
<td>Übungen zu Einführung in die Energiewirtschaft</td>
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Exam

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Competence Certificate

The assessment consists of a written exam (90 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:

V Introduction to Energy Economics
2581010, SS 2020, 2 SWS, Language: German, Open in study portal

Notes

1. Introduction: terms, units, conversions
2. The energy carrier gas (reserves, resources, technologies)
3. The energy carrier oil (reserves, resources, technologies)
4. The energy carrier hard coal (reserves, resources, technologies)
5. The energy carrier lignite (reserves, resources, technologies)
6. The energy carrier uranium (reserves, resources, technologies)
7. The final carrier source electricity
8. The final carrier source heat
9. Other final energy carriers (cooling energy, hydrogen, compressed air)

The student is able to

- characterize and judge the different energy carriers and their peculiarities,
- understand contexts related to energy economics.

Learning Content

1. Introduction: terms, units, conversions
2. The energy carrier gas (reserves, resources, technologies)
3. The energy carrier oil (reserves, resources, technologies)
4. The energy carrier hard coal (reserves, resources, technologies)
5. The energy carrier lignite (reserves, resources, technologies)
6. The energy carrier uranium (reserves, resources, technologies)
7. The final carrier source electricity
8. The final carrier source heat
9. Other final energy carriers (cooling energy, hydrogen, compressed air)

Workload

The total workload for this course is approximately 165.0 hours. For further information see German version.
Literature
Complementary literature:
Feess, Eberhard. Umweltökonomie und Umweltpolitik. ISBN 3-8006-2187-8
### 7.119 Course: Introduction to Engineering Geology [T-BGU-101500]

**Responsible:** Prof. Dr. Philipp Blum  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Prerequisites:** none

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<td>Prüfung (PR)</td>
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7.120 Course: Introduction to Engineering Mechanics I: Statics and Strength of Materials [T-MACH-102208]

Responsible: Prof. Dr.-Ing. Alexander Fidlin
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101259 - Engineering Mechanics

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Events

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<tr>
<td>SS 2020</td>
<td>2162238</td>
<td>Introduction to Engineering Mechanics I: Statics and Strength of Materials</td>
<td>2 SWS</td>
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<tr>
<td>SS 2020</td>
<td>2162239</td>
<td>Übungen zu Einführung in die Technische Mechanik I: Statik und Festigkeitslehre</td>
<td>1 SWS</td>
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Exams

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<td>WS 19/20</td>
<td>76-T-MACH-102208-1</td>
<td>Introduction to Engineering Mechanics I: Statics (75min)</td>
<td>Prüfung (PR)</td>
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<td>WS 19/20</td>
<td>76-T-MACH-102208-2</td>
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<td>Introduction to Engineering Mechanics I: Statics (75 Min)</td>
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Competence Certificate

The assessment consists of a written examination (120 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place in every semester. Re-examinations are offered at every ordinary examination date.

For students of economics the assessment consists of a written examination (Statics - 75 min.)

Permitted utilities: non-programmable calculator

Prerequisites

None

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

Introduction to Engineering Mechanics I: Statics and Strength of Materials

2162238, SS 2020, 2 SWS, Language: German, Open in study portal

Notes

Statics: force · moment · general equilibrium conditions · center of mass · inner force in structure · plane frameworks · theory of adhesion

Learning Content

Statics: force · moment · general equilibrium conditions · center of mass · inner force in structure · plane frameworks · theory of adhesion
### Course: Introduction to Engineering Mechanics II: Dynamics [T-MACH-102210]

**Responsible:** Prof. Dr.-Ing. Alexander Fidlin  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:**  
- M-MACH-101261 - Emphasis in Fundamentals of Engineering  
- M-WIWI-101839 - Additional Fundamentals of Engineering

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#### Events

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<tr>
<td>WS 19/20</td>
<td>2161276</td>
<td>Introduction to Engineering Mechanics II: Dynamics</td>
<td>Lecture (V)</td>
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<td>Introduction to Engineering Mechanics II: Dynamics</td>
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<td>Introduction to Engineering Mechanics II: Dynamics</td>
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#### Competence Certificate

The assessment consists of a written examination (75 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination is offered every semester. Re-examinations are offered at every ordinary examination date.

Permitted utilities: non-programmable calculator, literature.

#### Prerequisites

None

---

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

### Introduction to Engineering Mechanics II: Dynamics

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<td>German</td>
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**Lecture (V)**

**Annotation**

The credits have been changed from 4.5 to 5.
Course: Introduction to Game Theory [T-WIWI-102850]

**Responsible:** Prof. Dr. Clemens Puppe  
Prof. Dr. Johannes Philipp Reiß

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

**Part of:**  
M-WIWI-101499 - Applied Microeconomics  
M-WIWI-101501 - Economic Theory

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**Exams**

| Events | WS 19/20 | 7900311 | Introduction to Game Theory | Prüfung (PR) | Reiß |

**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 the recess period and can be resited 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:**

### Introduction to Game Theory

**2520525, SS 2020, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**Notes**
The course focusses on non-cooperative game theory. It discusses models, solution concepts, and applications for simultaneous games as well as sequential games. Various solution concepts, e.g., Nash equilibrium and subgame-perfect equilibrium, are introduced along with more advanced concepts. A short introduction to cooperative game theory is given if there is sufficient time. The assessment consists of a written exam (60 minutes) according to Section 4(2),1 of the examination regulation. The exam takes place in the recess period and can be resited at every ordinary examination date. The module [M-WIWI-101398] Introduction to Economics must have been passed.

**Compulsory textbook:**

**Additional Literature:**
### 7.123 Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences [T-BGU-101681]

**Responsible:** Dr.-Ing. Norbert Rösch  
Dr.-Ing. Sven Wursthorn

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

**Part of:**  
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

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<td>Rösch, Wursthorn</td>
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**Exams**

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<td>Introduction to GIS for Students of Natural, Engineering and Geo Sciences</td>
<td>Prüfung (PR)</td>
<td>Rösch, Wursthorn</td>
</tr>
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</table>
# 7.124 Course: Introduction to GIS for Students of Natural, Engineering and Geo Sciences, Prerequisite [T-BGU-103541]

**Responsible:** Dr.-Ing. Norbert Rösch
Dr.-Ing. Sven Wursthorn

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

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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## Events

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## Exams

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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-MACH-101287 - Microsystem Technology

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**Events**

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<td>2141861</td>
<td>Introduction to Microsystem Technology I</td>
<td>2</td>
<td>Lecture (V)</td>
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**Exams**

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<td>Introduction to Microsystem Technology I</td>
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**Competence Certificate**

Written examination for implementation in a major field, 30 min oral exam for elective subject

**Prerequisites**
none

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

**Introduction to Microsystem Technology I**

2141861, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Learning Content**

- Introduction in Nano- and Microtechnologies
- Silicon and processes for fabricating microelectronics circuits
- Basic physics background and crystal structure
- Materials for micromachining
- Processing technologies for microfabrication
- Silicon micromachining
- Examples

**Workload**

- Literature: 20 h
- Lessons: 21 h
- Preparation and Review: 50 h
- Exam preparation: 30 h

**Literature**

M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
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-MACH-101287 - Microsystem Technology

Type: Written examination
Credits: 3
Recurrence: Each summer term
Version: 1

Events
SS 2020 2142874 Introduction to Microsystem Technology II 2 SWS Lecture (V) Korvink, Badilita

Exams
WS 19/20 76-T-MACH-105183 Introduction to Microsystem Technology II Prüfung (PR) Korvink, Badilita

Competence Certificate
written examination for major field, oral exam (30 min) for elective field

Prerequisites
none

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

Introduction to Microsystem Technology II
2142874, SS 2020, 2 SWS, Language: English, Open in study portal

Notes
- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

Learning Content
- Introduction in Nano- and Microtechnologies
- Lithography
- LIGA-technique
- Mechanical microfabrication
- Patterning with lasers
- Assembly and packaging
- Microsystems

Workload
Literature: 20 h
Lessons: 21 h
Preparation and Review: 50 h
Exam preparation: 30 h

Literature
M. Madou
Fundamentals of Microfabrication
Taylor & Francis Ltd.; Auflage: 3. Auflage. 2011
7.127 Course: Introduction to Operations Research I and II [T-WIWI-102758]

**Responsible:** Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101418 - Introduction to Operations Research

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<td>2550040</td>
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**Exams**

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<th>Introduction to Operations Research I and II</th>
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</table>

**Competence Certificate**

The assessment of the module is carried out by a written examination (120 minutes) according to Section 4(2), 1 of the examination regulation.

In each term (usually in March and July), one examination is held for both courses.

The overall grade of the module is the grade of the written examination.

**Prerequisites**

None

**Recommendation**

Mathematics I und II. Programming knowledge for computing exercises.

It is strongly recommended to attend the course Introduction to Operations Research I [2550040] before attending the course Introduction to Operations Research II [2530043].

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

**Introduction to Operations Research II**

2530043, WS 19/20, 2 SWS, Language: German, Open in study portal

**Lecture (V)**

**Notes**

Integer and Combinatorial Programming: Basic notions, cutting plane methods, branch and bound methods, branch and cut methods, heuristics.

Nonlinear Programming: Basic notions, optimality conditions, solution methods for convex and nonconvex optimization problems.

Dynamic and stochastic models and methods: dynamical programming, Bellman method, lot sizing models, dynamical and stochastic inventory models, queuing theory.

**Learning objectives:**

The student

- names and describes basic notions of integer and combinatorial optimization, nonlinear programming, and dynamic programming,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.
Notes
Examples for typical OR problems.

Linear Programming: Basic notions, simplex method, duality, special versions of the simplex method (dual simplex method, three phase method), sensitivity analysis, parametric optimization, game theory.

Graphs and Networks: Basic notions of graph theory, shortest paths in networks, project scheduling, maximal and minimal cost flows in networks.

Learning objectives:
The student

- names and describes basic notions of linear programming as well as graphs and networks,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve optimization problems independently,
- validates, illustrates and interprets the obtained solutions.
7 COURSES

Course: Introduction to Programming with Java [T-WIWI-102735]

7.128 Course: Introduction to Programming with Java [T-WIWI-102735]

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<tr>
<th>Responsible</th>
<th>Prof. Dr.-Ing. Johann Marius Zöllner</th>
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| Events | | |
|--------|------------------|-----------------|---------|
| WS 19/20 | 2511000 | Introduction to Programming with Java | 3 SWS | Lecture (V) | Zöllner |
| WS 19/20 | 2511002 | Tutorien zu Programmieren I: Java | 1 SWS | Tutorial (Tu) | Zöllner, Struppek, Ulrich |
| WS 19/20 | 2511003 | Computer lab Introduction to Programming with Java | 2 SWS | Zöllner, Struppek, Ulrich |

| Exams | | |
|-------|------------------|-----------------|---------|
| WS 19/20 | 7900018 | Introduction to Programming with Java | Prüfung (PR) | Zöllner |

Competition Certificate
The assessment consists of a written resp. computer-based exam (60 min) according to Section 4 (2),1 of the examination regulation.
The successful completion of the compulsory tests in the computer lab is prerequisite for admission to the written resp. computer-based exam.
The examination takes place every semester. Re-examinations are offered at every ordinary examination date.

Annotation
see german version

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

V Introduction to Programming with Java
2511000, WS 19/20, 3 SWS, Language: German, Open in study portal

Notes
The lecture "Introduction to Programming with Java " introduces systematic programming and provides essential practical basics for all advanced computer science lectures.
Based on considerations of the structured and systematic design of algorithms, the most important constructs of modern higher programming languages as well as programming methods are explained and illustrated with examples. One focus of the lecture is on teaching the concepts of object-oriented Programming. Java is used as the programming language. Knowledge of this language is required in advanced computer science lectures.
At the end of the lecture period, a written examination will be held for which admission must be granted during the semester after successful participation in the practices. The exact details will be announced in the lecture.

Learning objectives:
- Knowledge of the fundamentals, methods and systems of computer science.
- The students acquire the ability to independently solve algorithmic problems in the programming language Java, which dominates in business applications.
- In doing so, they will be able to find strategic and creative answers in finding solutions to well-defined, concrete and abstract problems.

Workload:
The total workload for this course is approximately 150 hours. For further information see German version.
Course: Introduction to Public Finance [T-WIWI-102877]

**Responsibility:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101403 - Public Finance

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<td>2560131</td>
<td>Introduction to Public Finance</td>
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**Exams**

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<td>WS 19/20</td>
<td>790fiwi</td>
<td>Introduction to Public Finance</td>
<td>Prüfung (PR)</td>
<td>Wigger</td>
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**Competence Certificate**

The assessment consists of a written exam (60 min.).

**Prerequisites**

None

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

### Introduction to Public Finance

2560131, WS 19/20, 3 SWS, Language: German, [Open in study portal](#)

**Notes**

The course *Introduction to Public Finance* provides an overview of the fundamental issues in public economics. The first part of the course deals with normative theories about the economic role of the state in a market economy. Welfare economics theory is offered as a base model, with which alternative normative theories are compared and contrasted. Within this theoretical framework, arguments concerning efficiency and equity are developed as justification for varying degrees of economic intervention by the state. The second part of the course deals with the positivist theory of public economics. Processes of public decision making are examined and the conditions that lead to market failures resulting from collective action problems are discussed. The third part of the course examines a variety of public spending programs, including social security systems, the public education system, and programs aimed at reducing poverty. The fifth part of the course addresses the key theoretical and political issues associated with fiscal federalism.

**Learning goals:**

Students are able to:

- critically assess the economic role of the state in a market economy
- explain and discuss key concepts in public finance, including: public goods; economic externalities; and market failure
- explain and critically discuss competing theoretical approaches to public finance, including welfare economics and public choice theory
- explain the theory of bureaucracy according to Weber and critically assess its strengths and weaknesses
- evaluate the incentives inherent in the bureaucratic model, as well as the more recent introduction of market-oriented incentives associated with public-sector reform

**Workload:**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Learning Content
The course Introduction to Public Finance provides an overview of the fundamental issues in public economics. The first part of the course deals with normative theories about the economic role of the state in a market economy. Welfare economics theory is offered as a base model, with which alternative normative theories are compared and contrasted. Within this theoretical framework, arguments concerning efficiency and equity are developed as justification for varying degrees of economic intervention by the state. The second part of the course deals with the positivist theory of public economics. Processes of public decision making are examined and the conditions that lead to market failures resulting from collective action problems are discussed. The third part of the course examines a variety of public spending programs, including social security systems, the public education system, and programs aimed at reducing poverty. The fifth part of the course addresses the key theoretical and political issues associated with fiscal federalism.

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

Literature
Course: Introduction to Stochastic Optimization [T-WIWI-106546]

**Responsible:** Prof. Dr. Steffen Rebennack

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

**Part of:**
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-103278 - Optimization under Uncertainty

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<td>Übung zur Einführung in die Stochastische Optimierung</td>
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<td>Rebennack, Sinske</td>
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<td>SS 2020</td>
<td>2550474</td>
<td>Rechnerübung zur Einführung in die Stochastische Optimierung</td>
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<td>Introduction to Stochastic Optimiztion</td>
<td>Prüfung(PR)</td>
<td>Rebennack</td>
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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.
7.131 Course: Investments [T-WIWI-102604]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101435 - Essentials of Finance

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Events

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<td>2 SWS</td>
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<td>Übung zu Investments</td>
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Exams

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Competence Certificate
The assessment consists of a written exam (75 min) according to Section 4(2), 1 of the examination regulation. The examination takes place in every semester. Re-examinations are offered at every ordinary 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 of Business Administration: Finance and Accounting [2610026] is recommended.

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

Investments

2530575, SS 2020, 2 SWS, Language: German, Open in study portal

Description
The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. After a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory, followed by an introduction into derivatives markets, especially forwards and futures. The lecture concludes with investments on bond markets.

Learning Content
The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. After a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory. The lecture concludes with investments on bond markets.

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

Literature
Elective literature:
7.132 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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<td>Laboratory Production Metrology</td>
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<td>Häfner</td>
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**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 2020, 3 SWS, Language: German, Open in study portal

**Description**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/). Additional reference to literature will be provided, as well.
Notes
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The students learn the theoretical background as well as practical applications for industrial examples. The students use sensors by themselves during the course. Additionally, they are trained on how to integrate sensors in production processes and how to analyze measurement data with suitable software.

The following topics are addressed:

- Classification and examples for different measurement technologies in a production environment
- Machine vision with optical sensors
- Information fusion based on optical measurements
- Robot-based optical measurements
- Non-destructive testing by means of acoustic measurements
- Coordinate measurement technology
- Industrial computed tomography
- Measurement uncertainty evaluation
- Analysis of production data by means of data mining

Learning Outcomes:
The students …

- are able to name, describe and mark out different measurement technologies that are relevant in a production environment.
- are able to conduct measurements with the presented in-line and laboratory based measurement systems.
- are able to analyze measurement results and assess the measurement uncertainty of these.
- are able to deduce whether a workpiece 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

Learning Content
During this course, students get to know measurement systems that are used in a production system. In the age of Industry 4.0, sensors are becoming more important. Therefore, the application of in-line measurement technology such as machine vision and non-destructive testing is focussed. Additionally, laboratory based measurement technologies such as computed tomography are addressed. The student 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

Workload
regular attendance: 31.5 hours
self-study: 88.5 hours
7.133 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

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<td>Learning Factory &quot;Global Production&quot;</td>
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<td>Lanza</td>
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Competence Certificate
Alternative test achievement (graded):
- Knowledge acquisition in the context of the seminar (3 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/studium-und-lehre.php).

Due to the limited number of participants, advance registration is required.

Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

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

Learning Factory “Global Production”
2149612, WS 19/20, 2 SWS, Language: German, Open in study portal

Description
Media:
E-learning platform ilias, powerpoint, photo protocol. The media are provided through ilias (https://ilias.studium.kit.edu/).
Notes
The learning factory "Global Production" serves as a modern teaching environment for the challenges of global production. To make this challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:
- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection

Learning Outcomes:
The students are able to ...
- evaluate and select alternative locations using appropriate methods.
- use methods and tools of lean management to plan and manage production systems that are suitable for the location.
- use the Six Sigma method and apply goal-oriented process management.
- select an appropriate level of automation of the production units based on quantitative variables.
- make use of well-established methods for the evaluation and selection of suppliers.
- apply methods for planning a global production network depending on company-specific circumstances to sketch a suitable network and classify and evaluating it according to specific criteria.
- apply the learned methods and approaches with regard to problem solving in a global production environment and able to reflect their effectiveness.

Workload:
e-Learning: ~ 24 h
regular attendance: ~ 36 h
self-study: ~ 60 h

Learning Content
The learning factory "Global Production" serves as a modern teaching environment for the challenges of global production. To make this challenges come alive, students can run a production of electric motors under real production conditions. The course is divided into e-learning units and presence dates. The e-learning units help to learn essential basics and to immerse themselves in specific topics (e.g. selection of location, supplier selection and planning of production networks). The focus of the presence appointments is the case-specific application of relevant methods for planning and control of production systems that are suitable for the location. In addition to traditional methods and tools to organize lean production systems (e.g. Kanban and JIT/ JIS, Line Balancing) the lecture in particular deals with site-specific quality assurance and scalable automation. Essential methods for quality assurance in complex production systems are taught and brought to practical experience by a Six Sigma project. In the area of scalable automation, it is important to find solutions for the adaption of the level of automation of the production system to the local production conditions (e.g. automated workpiece transport, integration of lightweight robots for process linking) and to implement them physically. At the same time safety concepts should be developed and implemented as enablers for human-robot collaboration.

The course also includes an excursion to the production plant for the manufacturing of electric motors of an industrial partner.

Main focus of the lecture:
- site selection
- site-specific factory planning
- site-specific quality assurance
- scalable automation
- supplier selection
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/studium-und-lehre.php).
Due to the limited number of participants, advance registration is required.
Students should have previous knowledge in at least one of the following areas:

- Integrated Production Planning
- Global Production and Logistics
- Quality Management

Workload
- e-Learning: ~ 24 h
- regular attendance: ~ 36 h
- self-study: ~ 60 h
# 7.134 Course: Logistics and Supply Chain Management [T-WIWI-102870]

**Responsible:** Prof. Dr. Frank Schultmann  
Dr. Marcus Wiens  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101437 - Industrial Production I

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**Competence Certificate**

The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (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

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

## Logistics and Supply Chain Management

**2581996, SS 2020, 2 SWS, Language: English, Open in study portal**

### Lecture (V)

**Notes**

Students are introduced to the methods and tools of logistics and supply chain management. They students learn the key terms and components of supply chains together with key economic trade-offs. In detail, students gain knowledge of decisions in supply chain management, such as facility location, supply chain planning, inventory management, pricing and supply chain cooperation. In this manner, students will gain knowledge in analyzing, designing and steering of decisions in the domain of logistics and supply chain management.

- Introduction: Basic terms and concepts
- Facility location and network optimization
- Supply chain planning I: flexibility
- Supply chain planning II: forecasting
- Inventory management & pricing
- Supply chain coordination I: the Bullwhip-effect
- Supply chain coordination II: double marginalization
- Supply chain risk management

### Learning Content

- Introduction: Basic Terms and Concepts
- Logistics Systems and Supply Chain Management
- Supply Chain Risk Management
- Extensions and Applications

### Workload

Total effort required will account for approximately 105h (3.5 credits).

### Literature

will be announced in the course
### 7.135 Course: Machine Tools and Industrial Handling [T-MACH-102158]

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

**Prerequisites**  
“T-MACH-109055 - Werkzeugmaschinen und Handhabungstechnik” must not be commenced.

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

**Machine Tools and Industrial Handling**  
2149902, WS 19/20, 6 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**  
**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools 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:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Learning Outcomes:
The students...

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

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

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

Learning Content
The lecture gives an overview of the construction, use and application of machine tools and industrial handling equipment. In the course of the lecture a well-founded and practice-oriented knowledge for the selection, design and evaluation of machine tools is conveyed. First, the main components of the machine tools are systematically explained and their design principles as well as the integral machine tool design are discussed. Subsequently, the use and application of machine tools 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:

- Frames and frame components
- Feed axes
- Spindles
- Peripheral equipment
- Control unit
- Metrological evaluation and machine testing
- Process monitoring
- Maintenance of machine tools
- Safety assessment of machine tools
- Machine examples

Annotation
None
Workload

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

WiIng:/TVWL
regular attendance: 63 hours
self-study: 207 hours
7.136 Course: Macroeconomic Theory [T-WIWI-109121]

**Responsible:** Prof. Dr. Johannes Brumm

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

**Part of:**
- M-WIWI-101501 - Economic Theory
- M-WIWI-101668 - Economic Policy I

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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.

**Prerequisites**
None.

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

**V Macroeconomic Theory**
2560404, WS 19/20, 2 SWS, Language: English, [Open in study portal](#)

**Description**
This course introduces a modern approach to macroeconomics by building on microeconomic principles. To be able to rigorously address key macroeconomic questions a general framework based on intertemporal decision making is introduced. Starting by the principles of consumer and firm behavior, this framework is successively expanded by introducing market imperfections, monetary factors as well as international trade. With this framework at hand students are able to analyze labor market policies, government deficits, monetary policy, financial crises, trade policy, and other important macroeconomic problems. Throughout the course, we not only point out the power of theory but also its limitations.

**Workload**
The total workload for this course is approximately 135 hours. For further information see the German version.

**Literature**
Literature and lecture notes are provided during the course.
7 COURSES

7.137 Course: Management Accounting 1 [T-WIWI-102800]

Responsible: Prof. Dr. Marcus Wouters
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101498 - Management Accounting

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Exams

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Competence Certificate

The assessment consists of a written exam (120 minutes) (following §4(2), 1 of the examination regulation) at the end of each semester.

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 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)
Notes
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.

Learning 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.

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.
T 7.138 Course: Management Accounting 2 [T-WIWI-102801]

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

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

**Part of:** M-WIWI-101498 - Management Accounting

### Type
- **Written examination**

### Credits
- **4.5**

### Recurrence
- **Each winter term**

### Version
- **2**

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**Competence Certificate**
The assessment consists of a written exam (120 minutes) at the end of each semester.

**Prerequisites**
None

**Recommendation**
It is recommended to take part in the course "Management Accounting 1" before this course.

**Annotation**
Students in the Bachelor’s program can only take the related tutorial and examination. Students in the Master’s program (and Bachelor’s students who are already completing examinations for their Master’s program) can only take the related tutorial and examination.

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

V Management Accounting 2
2579903, WS 19/20, 2 SWS, Language: English, Open in study portal Lecture (V)
Notes
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.

Learning 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 and customer value propositions.
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.

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

Literature
- In addition, several papers that will be available on ILIAS.
7.139 Course: Management and Strategy [T-WIWI-102629]

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101425 - Strategy and Organization

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Competence Certificate

The assessment consists of a written exam (60 min) taking place at the beginn of the recess period (according to §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

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

Management and Strategy

2577900, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Description

- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation
Notes
The participants learn about central concepts of strategic management along the ideal-typical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration. Thereby a focus is on imparting knowledge about how price developments in oligopolistic markets can be understood, modeled and forecasted based on game theory.

Content in brief:
- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

Learning Objectives:
After passing this course students are able to
- prepare strategic decisions along the ideal-typical strategy process in practice ("strategic analysis”).
- assess strategic options.
- explain the portfolio management (Parental advantage and best owner of business entities).
- discuss price and capacity decisions in oligopolies and explain them in examples.

Recommendations:
None.

Workload:
The total workload for this course is approximately 105.0 hours. For further information see German version.

Assessment:
The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Learning Content
The participants learn about central concepts of strategic management along the ideal-typical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration. Thereby a focus is on imparting knowledge about how price developments in oligopolistic markets can be understood, modeled and forecasted based on game theory.

Annotation
The credits for the course "Management and Strategy” have been changed from 4 to 3.5 from summer term 2015 on.

Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

Literature

The relevant excerpts and additional sources are made known during the course.
### 7.140 Course: Managing Organizations [T-WIWI-102630]

**Responsible:** Prof. Dr. Hagen Lindstädt  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101425 - Strategy and Organization  
- M-WIWI-101513 - Human Resources and Organizations

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**Exams**

- **WS 19/20:** 7900049 - Managing Organizations - Prüfung (PR) - Lindstädt

**Competence Certificate**

The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 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

**Description**

- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes
Notes
The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organizational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

Content in brief:
- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

Learning Objectives:
After passing this course students are able to
- evaluate strengths and weaknesses of existing organisational structures and rules.
- compare alternatives of organisational structure in practice and assess and interpret them regarding their effectiveness and efficiency.
- assess the management of organisational changes.

Recommendations:
None.

Workload:
The total workload for this course is approximately 105.0 hours. For further information see German version.

Assessment:
The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary 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 one grade level (0.3 or 0.4). The exact criteria for the award of a bonus will be announced at the beginning of the lecture.

Learning Content
The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organizational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

Annotation
The credits for the course "Managing Organizations" have been changed from 4 to 3.5 from summer term 2015 on.

Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

Literature

The relevant excerpts and additional sources are made known during the course.
7.141 Course: Managing the Marketing Mix [T-WIWI-102805]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-101424 - Foundations of Marketing

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<td>Practice (Ü)</td>
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**Exams**

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**Competence Certificate**
The assessment is carried out by the preparation and presentation of a case study (max 30 points) as well as a written exam (max 60 points). In total, a maximum of 90 points can be achieved in the event.

**Prerequisites**
None

**Annotation**
The course is compulsory in the module “Foundations of Marketing”. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

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

**Managing the Marketing Mix**

2571152, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Notes**
The content of this course concentrates on the elements of the marketing mix. Therefore the main chapters are:

- Brand management
- Pricing
- Promotion

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

This course is compulsory within or the module “Foundations of Marketing” and must be examined.

**Learning objectives:**

**Student**

- know the meaning of the branding, the brand positioning and the possibilities of the brand value calculation
- understand the price behavior of customers and can apply this knowledge to the practice
- know different methods for price determination (conjoint analysis, cost-plus determination, target costing, customer surveys, value-in-use) and price differentiation
- are able to name and explain the relevant communication theories
- can name and judge different possibilities of the Intermediaplanung
- know various design elements of advertising communication
- understand the measurement of advertising impact and can apply it

**Workload:**
The total workload for this course is approximately 135.0 hours.
7.142 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

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**Competence Certificate**

Written Exam (180 min)

**Prerequisites**

none

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

**Manufacturing Technology**

2149657, WS 19/20, 6 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture notes will be provided in ilias (https://ilias.studium.kit.edu/).
Notes
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

Learning Content
The objective of the lecture is to look at manufacturing technology within the wider context of production engineering, to provide an overview of the different manufacturing processes and to impart detailed process knowledge of the common processes. The lecture covers the basic principles of manufacturing technology and deals with the manufacturing processes according to their classification into main groups regarding technical and economic aspects. The lecture is completed with topics such as process chains in manufacturing.

The following topics will be covered:

- Quality control
- Primary processing (casting, plastics engineering, sintering, additive manufacturing processes)
- Forming (sheet-metal forming, massive forming, plastics engineering)
- Cutting (machining with geometrically defined and geometrically undefined cutting edges, separating, abrading)
- Joining
- Coating
- Heat treatment and surface treatment
- Process chains in manufacturing

This lecture provides an excursion to an industry company.

Annotation
None

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

Literature
Lecture Notes
7.143 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-101269 - Introduction to Technical Logistics  
M-MACH-101277 - Material Flow in Logistic Systems

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**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 19/20, 6 SWS, Language: German, [Open in study portal]

**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).

**Media:** Presentations, black board, book, video recordings
Notes

Learning Content:

- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehousing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

After successful completion of the course, you are able (alone and in a team) to:

- Accurately describe a material handling system in a conversation with an expert.
- Model and parameterize the system load and the typical design elements of a material handling system.
- Design a material handling system for a task.
- Assess the performance of a material handling system in terms of the requirements.
- Change the main lever for influencing the performance.
- Expand the boundaries of today's methods and system components conceptually if necessary.

Literature:
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg, 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 colloquia, 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 colloquia 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 16.10.2019. In this session, the teaching concept of "Materialfluss in Logistiksysteme" is explained and outstanding issues are clarified.

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 colloquia as individual performance.

Learning Content

- Elements of material flow systems (conveyor elements, fork, join elements)
- Models of material flow networks using graph theory and matrices
- Queueing theory, calculation of waiting time, utilization
- Warehousing and order-picking
- Shuttle systems
- Sorting systems
- Simulation
- Calculation of availability and reliability
- Value stream analysis

Annotation
none
**Workload**
Regular attendance: 35 h  
Self-study: 135 h  
Group work: 100 h

**Literature**
Arnold, Dieter; Furmans, Kai: Materialfluss in Logistiksystemen; Springer-Verlag Berlin Heidelberg, 2009
7.144 Course: Material Science II for Business Engineers [T-MACH-102079]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101261 - Emphasis in Fundamentals of Engineering
- M-MACH-101262 - Emphasis Materials Science
- M-WIWI-101839 - Additional Fundamentals of Engineering

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<th>Materials Science II for Business Engineers</th>
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**Exams**

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<th>Prüfung (PR)</th>
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**Competence Certificate**
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the winter term is carried out by a written or oral exam.

**Prerequisites**
The module *Material Science* has to be completed beforehand.

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

**Materials Science II for Business Engineers**

2126782, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Learning Content**
The course gives an overview of different heat treatments for steels to obtain defined microstructures such as martensite or pearlite and discusses their impact on the mechanical properties. Different thermally activated processes, such as diffusion, creep, recovery and recrystallization are introduced and analyzed and terms of their relevance for materials engineering. Heat treatments and thermally activated processes are also related to aluminium and copper alloys. The second part of the course covers structure, processing and applications of polymers, nonmetallic inorganic glasses and ceramics. Finally an overview is given of the most important materials testing methods.

**Workload**

regular attendance: 32 hours
self-study: 118 hours

**Literature**

**Elective literature:**

7.145 Course: Materials Science I [T-MACH-102078]

- **Responsible:** Prof. Dr. Michael Hoffmann
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101260 - Materials Science

**Events**

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**Exams**

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**Competence Certificate**
The assessment consists of a written examination (150 min) taking place in the recess period (according to Section 4(2), 1 of the examination regulation). The examination takes place every semester. Re-examinations are offered at every ordinary examination date. The examination at the end of the summer term is carried out by a written or oral exam.

**Prerequisites**
None

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

**Materials Science I**

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**Learning Content**
- Atomic structure and interatomic bonding
- Structure of crystalline solids
- Imperfections in solids
- Mechanical behaviour
- Physical properties
- Solidification
- Thermodynamics of heterogeneous systems
- Phase diagrams
- Ferrous alloys

**Workload**
The total workload for this course is approximately 75.0 hours. For further information see the German version.

**Literature**

**Elective literature:***

7.146 Course: Mathematics I - Final Exam [T-MATH-102261]

**Responsible:**
Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:**  
KIT Department of Mathematics

**Part of:**  
M-MATH-101676 - Mathematics 1

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7.147 Course: Mathematics I - Midterm Exam [T-MATH-102260]

**Responsible:**
Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-101676 - Mathematics 1

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7.148 Course: Mathematics II - Final Exam [T-MATH-102263]

**Responsible:** Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101677 - Mathematics 2

**Type**  
Written examination

**Credits**  
3.5

**Version**  
1
7.149 Course: Mathematics II - Midterm Exam [T-MATH-102262]

**Responsible:** Dr. Martin Folkers  
Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101677 - Mathematics 2

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## T.150 Course: Mathematics III - Final Exam [T-MATH-102264]

### Responsible:
- Dr. Martin Folkers
- Prof. Dr. Daniel Hug
- Prof. Dr. Günter Last
- PD Dr. Steffen Winter

### Organisation:
- KIT Department of Mathematics

### Part of:
- M-MATH-101679 - Mathematics 3

### Events

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7.151 Course: Mechanical Design Basics I and II [T-MACH-110363]

**Responsible:** Prof. Dr.-Ing. Albert Albers  
Prof. Dr.-Ing. Sven Matthiesen  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101299 - Mechanical Design

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<td>Lecture (V)</td>
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<td>Lecture (V)</td>
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**Competence Certificate**  
Written Exam (90min) on the topics of MKLG I and MKLG II.

**Prerequisites**  

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

**Mechanical Design Basics I**  
2145131, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**  
**Media:**  
Beamer  
Visualizer  

**Learning Content**  
Introduction in product engineering  
Tools of visualization (technical drawing)  
Product manufacturing as problem solving  
Product manufacturing of technical systems:  
- system theory  
- Contact and Channel C&C²-A  

Basics of chosen design- and machining elements  
- springs  
- bearings  
- sealings  

Concommitant to the lectures tutorials take place with the following contents:  
Gear workshop  
Tutorial "tools of visualization (technical drawing)"  
Tutorial "technical systems product development, sytem theory, Contact and Channel C&C²-A"  
Tutorial "springs"  
Tutorial "bearing and bearing arrangements"  

Industrial Engineering and Management B.Sc.  
Module Handbook as of 18.02.2020
Annotation
Lecture notes:
The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h
self-study: 80 h

Literature
Lecture notes:
The lecture notes can be downloaded via the eLearning platform Ilias.

Literature:
*Konstruktionselemente des Maschinenbaus* - 1 und 2
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;
or per full text access provided by university library

Grundlagen von Maschinenelementen für Antriebsaufgaben;
Steinhilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

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**Mechanical Design Basics II**
2146131, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

Notes
Design
Dimensioning
Component connections
Bolted connection

**Prerequisites:**
MIT:
In a workshop with 3 project sessions the students will be divided into groups and their knowledge will be tested. Attendance in all 3 project sessions is compulsory and is checked. In colloquia the knowledge from the lecture will be tested at the beginning of the project sessions. The successful completion of the colloquia as well as the completion of the workshop task is a prerequisite for successful participation.

CIW/VT/IP-M/WWING/NWT/MATH/MWT:
During the lecture, students must apply the knowledge from MKL I and II to a design task. This is then evaluated and must be passed for successful participation.

**Workload:**
Presence time: 21 h
Self study: 51 h

Annotation
Lecture notes:
The Productdevelopment knowledge base PKB will be provided in digital form for registered students. All lecture notes and additional slides will be provided in Ilias.

Workload
regular attendance: 42 h
self-study: 80 h
7.152 Course: Mechanical Design Basics I, Tutorial [T-MACH-110364]

Responsible: Prof. Dr.-Ing. Albert Albers
Prof. Dr.-Ing. Sven Matthiesen

Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101299 - Mechanical Design

**Type** Completed coursework **Credits** 1 **Recurrence** Each winter term **Version** 1

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### Events

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**Exams**

- WS 19/20, 76-T-MACH-110364: Mechanical Design Basics I, Tutorial
- Albers, Matthiesen

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**Competence Certificate**

To pass the preliminary work, attendance at 3 workshop sessions of the MKL1 transmission workshop and the passing of a colloquium at the beginning of each workshop are prerequisites.

**Prerequisites**

None

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

### Tutorials Mechanical Design Basics I

**2145132, WS 19/20, 1 SWS, Language: German, Open in study portal**

**Practice (Ü)**

**Description**

**Media:**
- Beamer
- Visualizer
- Gear box (Workshop)

**Learning Content**

- Gear workshop
- Tutorial "tools of visualization (technical drawing)"
- Tutorial "technical systems product development, sytem theory, element model C&CM"
- Tutorial "springs"
- Tutorial "bearing and bearing arrangements"

**Literature**

**Konstruktionselemente des Maschinenbaus - 1 und 2**
Grundlagen der Berechnung und Gestaltung von Maschinenelementen;

**Grundlagen von Maschinenelementen für Antriebsaufgaben;**
Steinhiilper, Sauer, Springer Verlag, ISBN 3-540-29629-8

**CAD:**
- Pro/Engineer Tipps und Techniken, Wolfgang Berg, Hanser Verlag, ISBN: 3-446-22711-3 (für Fortgeschrittene)
### 7.153 Course: Mechanical Design Basics II, Tutorial [T-MACH-110365]

**Responsible:** Prof. Dr.-Ing. Albert Albers  
Prof. Dr.-Ing. Sven Matthiesen  

**Organisation:** KIT Department of Mechanical Engineering  

**Part of:** M-MACH-101299 - Mechanical Design

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**Competence Certificate**  
CIW/ VT/ IP-M/ WiING / NWT/ MATH/ MWT: For passing the prerequisite it is necessary that a design task is successfully completed as a technical hand drawing  
MIT: To pass the preliminary examination, attendance at workshop sessions and a colloquium at the beginning of each workshop are required.

**Prerequisites**  
None

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

### Tutorials Mechanical Design Basics II

**2146132, SS 2020, 2 SWS, Language: German,**  
[Open in study portal](#)

**Notes**  
Design  
Dimensioning  
Component connections  
Bolted connection

**Workload:**  
MIT Students:  
Presence time: 18 h  
Self study: 30 h  
CIW/ VT/ IP-M/ WiING / NWT/ MATH/ MWT  
Presence time: 10,5 h  
Self study: 37,5 h
7.154 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

### Type, Credits, Recurrence, Version

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### Competence Certificate

Oral Exam (20 min)

### Prerequisites

none

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

**Metal Forming**

2150681, SS 2020, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

### Description

Media:

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
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

Learning 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

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
### 7.155 Course: Microactuators [T-MACH-101910]

**Responsible:** Prof. Dr. Manfred Kohl  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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**Exams**

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**Competence Certificate**

written exam, 60 min.

**Prerequisites**

none

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

**Microactuators**

2142881, SS 2020, 2 SWS, Language: German, [Open in study portal]

**Description**

**Media:**

Script of ppt-slides

**Notes**

- 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
Learning 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

Annotation
Details will be announced at the beginning of the lecture

Workload
lecture time 1.5 h/week
self preparation: 8.5 h/week

Literature
- Lecture notes
- M. Kohl, Shape Memory Microactuators, M. Kohl, Springer-Verlag Berlin, 2004
7.156 Course: Mobile Machines [T-MACH-105168]

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

**Organisation:** KIT Department of Mechanical Engineering

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

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<td>Mobile Machines</td>
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**Competence Certificate**

The assessment consists of an oral exam (45 min) taking place in the recess period. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

none

**Recommendation**

Knowledge in Fluid Power Systems is required. It is recommended to attend the course Fluid Power Systems [2114093] beforehand.

**Annotation**

After completion of the course the students have knowledge of:

- a wide range of mobile machines
- operation modes and working cycles of important mobile machines
- selected subsystems and components

**Content:**

- Introduction of the required components and machines
- Basics and structure of mobile machines
- Practical insight in the development techniques

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

**Mobile Machines**

2114073, SS 2020, 4 SWS, Language: German, Open in study portal

**Description**

**Media:**

Lecture notes.

**Notes**

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

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

Workload

- regular attendance: 42 hours
- self-study: 184 hours
### 7.157 Course: Mobility and Infrastructure [T-BGU-101791]

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

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

**Part of:**
M-BGU-101067 - Mobility and Infrastructure

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**Exams**

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<td>Roos</td>
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</table>

**Competence Certificate**
written exam, 150 min.

**Prerequisites**
None

**Recommendation**
For students from the KIT-Department of Economics and Management it is recommended to take part in the exercises.

**Annotation**
none
Course: Model Based Application Methods [T-MACH-102199]

**Responsible:** Dr. Frank Kirschbaum

**Organisation:** KIT Department of Mechanical Engineering

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

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<td>Oral exam</td>
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**Competence Certificate**
- take-home exam, short presentation with oral examination

**Prerequisites**
- none
Course: Modeling and OR-Software: Introduction [T-WIWI-106199]

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

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

**Part of:** M-WIWI-101413 - Applications of Operations Research

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<td>Modellieren und OR-Software: Einführung</td>
<td>3 SWS</td>
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### 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
Firm knowledge of the contents from the lecture *Introduction to Operations Research* I (2550040) of the module *Operations Research*.

### Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is offered 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: Einführung**

- SS 2020, 2550490, 3 SWS, Language: German, [Open in study portal]
- Practical course (P)

### Notes
After an introduction to general concepts of modelling tools (implementation, data handling, result interpretation, ...), the software IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL will be discussed which can be used to solve OR problems on a computer-aided basis. Subsequently, a broad range of exercises will be discussed. The main goals of the exercises from literature and practical applications are to learn the process of modeling optimization problems as linear or mixed-integer programs, to efficiently utilize the presented tools for solving these optimization problems and to implement heuristic solution procedures for mixed-integer programs.

### Learning Content
The task of solving combinatorial and nonlinear optimization problems imposes much higher requirements on suggested solution approaches as in linear programming.

During the course of this software laboratory, students get to know important methods from combinatorial optimization, e.g. Branch & Cut- or Column Generation methods and are enabled to solve problems with the software system IBM ILOG CPLEX Optimization Studio and the corresponding modeling language OPL. In addition, issues of nonlinear optimization, e.g. quadratic optimization, are addressed. As an important part of the software laboratory, students get the possibility to model combinatorial and nonlinear problems and implement solution approaches in the software system.

The software laboratory also introduces some of the most frequently used modelling and programming languages that are used in practice to solve optimization problems.

### Annotation
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is held irregularly. The planned lectures and courses for the next three years are announced online.
Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
7.160 Course: Modelling and Identification [T-ETIT-100699]

**Responsible:** Prof. Dr.-Ing. Sören Hohmann  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101156 - Control Engineering

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**Events**

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**Prerequisites**

none
7.161 Course: Nanotechnology with Clusterbeams [T-MACH-102080]

**Responsible:** Dr. Jürgen Gspann

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

**Type**
Written examination

**Credits**
3

**Recurrence**
Each winter term

**Version**
1

**Competence Certificate**
written examination
presence in more that 70% of the lectures
Duration: 1 h

**aids:** none

**Prerequisites**
none
Course: Nonlinear Optimization I [T-WIWI-102724]

### Responsible
Prof. Dr. Oliver Stein

### Organisation
KIT Department of Economics and Management

### Part of
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-103278 - Optimization under Uncertainty

### Type
Written examination

### Credits
4,5

### Recurrence
Each winter term

### Version
4

### 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 exam takes place in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

### Prerequisites
The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

### Annotation
Part I and II of the lecture are held consecutively in the same semester.

---

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

### Nonlinear Optimization I

2550111, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Notes**
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.
7.163 Course: Nonlinear Optimization I and II [T-WIWI-103637]

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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**Competence Certificate**

The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

**Prerequisites**

None.

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

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

**V** Nonlinear Optimization I

2550111, WS 19/20, 2 SWS, Language: German, Open in study portal

**Notes**

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.
Notes
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.
Course: Nonlinear Optimization II [T-WIWI-102725]

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:** M-WIWI-101414 - Methodical Foundations of OR

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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 and possibly of a compulsory prerequisite.

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 19/20, 2 SWS, Language: German, [Open in study portal]

**Notes**

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.
### 7.165 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

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<td>Prüfung (PR)</td>
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**Competence Certificate**  
written exam, 60 minutes

**Prerequisites**  
none

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

**Novel actuators and sensors**  
2141865, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Description**  
**Media:**  
Script / script of ppt foils (part 2)

**Learning Content**  
**Contents:**  
- Basic knowledge in the material science of actuator and sensor principles  
- Layout and design optimization  
- Fabrication technologies  
- Selected developments  
- Applications

**Index:**  
The lecture includes amongst others the following topics:

- Piezo actuators  
- Magnetostriuctive actuators  
- Shape memory actuators  
- Electro-/magnetorheological actuators  
- Sensors: Concepts, materials, fabrication  
- Micromechanical sensors: Pressure, force, inertia sensors  
- Temperature sensors  
- Micro sensors for bio analytics  
- Mechano-magnetic sensors

The lecture addresses students in the fields of mechanical engineering, mechatronics and information technology, materials science and engineering, electrical engineering and economic sciences. A comprehensive introduction is given in the basics and current developments on the macroscopic length scale.

The lecture is core subject of the major course "Actuators and Sensors" of the specialization "Mechatronics and Microsystems Technology" in Mechanical Engineering.
Workload

Work Lecture:

time of attendance: 21 hours
Self-study: 99 hours

Literature

- Lecture notes
- Donald J. Leo, Engineering Analysis of Smart Material Systems, John Wiley & Sons, Inc., 2007
Course: Operative CRM [T-WIWI-102597]

**Responsible:** Prof. Dr. Andreas Geyer-Schulz

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

**Part of:** M-WIWI-101422 - Specialization in Customer Relationship Management
M-WIWI-101460 - CRM and Service Management

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**Competence Certificate**

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

**Prerequisites**

None

**Recommendation**

The attendance of courses Customer Relationship Management and Analytical CRM is advised.

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

**Operative CRM**

2540522, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

The Student should be able to understand and implement methods and applications within the operative CRM. This includes, but is not limited to the analysis of business processes, as a basis for improvements in CRM, and applications like call centers.

**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
Literature

Elective literature:
7.167 Course: Optimization under Uncertainty [T-WIWI-106545]

**Responsible:** Prof. Dr. Steffen Rebennack

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

**Part of:** M-WIWI-101413 - Applications of Operations Research
M-WIWI-103278 - Optimization under Uncertainty

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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.
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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**Prerequisites**

none

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101513 - Human Resources and Organizations
M-WIWI-101668 - Economic Policy I

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Events

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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. 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
Completion of module Business Administration is recommended. Basic knowledge of microeconomics, game theory, and statistics is recommended.

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

Personnel Policies and Labor Market Institutions
2573001, SS 2020, 2 SWS, Language: German, Open in study portal
Notes
The students acquire knowledge about the process and the strategic aspects of collective bargaining about wages. They analyze selected aspects of corporate governance and co-determination in Germany. The lecture also addresses questions of personnel politics and labor market discrimination. Microeconomic and behavioral approaches as well as empirical data is used and evaluated critically.

Aim
The student
- understands the process and role of agents in collective wage bargaining.
- analyzes strategic decisions in the context of corporate governance.
- understands the concept of co-determination in Germany.
- challenges statements that evaluate certain personnel politics.

Workload
The total workload for this course is approximately 135 hours.
Lecture 32h
Preparation of lecture 52h
Exam preparation 51h

Literature
7.170 Course: PH APL-ING-TL01 [T-WIWI-106291]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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7.171 Course: PH APL-ING-TL02 [T-WIWI-106292]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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**Organisation:** University

**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering
7.174 Course: PH APL-ING-TL05 ub [T-WIWI-106295]

**Organisation:** University

**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering

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## 7.175 Course: PH APL-ING-TL06 ub [T-WIWI-106296]

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**Organisation:** University  
**Part of:** M-WIWI-101404 - Extracurricular Module in Engineering
7.176 Course: PH APL-ING-TL07 [T-WIWI-108384]

Organisation: University
Part of: M-WIWI-101404 - Extracurricular Module in Engineering

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7.177 Course: Physical Basics of Laser Technology [T-MACH-102102]

**Responsible:** Dr.-Ing. Johannes Schneider

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**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 19/20, 3 SWS, Language: German, [Open in study portal]

**Description**

**Media:**

lecture notes via ILIAS
Notes
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.

Learning 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.

Annotation
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.

Workload
regular attendance: 33.5 hours
self-study: 116.5 hours

Literature
### 7.178 Course: Physics for Engineers [T-MACH-100530]

**Responsible:**
- Prof. Dr. Martin Dienwiebel
- Prof. Dr. Peter Gumbsch
- Prof. Dr. Alexander Nesterov-Müller
- Dr. Daniel Weygand

**Organisation:**
KIT Department of Mechanical Engineering

**Part of:**
- M-MACH-101287 - Microsystem Technology

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**Exams**

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**Prerequisites**
none

**Competence Certificate**
written exam 90 min

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

**Physics for Engineers**
2142890, SS 2020, 2 SWS, Language: German, [Open in study portal](#)
Notes
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 (2142891, 2 SWS) are used for complementing and deepening the contents of the lecture as well as for answering more extensive questions raised by the students and for testing progress in learning of the topics.

The student
   - has the basic understanding of the physical foundations to explain the relationship between the quantum mechanical principles and the optical as well as electrical properties of materials
   - can describe the fundamental experiments, which allow the illustration of these principles

regular attendance: 22.5 hours (lecture) and 22.5 hours (excerises 2142891)
self-study: 97.5 hours and 49 hours (excerises 2142891)
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Learning 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 (2142891, 2 SWS) 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.

Workload
regular attendance: 22.5 hours (lecture) and 22.5 hours (excerises 2142891)
self-study: 97.5 hours and 49 hours (excerises 2142891)

Literature
- Tipler und Mosca: Physik für Wissenschaftler und Ingenieure, Elsevier, 2004
- Harris, Moderne Physik, Pearson Verlag, 2013
7.179 Course: Platform Economy [T-WIWI-109936]

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

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

**Part of:**  
M-WIWI-101421 - Supply Chain Management  
M-WIWI-101434 - eBusiness and Service Management  
M-WIWI-104911 - Information Systems & Digital Business: Interaction  
M-WIWI-104912 - Information Systems & Digital Business: Platforms

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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. Details of the grades will be announced at the beginning of the course.

**Prerequisites**

see below

**Recommendation**

None

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

**Platform Economy**

2540468, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

Apple, Alphabet, Microsoft, Amazon und Facebook; five of the most valuable companies are digital platforms. This lecture provides an overview on how such platforms work, which market mechanisms are effective for achieving certain goals and how users behave on such platforms. The content is exemplified and discussed in several real-world examples and case studies in the field of sharing economy (e.g., airbnb), finance (e.g., social trading) and crowdsourcing (e.g., kickstarter).
**7.180 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-101270 - Product Lifecycle Management

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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 19/20, SWS, Language: German, Open in study portal

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.

**PLM for product development in mechatronics**
2122376, SS 2020, SWS, Language: German, Open in study portal

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.
7.181 Course: PLM-CAD Workshop [T-MACH-102153]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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**Competence Certificate**
Alternative exam assessment (graded)

**Prerequisites**
None

**Annotation**
Number of participants is limited, compulsory attendance
7.182 Course: Polymer Engineering I [T-MACH-102137]

- **Responsible:** Prof. Dr.-Ing. Peter Elsner
- **Organisation:** KIT Department of Mechanical Engineering
- **Part of:** M-MACH-101262 - Emphasis Materials Science

**Events**

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**Competence Certificate**

Oral exam, about 25 minutes

**Prerequisites**

none

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

**Polymer Engineering I**

- 2173590, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Notes**

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

**Requirements:**

none

**Workload:**

- regular attendance: 21 hours
- self-study: 99 hours
Learning Content
1. Economical aspects of polymers
2. Introduction of mechanical, chemical and electrical properties
3. Processing of polymers (introduction)
4. Material science of polymers
5. Synthesis

Workload
regular attendance: 21 hours
self-study: 99 hours

Literature
Recommended literature and selected official lecture notes are provided in the lecture
### 7.183 Course: Polymer Engineering II [T-MACH-102138]

**Responsible:** Prof. Dr.-Ing. Peter Elsner  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Competence Certificate**  
Oral exam, about 25 minutes

**Prerequisites**  
none

**Recommendation**  
Knowledge in Polymerengineering I

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

### Polymer Engineering II

**Notes**

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  
- can exemplify mould design principles based on technical parts.  
- know about practical applications and processing of polymer parts  
- are able to design polymer parts according to given restrictions  
- can choose appropriate polymers based on the technical requirements  
- can decide how to use polymers regarding the production, economical and ecological requirements

**Requirements:**  
Polymerengineering I

**Workload:**

The workload for the lecture Polymerengineering II is 120 h per semester and consists of the presence during the lecture (21 h) as well as preparation and rework time at home (99 h).
Learning 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

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
Recommended literature and selected official lecture notes are provided in the lecture.
### 7.184 Course: Power Generation [T-ETIT-101924]

**Responsible:** Dr.-Ing. Bernd Hoferer  
**Organisation:** KIT Department of Electrical Engineering and Information Technology  
**Part of:** M-ETIT-101165 - Energy Generation and Network Components

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**Prerequisites**  
none
7.185 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-102379 - Power Network

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7 COURSES

7.186 Course: Practical Seminar Digital Services [T-WIWI-105711]

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Responsible: Prof. Dr. Gerhard Satzger
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102752 - Fundamentals of Digital Service Systems

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
The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.
7.187 Course: Practical Seminar Interaction [T-WIWI-109935]

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

Organisation: KIT Department of Economics and Management

**Type**: Examination of another type  
**Credits**: 4,5  
**Recurrence**: Each term  
**Version**: 2

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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.
7.188 Course: Practical Seminar Platforms [T-WIWI-109937]

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

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

**Part of:** M-WIWI-104912 - Information Systems & Digital Business: Platforms

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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.
7.189 Course: Practical Seminar Servitization [T-WIWI-109939]

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

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

**Part of:** M-WIWI-104913 - Information Systems & Digital Business: Servitization

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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.
Course: Practical Training in Basics of Microsystem Technology [T-MACH-102164]

**Responsible:** Dr. Arndt Last  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101287 - Microsystem Technology

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<td>Introduction to Microsystem Technology - Practical Course</td>
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<td>Introduction to Microsystem Technology - Practical Course</td>
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<td>Practical course (P)</td>
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**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 19/20, 2 SWS, Language: German, [Open in study portal](#)  

**Learning 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.

**Workload**  
Time of attendance: 21 h + 2 h exam  
Privat studies: 5 h preparing experiments + 10 h preparing the exam
Learning 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.

Workload
Time of attendance: 21 h + 2 h exam
Privat studies: 5 h preparing experiments + 10 h preparing the exam

Introduction to Microsystem Technology - Practical Course
2143875, SS 2020, 2 SWS, Language: German, Open in study portal
Practical course (P)
Notes
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.

Learning 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.

Workload
Time of attendance: 21 h + 2 h exam
Privat studies: 5 h preparing experiments + 10 h preparing the exam
Course: Problem Solving, Communication and Leadership [T-WIWI-102871]

**Responsible:** Prof. Dr. Hagen Lindstädt

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

**Part of:**
- M-WIWI-101425 - Strategy and Organization
- M-WIWI-101513 - Human Resources and Organizations

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**Exams**

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**Competence Certificate**
The assessment consists of a written exam (30 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

**Notes**
The course deals with various aspects of problem solving and communication processes and is divided into two parts. The first part of the course addresses the fundamental steps in the problem-solving process; namely, problem identification, problem structuring, problem analysis and communication of solution. Ideas for structuring problem solving processes will be discussed and the perquisites for and principles of structured communication based on charts and presentations will be explained. The second part of the course addresses important concepts in leadership, including the context-specificity of influence, the choice of leader and the characteristics of employees. The course content reflects current issues in management and communication practice and is oriented toward the practical application of theoretical insights to these issues. In this respect, the course aims to develop interdisciplinary skills.

**Learning Objectives:**
After passing this course students are able to

- structure problem solving processes.
- apply the principles of focused communication based on charts and presentations.
- understand leadership in the context of situation and personality.

**Recommendations:**
None.

**Workload:**
The total workload for this course is approximately 60 hours. For further information see German version.

**Assessment:**
The assessment consists of a written exam (30 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.
Learning Content
The course deals with various aspects of problem solving and communication processes and is divided into two parts. The first part of the course addresses the fundamental steps in the problem-solving process; namely, problem identification, problem structuring, problem analysis and communication of solution. Ideas for structuring problem solving processes will be discussed and the perquisites for and principles of structured communication based on charts and presentations will be explained. The second part of the course addresses important concepts in leadership, including the context-specificity of influence, the choice of leader and the characteristics of employees. The course content reflects current issues in management and communication practice and is oriented toward the practical application of theoretical insights to these issues. In this respect, the course aims to develop interdisciplinary skills.

Workload
The total workload for this course is approximately 60 hours. For further information see German version.

Literature
The relevant excerpts and additional sources are made known during the course.

Problem solving, communication and leadership
2577910, SS 2020, 1 SWS, Language: German, Open in study portal

Learning Content
The course deals with various aspects of problem solving and communication processes and is divided into two parts. The first part of the course addresses the fundamental steps in the problem-solving process; namely, problem identification, problem structuring, problem analysis and communication of solution. Ideas for structuring problem solving processes will be discussed and the perquisites for and principles of structured communication based on charts and presentations will be explained. The second part of the course addresses important concepts in leadership, including the context-specificity of influence, the choice of leader and the characteristics of employees. The course content reflects current issues in management and communication practice and is oriented toward the practical application of theoretical insights to these issues. In this respect, the course aims to develop interdisciplinary skills.

Workload
The total workload for this course is approximately 60 hours. For further information see German version.

Literature
The relevant excerpts and additional sources are made known during the course.
7.192 Course: Procedures of Remote Sensing [T-BGU-103542]

**Responsible:** Dr.-Ing. Uwe Weidner  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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### 7.193 Course: Procedures of Remote Sensing, Prerequisite [T-BGU-101638]

**Responsible:** Dr.-Ing. Uwe Weidner  
**Organisation:** KIT Department of Civil Engineering, Geo- and Environmental Sciences  
**Part of:**  
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Events**

| SS 2020 | 6020244 | Fernerkundungsverfahren, Übung | 1 SWS | Practice (Ü) | Weidner |

| SS 2020 | 8284101638 | Procedures of Remote Sensing, Prerequisite | Prüfung (PR) | Weidner |

**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7 COURSES

Course: Process Fundamentals by the Example of Food Production [T-CIWVT-106058]

**Responsible:** Dr. Volker Gaukel

**Organisation:** KIT Department of Chemical and Process Engineering

**Part of:** M-WIWI-101839 - Additional Fundamentals of Engineering

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Verfahrenstechnische Grundlagen am Beispiel der Lebensmittelverarbeitung (für LmCh, WIWI)

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Process fundamentals by the example of food production

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**Prerequisites**

none
Course: Product- and Production-Concepts for modern Automobiles [T-MACH-110318]

**Responsibility:** Dr. Stefan Kienzle
Dr. Dieter Steegmüller

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

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**Competence Certificate**

Oral Exam (20 min)

**Prerequisites**

T-MACH-105166 - Materials and Processes for Body Leightweight Construction in the Automotive Industry must not have been started.

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

**Product- and Production-Concepts for modern Automobiles**

2149670, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
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

Learning 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.

Workload
regular attendance: 25 hours
self-study: 95 hours
### 7.196 Course: Product Lifecycle Management [T-MACH-105147]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

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#### Events

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#### Competence Certificate

Written examination 90 min.

#### Prerequisites

None

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

**Product Lifecycle Management**  
2121350, WS 19/20, 2 SWS, Language: German, Open in study portal

**Learning Content**

Product Lifecycle Management (PLM) is an approach to the holistic and cross-company management and control of all product-related processes and data throughout the life cycle along the extended supply chain - from design and production to sales, to the dismantling and recycling.

Product Lifecycle Management is a comprehensive approach for effective and efficient design of the product life cycle. Based on all product information, which comes up across the entire value chain and across multiple partners, processes, methods and tools are made available to provide the right information at the right time, quality and the right place.

The course covers:

- A consistent description of all business processes that occur during the product life cycle (development, production, sales, dismantling, ...)
- the presentation of methods for the performance of the PLM business processes,
- explaining the most important corporate information systems to support the life cycle (PDM, ERP, SCM, CRM systems) to sample the software manufacturer SAP

**Workload**

Regular attendance: 42 hours  
Self-study: 128 hours
Literature
Lecture slides.


7.197 Course: Product, Process and Resource Integration in the Automotive Industry [T-MACH-102155]

**Responsible:** Dr.-Ing. Sama Mbang

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101270 - Product Lifecycle Management

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<td>2 SWS</td>
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**Competence Certificate**

Oral examination 20 min.

**Prerequisites**

None

**Annotation**

Limited number of participants.

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

**Product, Process and Resource Integration in the Automotive Industry**

2123364, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Learning Content**

The lecture

- Overview of product development in the automotive sector (process- and work cycle, IT-Systems)
- Integrated product models in the automotive industry (product, process and resource)
- New CAx modeling methods (intelligent feature technology, templates & functional modeling)
- Automation and knowledge-based mechanism for product design and production planning
- Product development in accordance with defined process and requirement (3D-master principle, tolerance models)
- Concurrent Engineering, shared working
- Enhanced concepts: the digital and virtual factory (application of virtual technologies and methods in the product development)
- Systems: Siemens NX.

Additionally, A practical industrial project study is offered, which is based on an integrated application scenario (from design of production resources, over testing and validation method planning to the manufacturing and implementation of the production resources).

Since the student will be divided in small teams, this study will also teach the students about team work and distributed development.

**Annotation**

Max. 20 students, registration necessary (ILIAS)

**Workload**

regular attendance: 32 hours
self-study: 72 hours

**Literature**

Lecture slides
7 COURSES

Course: Production Economics and Sustainability [T-WIWI-102820]

7.198 Course: Production Economics and Sustainability [T-WIWI-102820]

Responsible: Prof. Dr. Frank Schultmann
Dr.-Ing. Rebekka Volk

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101437 - Industrial Production I

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Competence Certificate

The assessment consists of an oral (30 minutes) or a written (60 minutes) exam (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

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

Production Economics and Sustainability

2581960, WS 19/20, 2 SWS, Language: German, Open in study portal

Lecture (V)

Notes

The analysis and management of material flows on the company level and above will be the focus of this lecture. Herein, the discussion will be about cost-effective and environmentally acceptable steps to avoid, abate and recycle emissions and waste as well as ways of efficient resources handling. As methods material flow analysis (MFA), life cycle assessment (LCA) and OR methods, e.g. for decision support, are introduced.

Topics:
- regulations related to materials and substances
- raw materials, reserves and their availabilities/lifetimes
- material and substance flow analysis (MFA/SFA)
- material related ecoprofiles, e.g. Carbon Footprint
- LCA
- resource efficiency
- emission abatement
- waste management and closed-loop recycling
- raw material oriented production systems
- environmental management (EMAS, ISO 14001, Ecoprofit), eco-controlling

Learning Content

The analysis and management of material flows on the company level and above will be the focus of this lecture. Herein, the discussion will be about cost-effective and environmentally acceptable steps to avoid, abate and recycle emissions and waste as well as ways of efficient resources handling. As methods material flow analysis (MFA), life cycle assessment (LCA) and OR methods, e.g. for decision support, are introduced.

Topics:
- regulations related to materials and substances
- raw materials, reserves and their availabilities/lifetimes
- material and substance flow analysis (MFA/SFA)
- material related ecoprofiles, e.g. Carbon Footprint
- LCA
- resource efficiency
- emission abatement
- waste management and closed-loop recycling
- raw material oriented production systems
- environmental management (EMAS, ISO 14001, Ecoprofit), eco-controlling
Workload
Total effort required will account for approximately 105h (3.5 credits).

Literature
will be announced in the course
### 7.199 Course: Project in Applied Remote Sensing [T-BGU-101814]

| Responsible: | Prof. Dr.-Ing. Stefan Hinz  
|              | Dr.-Ing. Uwe Weidner |
| Organisation: | KIT Department of Civil Engineering, Geo- and Environmental Sciences |
| Part of:      | M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
|              | M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
|              | M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis |

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#### Exams

7.200 Course: Project Management [T-BGU-101675]

Responsible: Prof. Dr.-Ing. Shervin Haghsheno
Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-BGU-101004 - Fundamentals of Construction

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Competence Certificate

written exam with 60 minutes

Prerequisites

None

Recommendation

None

Annotation

None
### 7.201 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

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**Exams**

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**Competence Certificate**
- Oral examination
- Duration: 30 up to 40 minutes
- Auxiliary means: none

**Prerequisites**
none

---

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

**Project Workshop: Automotive Engineering**
- 2115817, WS 19/20, 3 SWS, Language: German, [Open in study portal](#)
Notes
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.

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Learning 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.

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Annotation
Selection procedure, applications are to submit in the end of the preceding semester.

Workload
regular attendance: 49 hours
self-study: 131 hours

Literature

The scripts will be supplied in the start-up meeting.
Notes
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.

Learning 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.

Annotation
Selection procedure, applications are to submit in the end of the preceding semester.

Workload
regular attendance: 49 hours
self-study: 131 hours

Literature

The scripts will be supplied in the start-up meeting.
# 7.202 Course: Public Law I & II [T-INFO-110300]

**Responsible:** Prof. Dr. Nikolaus Marsch  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101187 - Elective Module Law  
M-INFO-105084 - Public and Civil Law  

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Course: Public Revenues [T-WIWI-102739]

**Responsible:** Prof. Dr. Berthold Wigger

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

**Part of:**
- M-WIWI-101403 - Public Finance
- M-WIWI-101499 - Applied Microeconomics
- M-WIWI-101668 - Economic Policy I

### Events

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### Competence Certificate

The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

### 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 2020, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

### Description

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 dept-incurring.

### Notes

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 dept-incurring.

### Learning goals:

See German version.

### Workload:

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

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

Literature
Elective literature:

### Course: Public Sector Finance [T-WIWI-109590]

**Responsible:** Prof. Dr. Berthold Wigger  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101403 - Public Finance

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#### Competence Certificate
The assessment consists of a written exam (60 min.).

#### Prerequisites
T-WIWI-107763 "Municipal Finance" must not be selected.

#### Annotation
Previous title until winter semester 2018/19 "Municipal Finance".

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

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### Notes
The course **Municipal Finance** addresses the theory and policy of municipal revenues and spending including grants, municipal revenue equalisation, taxation as well as municipal and public enterprises.

At the beginning of the course, fundamental concepts of taxation theory as well as key elements of the German taxation system are introduced. The allocative and distributive effects of different taxation methods are examined thereafter and are combined within the theory of optimal taxation. The following chapter is concerned with municipal borrowing and illustrates ways to acquire additional funding. After addressing the extent, structure and variety of municipal borrowing, macroeconomic theories are introduced and applied to the municipal sector. In the course of this final chapter, special attention will be paid to the long term consequences and the sustainability of municipal borrowing as a means of budgeting.

### Learning goals:

The students:
- are familiar with the theory and policy of municipal revenues and spending.
- are able to evaluate the allocative and distributive effects of different kinds of municipal revenues and spending.
- understand the extent, structure and variety of municipal budgeting and are able to assess long term consequences of municipal revenues and spending.

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

### Learning Content

The course **Municipal Finance** addresses the theory and policy of municipal revenues and spending including grants, municipal revenue equalisation, taxation as well as municipal and public enterprises.

At the beginning of the course, fundamental concepts of taxation theory as well as key elements of the German taxation system are introduced. The allocative and distributive effects of different taxation methods are examined thereafter and are combined within the theory of optimal taxation. The following chapter is concerned with municipal borrowing and illustrates ways to acquire additional funding. After addressing the extent, structure and variety of municipal borrowing, macroeconomic theories are introduced and applied to the municipal sector. In the course of this final chapter, special attention will be paid to the long term consequences and the sustainability of municipal borrowing as a means of budgeting.
**Literature**

- Several publications of the Ministry of Interior and the Ministry of Finance Baden-Württemberg.
### 7.205 Course: Python Algorithm for Vehicle Technology [T-MACH-110796]

**Responsible:** Stephan Rhode  
**Organisation:** Part of: M-MACH-101265 - Vehicle Development

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**Competence Certificate**

Written Examination  
Duration: 90 minutes

**Prerequisites**

none

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

### Python Algorithms for Automotive Engineering

2114862, SS 2020, 2 SWS, Language: German, Open in study portal  
Lecture (V)

**Notes**

**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.
7.026 Course: Python for Empirical Finance [T-WIWI-110217]

**Responsible:** Prof. Dr Maxim Ulrich

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

**Part of:** M-WIWI-105035 - Empirical Finance

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<tr>
<td>WS 19/20</td>
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**Competence Certificate**
The assessment is carried out in form of six biweekly Python programming tasks and offered each winter term. The grade of this course is determined by the points achieved in the programming tasks.

**Prerequisites**
None.

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

**Python for Empirical Finance**
2500014, WS 19/20, 2 SWS, Language: English, [Open in study portal]

**Description**
The aim of this course is to provide students with strong knowledge in Python to independently solve real-world data problems related to computational risk and asset management.

**Notes**
The aim of this course is to provide students with strong knowledge in Python to independently solve real-world data problems related to computational risk and asset management.

The course covers several topics from a programming perspective, among them:

- Mean-Variance Portfolio Optimization
- Modeling Distribution of Asset Returns with Factor Models and ARMA-GARCH
- Monte-Carlo Simulation
- Parameter Estimation with Maximum Likelihood and Regressions

The course introduces students to Python, one of the most popular high-level programming languages in data analytics. After an introduction to the basic concepts, students will soon begin to solve problems related to the agenda of the lecture ‘Empirical Finance’. This enables them to work with financial data, perform various statistical analysis and estimate their own time series models.
Learning Content
The course covers several topics from a programming perspective, among them:

Mean-Variance Portfolio Optimization
Modeling Distribution of Asset Returns with Factor Models and ARMA-GARCH
Monte-Carlo Simulation
Parameter Estimation with Maximum Likelihood and Regressions

Workload
The total workload for this course is approximately 90 hours.
Course: Quality Management [T-MACH-102107]

**Responsibility:** Prof. Dr.-Ing. Gisela Lanza

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101284 - Specialization in Production Engineering

**Type:** Written examination  
**Credits:** 4  
**Recurrence:** Each winter term  
**Version:** 1

**Events**

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<td>Quality Management</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:

**Quality Management**

2149667, WS 19/20, 2 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/)

**Description**

**Media:**

Lecture notes will be provided in Ilias (https://ilias.studium.kit.edu/)
Notes
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

Main topics of the lecture:
- The term "Quality"
- Total Quality Management (TQM) and Six Sigma
- Universal methods and tools
- QM during early product stages – product definition
- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Learning Outcomes:
The students ...
- are capable to comment on the content covered by the lecture.
- are capable of substantially quality philosophies.
- are able to apply the QM tools and methods they have learned about in the lecture to new problems from the context of the lecture.
- are able to analyze and evaluate the suitability of the methods, procedures and techniques they have learned about in the lecture for a specific problem.

Workload:
regular attendance: 21 hours
self-study: 99 hours

Learning Content
Based on the quality philosophies Total Quality Management (TQM) and Six Sigma, the lecture deals with the requirements of modern quality management. Within this context, the process concept of a modern enterprise and the process-specific fields of application of quality assurance methods are presented. The lecture covers the current state of the art in preventive and non-preventive quality management methods in addition to manufacturing metrology, statistical methods and service related quality management. The content is completed with the presentation of certification possibilities and legal quality aspects.

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- QM during product development and in procurement
- QM in production – manufacturing metrology
- QM in production – statistical methods
- QM in service
- Quality management systems
- Legal aspects of QM

Annotation
None

Workload
regular attendance: 21 hours
self-study: 99 hours
7.08 Course: Rail System Technology [T-MACH-102143]

**Responsible:** Prof. Dr.-Ing. Peter Gratzfeld  
**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101274 - Rail System Technology

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<td>WS 19/20</td>
<td>2115996 Rail Vehicle Technology 2 SWS Lecture (V) Gratzfeld</td>
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<td>2115919 Rail System Technology 2 SWS Lecture (V) Gratzfeld</td>
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<tr>
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<tr>
<td>SS 2020</td>
<td>76-T-MACH-102143 Rail System Technology Prüfung (PR) Gratzfeld</td>
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**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 19/20, 2 SWS, Language: German, Open in study portal

**Description**  
**Media:**  
All slides are available for download (Ilias-platform).

**Notes**  
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, power networks, filling stations  
8. History (optional)
Learning 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. Signalling 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, power networks, filling stations
8. History (optional)

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

Rail Vehicle Technology
2115996, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
1. Vehicle system technology: structure and main systems of rail vehicles
2. Car body: functions, requirements, design principles, crash elements, interfaces
3. Bogies: forces, running gears, axle configuration
4. Drives: vehicle with/without contact wire, dual-mode vehicle
5. Brakes: tasks, basics, principles, blending, brake control
6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Rail System Technology
2115919, SS 2020, 2 SWS, Language: German, Open in study portal

Description
Media:
All slides are available for download (Ilias-platform).
Notes
1. Railway System: railway as system, subsystems and interdependencies, definitions, laws, rules, railway and environment, economic impact
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8. History (optional)

Learning Content
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7. Traction power supply: power supply of rail vehicles, power networks, filling stations
8. History (optional)

Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).

Rail Vehicle Technology
2115996, SS 2020, 2 SWS, Language: German, Open in study portal

Description
Media:
All slides are available for download (Ilias-platform).

Notes
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7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons

Learning Content
1. Vehicle system technology: structure and main systems of rail vehicles
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6. Train control management system: definitions, networks, bus systems, components, examples
7. Vehicle concepts: trams, metros, regional trains, intercity trains, high speed trains, double deck coaches, locomotives, freight wagons
Workload
Regular attendance: 21 hours
Self-study: 21 hours
Exam and preparation: 78 hours

Literature
A bibliography is available for download (Ilias-platform).
Course: Real Estate Management I [T-WIWI-102744]

**7.209 Course: Real Estate Management I [T-WIWI-102744]**

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf

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

**Part of:** M-WIWI-101466 - Real Estate Management

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<td>Lecture (V)</td>
<td>Lützkendorf, Worschech</td>
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<td>WS 19/20</td>
<td>2586401</td>
<td>Übungen zu Real Estate Management I</td>
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**Exams**

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<td>7900316</td>
<td>Real Estate Management I</td>
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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 two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

**Prerequisites**
None

**Annotation**
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

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

**Real Estate Management I**

<table>
<thead>
<tr>
<th>Term</th>
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<td>2586400</td>
<td>WS 19/20, 2 SWS, Language: German, Open in study portal</td>
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</table>

**Description**
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, german federal building codes as well as finance and assessment of economic efficiency.

The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.
Notes
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, german federal building codes as well as finance and assessment of economic efficiency. The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, german federal building codes as well as finance and assessment of economic efficiency. The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

Recommendations:
A combination with the module Design Construction and Assessment of Green Buildings I [WW3BWLOOW1] is recommended.
Furthermore it is recommended to choose courses of the following fields
- Finance and Banking
- Insurance
- Civil Engineering and Architecture (building physics, structural design, facility management)

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

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (winter semester). Re-examinations are offered at every ordinary examination date.

Learning Content
The course Real Estate Management I deals with questions concerning the economy of a single building throughout its lifecycle. Among other topics this includes project development, location and market studies, german federal building codes as well as finance and assessment of economic efficiency. The tutorial recesses the contents of the course by means of practical examples and, in addition to that, goes into the possible use of software tools.

Annotation
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

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

Literature
Elective literature:
### 7.210 Course: Real Estate Management II [T-WIWI-102745]

**Responsible:** Prof. Dr.-Ing. Thomas Lützkendorf  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101466 - Real Estate Management

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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 two times only in the semester in which the lecture is taken place (summer semester). Reexaminations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

A combination with the module Design Construction and Assessment of Green Buildings is recommended. Furthermore it is recommended to choose courses of the following fields:

- Finance and Banking
- Insurance
- Civil Engineering and Architecture (building physics, structural design, facility management)

**Annotation**

The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

---

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

### Real Estate Management II

2585400, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Description**

The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.
Notes
The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.

The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

The student
• has an in-depth knowledge on the economic classification and significance of the real estate industry
• has a critical understanding of essential theories, methods and instruments of the real estate industry
• is able to analyze and evaluate activity areas and functions in real estate companies as well as to prepare or to take decisions

Recommendations:
A combination with the module Design Construction and Assessment of Green Buildings I [WW3BWLOOW1] is recommended.

Furthermore it is recommended to choose courses of the following fields
• Finance and Banking
• Insurance
• Civil Engineering and Architecture (building physics, structural design, facility management)

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

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place two times only in the semester in which the lecture is takes place (summer semester). Reexaminations are offered at every ordinary examination date.

Learning Content
The course Real Estate Management II gives special attention to topics in connection to the management of large real estate portfolios. This especially includes property valuation, market and object rating, maintenance and modernization, as well as real estate portfolio and risk management. The tutorial provides examples in order to practice the application of theoretical knowledge to practical problems.

Annotation
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

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

Literature
Elective literature:
See german version.
Course: Remote Sensing, Exam [T-BGU-101636]

**Responsible:** Prof. Dr.-Ing. Stefan Hinz
Dr.-Ing. Uwe Weidner

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

**Part of:**
- M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1
- M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2
- M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

**Type:** Oral examination
**Credits:** 4
**Recurrence:** Each summer term
**Version:** 1

### Events

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### Exams

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**Recommendation**
None
### Course: Renewable Energy-Resources, Technologies and Economics [T-WIWI-100806]

**Responsible:** PD Dr. Patrick Jochem  
Prof. Dr. Russell McKenna

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

**Part of:** M-WIWI-101464 - Energy Economics

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**Exams**

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<td>Renewable Energy-Resources, Technologies and Economics</td>
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**Competence Certificate**

The assessment consists of a written exam (60 min., in English, answers in English or German).

**Prerequisites**

None.

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

#### Renewable Energy – Resources, Technologies and Economics

**2581012, WS 19/20, 2 SWS, Language: English, Open in study portal**

**Lecture (V)**

**Notes**

1. General introduction: Motivation, Global situation
2. Basics of renewable energies: Energy balance of the earth, potential definition
3. Hydro
4. Wind
5. Solar
6. Biomass
7. Geothermal
8. Other renewable energies
9. Promotion of renewable energies
10. Interactions in systemic context
11. Excursion to the "Energieberg" in Mühlburg

**Learning Goals:**

- The student understands the motivation and the global context of renewable energy resources.
- Gains detailed knowledge about the different renewable resources and technologies as well as their potentials.
- Understands the systemic context and interactions resulting from the increased share of renewable power generation.
- Understands the important economic aspects of renewable energies, including electricity generation costs, political promotion and marketing of renewable electricity.
- Is able to characterize and where required calculate these technologies.
Learning Content
1. General introduction: Motivation, Global situation
2. Basics of renewable energies: Energy balance of the earth, potential definition
3. Hydro
4. Wind
5. Solar
6. Biomass
7. Geothermal
8. Other renewable energies
9. Promotion of renewable energies
10. Interactions in systemic context
11. Excursion to the “Energieberg” in Mühlburg

Workload
The total workload for this course is approximately 105.0 hours. For further information see German version.

Literature
Elective literature:
7.213 Course: Selected Topics on Optics and Microoptics for Mechanical Engineers [T-MACH-102165]

**Responsible:** Mathias Heckele  
Dr.-Ing. Timo Mappes

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101287 - Microsystem Technology

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**Competence Certificate**
Oral examination

**Prerequisites**
none
7.214 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-101816 - Seminar Module

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**Exams**

- Seminar Data Mining in Production
- Seminar Data Mining in Production

**Exams**

- Seminar Data Mining in Production

**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:

**Seminar Data Mining in Production**

2151643, WS 19/20, 2 SWS, Language: German, Open in study portal

**Description**

**Media:**

KNIME Analytics Platform
Notes
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

Learning 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.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours
self-study: 80 hours

Seminar Data Mining in Production
2151643, SS 2020, 2 SWS, Language: German, Open in study portal

Description
Media:
KNIME Analytics Platform
Notes
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 ...
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- are able to explain and apply the CRISP-DM model.

Workload:
regular attendance: 10 hours
self-study: 80 hours

Learning 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.

Annotation
The number of students is limited to twelve. Dates and deadlines for the seminar will be announced at https://www.wbk.kit.edu/studium-und-lehre.php.

Workload
regular attendance: 10 hours
self-study: 80 hours
### 7.215 Course: Seminar in Business Administration (Bachelor) [T-WIWI-103486]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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- Examination of another type
- Credits: 3
- Recurrence: Each term
- Version: 1

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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 in Empirical Finance**
2500028, WS 19/20, 2 SWS, Language: English, Open in study portal

**Description**
The aim of this seminar is to introduce the student to empirical data work in financial economics and investments.

**Data Science in Service Management**
2540473, WS 19/20, 2 SWS, Language: German/English, Open in study portal

**Notes**
wird auf deutsch und englisch gehalten

**Bachelor Seminar aus Data Science**
2540524, WS 19/20, 2 SWS, Language: German, Open in study portal

**Workload**
The total workload for this course is approximately 90 hours (3 credits):

**Time of attendance**
- Introductory lessons: 4 x 90min = 6h 00m
- Presentations: 4 x 90min = 6h 00m

**Selbststudium**
- Preparing the presentation: 8h
- Literature research: 40h
- Writing the seminar paper: 30h

**Summe:** 90h 00m
Entrepreneurship Basics (Track 1)

2545010, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
The seminar introduces students to basic concepts of business planning for entrepreneurs. This involves concepts for the concretization of business ideas (development of business models), market potential estimation, resource planning, etc.) as well as the creation of an executable business plan (with or without VC financing).

The primary focus of the seminar is on working with the Business Model Canvas and developing a value proposition.

Learning objectives:
After attending, students have learned how to use a structured process to take the first steps in starting a business to identify and minimize their most important risks. In particular, they have practical experience in identifying and validating 1) relevant customer issues, 2) designing and testing solutions to these problems, 3) targeting and assessing their accessibility, and 4) their willingness to pay. In doing so, they have learned to know and apply the business model canvas, methods for developing value propositions, rapid prototyping and target group interviews. In addition, they have learned to work efficiently in a team through the use of communication strategies.

Credentials:
Registration is via the Wiwi portal.
Exam:
Presentation + active participation + paper.
Target group:
Bachelor students

Entrepreneurship Basics (Track 2)

2545011, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
The seminar introduces students to basic concepts of business planning for entrepreneurs. This involves concepts for the concretization of business ideas (development of business models), market potential estimation, resource planning, etc.) as well as the creation of an executable business plan (with or without VC financing).

The primary focus of the seminar is on working with the Business Model Canvas and developing a value proposition.

Learning objectives:
After attending, students have learned how to use a structured process to take the first steps in starting a business to identify and minimize their most important risks. In particular, they have practical experience in identifying and validating 1) relevant customer issues, 2) designing and testing solutions to these problems, 3) targeting and assessing their accessibility, and 4) their willingness to pay. In doing so, they have learned to know and apply the business model canvas, methods for developing value propositions, rapid prototyping and target group interviews. In addition, they have learned to work efficiently in a team through the use of communication strategies.

Credentials:
Registration is via the Wiwi portal.
Exam:
Presentation + active participation + paper.
Target group:
Bachelor students

Literature
Elective literature:
Seminar: Human Resources and Organizations (Bachelor)
2573010, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
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.

Seminar: Human Resource Management (Bachelor)
2573011, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes
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 Management Accounting - Special Topics
2579919, WS 19/20, 2 SWS, Language: English, Open in study portal
Notes
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.

Learning 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 four to five meetings that are spread throughout the semester.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Seminar in Finance
2530580, SS 2020, 2 SWS, Language: German, Open in study portal

Learning Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.
The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced at the end of the foregoing semester.

Seminar Human Resources and Organizations (Bachelor)
2573010, SS 2020, 2 SWS, Language: German, Open in study portal
Notes
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.

Seminar Human Resource Management (Bachelor)
2573011, SS 2020, 2 SWS, Language: German, Open in study portal

Notes
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 Management Accounting
2579909, SS 2020, 2 SWS, Language: English, Open in study portal
Notes
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.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Learning 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.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation

Maximum of 24 students.

Workload

The total workload for this course is approximately 90 hours. For further information see German version.

Literature

Will be announced in the course.
Notes
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.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:
- Maximum of 16 students.

Learning 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 four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Annotation
Maximum of 24 students.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.
### 7.216 Course: Seminar in Economics (Bachelor) [T-WIWI-103487]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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<td>Topics in Econometrics</td>
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<td>Schienle, Chen, Görgen</td>
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<tr>
<td>WS 19/20</td>
<td>2560140</td>
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<tr>
<td>WS 19/20</td>
<td>2560142</td>
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<td>Seminar (S)</td>
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<tr>
<td>WS 19/20</td>
<td>2561208</td>
<td>Ausgewählte Aspekte der europäischen Verkehrsplanung und -modellierung</td>
<td>1 SWS</td>
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<td>SS 2020</td>
<td>2560241</td>
<td>Digital IT Solutions and Services transforming the Field of Public Transportation</td>
<td>2 SWS</td>
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<td>SS 2020</td>
<td>2560555</td>
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<td>SS 2020</td>
<td>2560556</td>
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<td>2 SWS</td>
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<td>Seminar in Economics (Bachelor)</td>
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<td>Szech, Puppe</td>
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<td>WS 19/20</td>
<td>7900132</td>
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<td>7900139</td>
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<td>WS 19/20</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.
Below you will find excerpts from events related to this course:

**Topics in Econometrics**
2521310, WS 19/20, 2 SWS, Language: German, Open in study portal

**Annotation**
In the winter semester 2018/19 the course will be held in English.

**Topics in Political Economy (Bachelor)**
2560140, WS 19/20, 2 SWS, Language: English, Open in study portal

**Notes**
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 presentations in the seminar (50%) and the seminar paper (50%). Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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 (Bachelor & Master)**
2560141, WS 19/20, 2 SWS, Language: English, Open in study portal

**Notes**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](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 presentations in the seminar (50%) and the seminar paper (50%).

For Master students, grades will be based on the quality of presentations in the seminar (40%) and the seminar paper (40%). Additionally Master students will have to hand in two abstracts with their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade.

Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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 19/20, 2 SWS, Language: English, Open in study portal
Notes
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 presentations in the seminar (40%) and the seminar paper (40%). Additionally students have to hand in two abstracts with their paper – one with a maximum length of 100 words and one with a maximum length of 150 words. The quality of abstracts will reflect with 20% in the final grade. Students can improve their grades by 0.3 for good and constructive discussion contributions or by 0.7 for excellent and constructive discussion contributions.

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.

Workload
About 90 hours.

Fighting Climate Change, Seminar on Morals and Social Behavior (Master)
2560555, SS 2020, 2 SWS, Language: English, Open in study portal

Description
For a long time, economists studied given markets and mechanisms to predict outcomes, future developments or generally the participants’ behavior. In contrast, Market Design uses theory, empirical and experimental work to design markets which incentivize their participants in a way that leads to a “desirable” outcome. In this, the designer can have different objectives, for example: Maximizing efficiency, welfare or minimizing negative externalities.

Prominent applications of Market Design include, quite topical, Germany’s auction of 5G mobile licenses and matching markets, where there are two large populations that need to be matched to one another (think of hospitals and interns, students and dorm rooms or kidney donors and receivers). In this seminar, we think about ways to either design new markets or how we could alter existing ones in a socially beneficial way. Alternatively, research ideas could focus on finding failures or shortcomings of ineffectively designed markets.

Notes
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.

For bachelor students grades will be based on the quality of presentations in the seminar (50%) and the seminar paper (50%). Students can improve their grades by actively participation in the discussion.

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.

Annotation
For further questions, please contact David Huber (david.huber@kit.edu).

Workload
About 90 hours.

Designing the Digital Economy, Topics on Political Economy (Bachelor)
2560556, SS 2020, 2 SWS, Language: English, Open in study portal

Workload
About 90 hours.

Designing the Digital Economy, Topics on Political Economy (Master)
2560557, SS 2020, 2 SWS, Language: English, Open in study portal
Workload
About 90 hours.
### 7.217 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-101816 - Seminar Module

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<td>SWS</td>
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<td>SS 2020</td>
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#### Competence Certificate

See German version.

#### Prerequisites

See module description.

#### Recommendation

None
### Course: Seminar in Informatics (Bachelor) [T-WIWI-103485]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101816 - Seminar Module

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<td>WS 19/20</td>
<td>2512311</td>
<td>Real-World Challenges in Data Science and Analytics</td>
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<td>WS 19/20</td>
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<td>SS 2020</td>
<td>2595470</td>
<td>Seminar Service Science, Management &amp; Engineering</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Weinhardt, Nickel, Fichtner, Satzger, Sure-Vetter, Fromm</td>
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#### Exams

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<tr>
<td>WS 19/20</td>
<td>7900038</td>
<td>Linked Data and the Semantic Web</td>
<td>Prüfung (PR)</td>
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<tr>
<td>WS 19/20</td>
<td>7900042</td>
<td>Seminar Betriebliche Informationssysteme: Programmieren 3</td>
<td>Prüfung (PR)</td>
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<tr>
<td>WS 19/20</td>
<td>7900044</td>
<td>Seminar Service Science, Management &amp; Engineering</td>
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<td>WS 19/20</td>
<td>7900119</td>
<td>Cognitive automobiles and robots</td>
<td>Prüfung (PR)</td>
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<td>WS 19/20</td>
<td>7900129</td>
<td>Security and Privacy Awareness</td>
<td>Prüfung (PR)</td>
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<tr>
<td>WS 19/20</td>
<td>7900187</td>
<td>Real-World Challenges in Data Science and Analytics</td>
<td>Prüfung (PR)</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:

### Linked Data and the Semantic Web
2512301, WS 19/20, 3 SWS, Language: German/English, Open in study portal

Notes
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this practical seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

The Linked Data principles are a set of practices for data publishing on the web. Linked Data builds on the web architecture and uses HTTP for data access, and RDF for describing data, thus aiming towards web-scale data integration. There is a vast amount of data available published according to those principles: recently, 4.5 billion facts have been counted with information about various domains, including music, movies, geography, natural sciences. Linked Data is also used to make web-pages machine-understandable, corresponding annotations are considered by the big search engine providers. On a smaller scale, devices on the Internet of Things can also be accessed using Linked Data which makes the unified processing of device data and data from the web easy.

In this practical seminar, students will build prototypical applications and devise algorithms that consume, provide, or analyse Linked Data. Those applications and algorithms can also extend existing applications ranging from databases to mobile apps.

For the seminar, programming skills or knowledge about web development tools/technologies are highly recommended. Basic knowledge of RDF and SPARQL are also recommended, but may be acquired during the seminar. Students will work in groups. Seminar meetings will take place as 'Block-Seminar'.

Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media

The exact dates and information for registration will be announced at the event page.

### Real-World Challenges in Data Science and Analytics
2512311, WS 19/20, 3 SWS, Language: German/English, Open in study portal
Notes
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 Business Information Systems: Programming 3 (Bachelor)**

2513200, WS 19/20, 2 SWS, Open in study portal

Notes
Registration information and the content of the seminar will be announced on the course page. Only bachelor students are allowed to attend this seminar.

**Cognitive Automobiles and Robots**

2513500, WS 19/20, 2 SWS, Language: German/English, Open in study portal

Notes
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.

**Seminar Service Science, Management & Engineering**

2595470, WS 19/20, 3 SWS, Language: German, Open in study portal
Notes
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Learning objectives:
The student
- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:
Lecture eServices [2595466] is recommended.

Workload:
The total workload for this course is approximately 90 hours. For further information see German version.

Seminar Knowledge Discovery and Data Mining (Bachelor)
2513308, SS 2020, 3 SWS, Language: English, Open in study portal

Notes
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.

Seminar Data Science & Real-time Big Data Analytics (Bachelor)
2513310, SS 2020, 2 SWS, Language: English, Open in study portal

Notes
In this practical 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.
Notes
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.

Notes
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.

See the KSRI website for more information about this seminar: www.ksri.kit.edu

Learning objectives:
The student
- illustrates and evaluates classic and current research questions in service science, management and engineering,
- applies models and techniques in service science, also with regard to their applicability in practical cases,
- 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.

Recommendations:
Lecture eServices[2595466] is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Course: Seminar in Mathematics (Bachelor) [T-MATH-102265]

**Responsible:**  
Dr. Martin Folkers  
Prof. Dr. Günter Last

**Organisation:**  
KIT Department of Mathematics

**Part of:**  
M-WIWI-101816 - Seminar Module

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Course: Seminar in Operations Research (Bachelor) [T-WIWI-103488]

**Responsible:**
Prof. Dr. Stefan Nickel  
Prof. Dr. Steffen Rebennack  
Prof. Dr. Oliver Stein

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

**Part of:**
M-WIWI-101816 - Seminar Module

**Type**
Examination of another type

**Credits**
3

**Recurrence**
Each term

**Version**
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### Events

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<td>WS 19/20</td>
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### Exams

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<td>Modern OR and Innovative Logistics</td>
<td>Prüfung (PR)</td>
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<td>7900216</td>
<td>Real-World Challenges in Data Science und Analytics</td>
<td>Prüfung (PR)</td>
<td>Nickel</td>
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<td>7900313</td>
<td>Seminar in Operations Research (Bachelor)</td>
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### Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:
- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

### Prerequisites

None.

### Recommendation

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

### Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

Notes
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.

Learning Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Notes
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.
Learning Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Annotation
The seminar is offered in each term.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
### Course: Seminar in Statistics (Bachelor) [T-WIWI-103489]

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

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

**Part of:** M-WIWI-101816 - Seminar Module

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<td>WS 19/20</td>
<td>2521310</td>
<td>Topics in Econometrics</td>
<td>2</td>
<td>Seminar (S)</td>
<td>Schienle, Chen, Görgen</td>
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</table>

**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

**Prerequisites**  
None.

**Recommendation**  
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**  
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

**Topics in Econometrics**  
2521310, WS 19/20, 2 SWS, Language: German, Open in study portal

**Annotation**  
In the winter semester 2018/19 the course will be held in English.
### 7.222 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-101816 - Seminar Module

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<td>Fleischer, Lanza, Schulze</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

**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 2020, 1 SWS, Language: German, [Open in study portal]

**Description**

The specific topics are published on the homepage of the wbk Institute of Production Science.
Notes
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

Learning 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.

Workload
regular attendance: 10 hours
self-study: 80 hours
### 7.223 Course: Seminar: Legal Studies I [T-INFO-101997]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-WIWI-101816 - Seminar Module

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<td>Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung</td>
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**Exams**

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

**Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung**

2400061, SS 2020, 2 SWS, [Open in study portal](https://portal.wiwi.kit.edu/ys/2708)

**Notes**

Registration via [https://portal.wiwi.kit.edu/ys/2708](https://portal.wiwi.kit.edu/ys/2708)
7.224 Course: Services Marketing and B2B Marketing [T-WIWI-102806]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-101424 - Foundations of Marketing

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<td>Services Marketing and B2B Marketing</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
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**Exams**

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<td>Klarmann</td>
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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**

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

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

**Services Marketing and B2B Marketing**

2572158, WS 19/20, 2 SWS, Language: German, Open in study portal

**Notes**

The aim of this course is to prepare students for two certain marketing perspectives. The service marketing is concentrated on the particularities coming up when a company sells services instead of products. Subjects in this section are for example:

- Measuring service quality
- Pricing services
- Management of service staff

The second part of the course contains a business-to-business marketing perspective. Topics are below others:

- Management of buying centers
- Competitive Bidding
- B2B-Branding

Students

- know about the characteristics of service- and B2B environments
- are able to apply different methods (SERVQUAL, Gap-model, Mystery Shopping) to measure the quality of services
- are able to design pricing systems for services
- know about queuing management
- are able to plan capacities in service environments
- are able to identify different types of B2B businesses and know about their characteristics
- know about the specifics and challenges of B2B branding
- know central theories about organizational buying
- are able to apply the concept of competitive bidding for tenders
- are able to prepare, conduct, and review price negotiations

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

The total workload for this course is approximately 90 hours.

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
7.225 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
M-MACH-101267 - Mobile Machines

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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:
Notes
- 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

Learning 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

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

Literature
Elective literature:
- miscellaneous guides according the software-tools pdf-shaped
- information to the wheel-type loader
7.226 Course: Simulation of Coupled Systems - Advance [T-MACH-108888]

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

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101265 - Vehicle Development
M-MACH-101267 - Mobile Machines

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<td>Simulation of Coupled Systems - Advance</td>
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**Competence Certificate**

Preparation of semester report

**Prerequisites**

none
### Course: Social Science A (WiWi) [T-GEISTSOZ-109048]

- **Responsible:** Prof. Dr. Gerd Nollmann
- **Organisation:** KIT Department of Humanities and Social Sciences
- **Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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## 7.228 Course: Social Science B (WiWi) [T-GEISTSOZ-109049]

**Responsible:** Prof. Dr. Gerd Nollmann  
**Organisation:** KIT Department of Humanities and Social Sciences  
**Part of:** M-GEISTSOZ-101167 - Sociology/Empirical Social Research

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### Exams

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**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-101434 - eBusiness and Service Management

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<td>Prüfung (PR)</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 (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](http://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 Management and Engineering" 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.
7.230 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-101599 - Statistics and Econometrics

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**Competence Certificate**  
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

**Prerequisites**  
None

**Recommendation**  
Knowledge of the contents covered by the course “Economics III: Introduction in Econometrics” [2520016]

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

**Statistical Modeling of Generalized Regression Models**  
2521350, WS 19/20, 2 SWS, Open in study portal

**Lecture (V)**

**Notes**  
**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

**Annotation**  
Knowledge of the contents covered by the course “Economics III: Introduction in Econometrics” [2520016]

**Workload**  
The total workload for this course is approximately 135 hours (4.5 credits).  
regular attendance: 30 hours  
self-study: 65 hours  
exam preparation: 40 hours
7.231 Course: Statistics I [T-WIWI-102737]

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

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

**Part of:** M-WIWI-101432 - Introduction to Statistics

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| Exams  | WS 19/20 | 7900009 | Statistics I | Prüfung (PR) | Schienle |

**Competence Certificate**

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

The exam takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

**Prerequisites**

None

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

| Statistics I | 2600008, SS 2020, 4 SWS, Language: German, [Open in study portal](#) | Lecture (V) |

**Notes**

**Learning objectives:**

The Student understands and applies

- the basic concepts of statistical data exploration,
- the basic definitions and theorems of probability theory.

**Content:**

A. Descriptive Statistics: univariate und bivariate analysis  
B. Probability Theory: probability space, conditional and product probabilities  
C. Random variables: location and shape parameters, dependency measures, concrete distribution models

**Workload:**

Total workload for 5 CP: approx. 150 hours  
Attendance: 60 hours  
Preparation and follow-up: 90 hours

**Learning Content**

A. Descriptive Statistics: univariate und bivariate analysis  
B. Probability Theory: probability space, conditional and product probabilities  
C. Random variables: location and shape parameters, dependency measures, concrete distribution models

**Workload**

150 hours (5.0 Credits).
Literature
Skriptum: Kurzfassung Statistik I

Elective literature:
### Course: Statistics II [T-WIWI-102738]

**Responsible:** Prof. Dr. Oliver Grothe  
Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101432 - Introduction to Statistics

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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 takes place at the end of the lecture period or at the beginning of the recess period. The re-examination takes place in the following semester.

**Prerequisites**

None

**Recommendation**

It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2610020].

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

### Statistics II

2610020, WS 19/20, 4 SWS, Language: German, [Open in study portal](#)

**Notes**

**Learning objectives:**

The student

- understands and applies the basic definitions and theorems of probability theory,
- transfers these theoretical foundations to problems in parametrical mathematical statistics.

**Content:**

D. Sampling and Estimation Theory: Sampling distributions, estimators, point and interval estimation  
E. Test Theory: General Principles of Hypothesis Testing, Concrete 1- and 2-Sampling Tests  
F. Regression analysis: Simple and multiple linear regression, statistical inference

**Requirements:**

It is recommended to attend the course Statistics I [2600008] before the course Statistics II [2610020].

**Workload:**

Total workload: 150 hours (5.0 Credits).  
Attendance: 30 hours  
Preparation and follow-up: 90 hours
Learning Content
D. Sampling and Estimation Theory: Sampling distributions, estimators, point and interval estimation
E. Test Theory: General Principles of Hypothesis Testing, Concrete 1- and 2-Sampling Tests
F. Regression analysis: Simple and multiple linear regression, statistical inference

Workload
150 hours (5.0 Credits).

Literature
Script: Kurzfassung Statistik II

Elective literature:
7.233 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-101423 - Topics in Finance II
- M-WIWI-101465 - Topics in Finance I

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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.
7.234 Course: Structural and Phase Analysis [T-MACH-102170]

**Responsibility:** Dr.-Ing. Susanne Wagner

**Organisation:** KIT Department of Mechanical Engineering

**Part of:** M-MACH-101262 - Emphasis Materials Science

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**Exams**

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<tr>
<th>Events</th>
<th>76-T-MACH-102170</th>
<th>Structural and Phase Analysis</th>
<th>Prüfung (PR)</th>
<th>Wagner, Hinterstein</th>
</tr>
</thead>
</table>

**Competence Certificate**

Oral examination

**Prerequisites**

none

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

**Structural and phase analysis**

2125763, WS 19/20, 2 SWS, Language: German, [Open in study portal](#)

**Lecture (V)**

**Learning Content**

The course gives an overview to generation and detection of x-rays as well as their interaction with matter. It provides an introduction to crystallography and describes modern measurement and analysis methods of x-ray diffraction.

It is arranged in the following units:

- Generation and properties of X-Ray's
- Crystallography
- Fundamentals and application of different measuring methods
- Qualitative and quantitative phase analysis
- Texture analysis (pole figures)
- Residual stress measurements

**Workload**

regular attendance: 30 hours

self-study: 90 hours

**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-101262 - Emphasis Materials Science

#### Type | Credits | Recurrence | Version
--- | --- | --- | ---
Oral examination | 4 | Each summer term | 1

#### Events

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<td>WS 19/20 76-T-MACH-102179</td>
<td>Prüfung (PR)</td>
<td>Hoffmann, Wagner, Schell</td>
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</table>

**Competence Certificate**

Oral examination, 20 min

**Prerequisites**

none

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

#### Structural Ceramics

2126775, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Description**

**Media:**

Slides for the lecture:
available under [http://www.iam.kit.edu/km](http://www.iam.kit.edu/km)

**Learning Content**

The lecture gives an overview on structure and properties of the technical relevant structural ceramics silicon nitride, silicon carbide, alumina, zirconia, boron nitride and fibre-reinforced ceramics. All types of structural ceramics will be discussed in detail in terms of preparation methods of the raw materials, shaping techniques, densification, microstructural development, mechanical properties and application fields.

**Annotation**

The course will not take place every year.

**Workload**

regular attendance: 21 hours  
self-study: 99 hours

**Literature**

7.236 Course: Supplement Applied Informatics [T-WIWI-110711]

**Responsible:** Professorenschaft des Fachbereichs Informatik

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

**Part of:**
- M-WIWI-101399 - Emphasis Informatics
- M-WIWI-101426 - Electives in Informatics

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**Competence Certificate**
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation. Depending on the particular course associated with this placeholder a bonus on the examination grade is possible.

**Prerequisites**
None

**Annotation**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but is not equivalent to another course of this topic.
### Course: System Dynamics and Control Engineering [T-ETIT-101921]

<table>
<thead>
<tr>
<th>Responsible:</th>
<th>Prof. Dr.-Ing. Sören Hohmann</th>
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<tr>
<td>Organisation:</td>
<td>KIT Department of Electrical Engineering and Information Technology</td>
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#### Exams

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<td>System Dynamics and Control Engineering</td>
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#### Prerequisites

none
7.238 Course: Systematic Materials Selection [T-MACH-100531]

Responsible: Dr.-Ing. Stefan Dietrich
Organisation: KIT Department of Mechanical Engineering
Part of: M-MACH-101262 - Emphasis Materials Science

<table>
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Exams

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</table>

Competence Certificate
The assessment is carried out as a written exam of 2 h.

Prerequisites
The two courses "Materials Science I" (T-MACH-102078) and "Materials Science II" (T-MACH-102079) must be passed.

Recommendation
Basic knowledge in materials science, mechanics and mechanical design due to the lecture Materials Science I/II.

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

Systematic Materials Selection
2174576, SS 2020, 3 SWS, Language: German, Open in study portal  Lecture (V)
Notes
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).

Learning 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

Workload
The workload for the lecture is 120 h per semester and consists of the presence during the lecture (30 h) as well as preparation and rework time at home (30 h) and preparation time for the oral exam (60 h).

Literature
Lecture notes; Problem sheets; Textbook: M.F. Ashby, A. Wanner (Hrsg.), C. Fleck (Hrsg.); Materials Selection in Mechanical Design: Das Original mit Übersetzungshilfen Easy-Reading-Ausgabe, 3. Aufl., Spektrum Akademischer Verlag, 2006 ISBN: 3-8274-1762-7
7.239 Course: Systems of Remote Sensing, Prerequisite [T-BGU-101637]

**Responsible:** Prof. Dr.-Ing. Stefan Hinz  
Dr.-Ing. Uwe Weidner

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

**Part of:**  
M-WIWI-101646 - Introduction to Natural Hazards and Risk Analysis 1  
M-WIWI-101648 - Introduction to Natural Hazards and Risk Analysis 2  
M-WIWI-104838 - Introduction to Natural Hazards and Risk Analysis

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**Prerequisites**

None

**Recommendation**

None

**Annotation**

None
7.240 Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

 Responsible: Prof. Dr. Stefan Nickel
 Organisation: KIT Department of Economics and Management
 Part of: M-WIWI-101413 - Applications of Operations Research
 M-WIWI-101421 - Supply Chain Management
 M-WIWI-103278 - Optimization under Uncertainty

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<th>Practice</th>
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<td>Taktisches und operatives SCM</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>SS 2020 2550487</td>
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<td>1 SWS</td>
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Exams

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<td>Nickel</td>
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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. Prerequisite for admission to examination is the successful completion of the online assessments.

Prerequisites

Prerequisite for admission to examination is the successful completion of the online assessments.

Recommendation

None

Annotation

The lecture is held in 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:

Taktisches und operatives SCM

2550486, SS 2020, 2 SWS, Language: German, Open in study portal

Notes

The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer). The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, 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. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot. The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

Annotation

The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.
Literature

Elective Literature

- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005
7.241 Course: Technical Conditions Met [T-WIWI-106623]

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101599 - Statistics and Econometrics

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Competence Certificate
This module element is intended to record the Bachelor-examination "Introduction to Game Theory". In the master module M-WIWI-101453 "Applied Strategic Decisions", this means that the obligatory course "Advanced Game Theory" is not required.

Prerequisites
None
7.242 Course: Tires and Wheel Development for Passenger Cars [T-MACH-102207]

Responsible: Dr.-Ing. Günter Leister
Organisation: KIT Department of Mechanical Engineering

Part of: M-MACH-101265 - Vehicle Development

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Events

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<th>Tires and Wheel Development for Passenger Cars</th>
<th>2 SWS</th>
<th>Lecture (V)</th>
<th>Leister</th>
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</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:

Tires and Wheel Development for Passenger Cars
2114845, SS 2020, 2 SWS, Open in study portal

Lecture (V)

Notes
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.

Learning 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

Workload
regular attendance: 22.5 hours
self-study: 97.5 hours
Literature
Manuscript to the lecture
7.243 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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**Events**

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<tr>
<td>WS 19/20</td>
<td>2113806</td>
<td>Vehicle Comfort and Acoustics I</td>
<td>Lecture (V)</td>
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<td>Gauterin</td>
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<td>SS 2020</td>
<td>2114856</td>
<td>Vehicle Ride Comfort &amp; Acoustics I</td>
<td>Lecture (V)</td>
<td>2 SWS</td>
<td>Gauterin</td>
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**Exams**

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<td>Gauterin</td>
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</tbody>
</table>

**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 19/20, 2 SWS, Language: German, [Open in study portal](#)  

**Notes**

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.
Learning Content
1. Perception of noise and vibrations
3. Fundamentals of acoustics 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.

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours

Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

The script will be supplied in the lectures

Vehicle Ride Comfort & Acoustics I
2114856, SS 2020, 2 SWS, Language: English, Open in study portal

Notes
1. Perception of noise and vibrations
3. Fundamentals of acoustics 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 chasis regarding driving comfort and acoustic under consideration of goal conflicts.

Learning Content
1. Perception of noise and vibrations
3. Fundamentals of acoustics 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.

Workload
regular attendance: 22,5 hours
self-study: 97,5 hours
Literature
2. Russel C. Hibbeler, Technische Mechanik 3, Dynamik, Pearson Studium, München, 2006

The script will be supplied in the lectures
7.244 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

<table>
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**Events**

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**Exams**

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<tr>
<td>WS 19/20</td>
<td>76-T-MACH-105155</td>
<td>Vehicle Comfort and Acoustics II</td>
<td>Prüfung</td>
<td>Gauterin</td>
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</table>

**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:*
Notes
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.

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1. Summary of the fundamentals of acoustics and vibrations

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Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature
The script will be supplied in the lectures.
Notes
1. Summary of the fundamentals of acoustics and vibrations

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Workload
regular attendance: 22.5 hours
self-study: 97.5 hours

Literature
The script will be supplied in the lectures.
**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

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>Written examination</td>
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<td>Each winter term</td>
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**Exams**

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<td>76-T-MACH-105156</td>
<td>Vehicle Mechatronics I</td>
<td>Prüfung (PR)</td>
<td>Ammon</td>
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</table>

**Competence Certificate**

- **Written examination**

  - **Duration:** 90 minutes
  - **Auxiliary means:** none

**Prerequisites**

- none
7.246 Course: Virtual Reality Practical Course [T-MACH-102149]

**Responsible:** Prof. Dr.-Ing. Jivka Ovtcharova  
**Organisation:** KIT Department of Mechanical Engineering  
**Part of:** M-MACH-101270 - Product Lifecycle Management

<table>
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<tr>
<td>Examination of another type</td>
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<td>Each term</td>
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**Events**

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<th>Organiser</th>
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<tr>
<td>WS 19/20</td>
<td>2123375</td>
<td>Virtual Reality Practical Course</td>
<td>3</td>
<td>Project (PRO)</td>
<td>Ovtcharova, Mitarbeiter</td>
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<tr>
<td>WS 19/20</td>
<td>76-T-MACH-102149</td>
<td>Virtual Reality Practical Course</td>
<td></td>
<td>Prüfung (PR)</td>
<td>Ovtcharova</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
Assessment of another type (graded)

**Prerequisites**  
None

**Annotation**  
Number of participants is limited

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

### Virtual Reality Practical Course

**2123375, WS 19/20, 3 SWS, Language: German/English, [Open in study portal](#)**

**Project (PRO)**

**Learning Content**

The lab course consists of:

1. Introduction and basics in virtual reality (hardware, software, application)  
2. Introduction in 3DVIA Virtools tool kit as an application development system  
3. Implementation and practice by developing a driving simulator in small groups.
**T.247 Course: Welfare Economics [T-WIWI-102610]**

**Responsible:** Prof. Dr. Clemens Puppe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101501 - Economic Theory

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<th>Type</th>
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<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>Written exam</td>
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<td>Each summer term</td>
<td>2</td>
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**Competence Certificate**  
The assessment consists of a written exam at the end of the semester (according to Section 4 (2), 1 or 2 of the examination regulation).

**Prerequisites**  
The courses Economics I: Microeconomics [2610012] and Economics II: Macroeconomics [2600014] have to be completed beforehand.

**Recommendation**  
None