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Information Engineering and Management B.Sc.
Module Handbook as of 18.02.2020
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<td>6.138</td>
<td>Welfare Economics - T-WIWI-102610</td>
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</table>
1 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.

For modules and courses with INFO-Id:

KIT Department of Informatics, Informatics Study Program Service
Personal counselling
📞 +49 721 608-44031
✉️ bachelor@wirtschaftsinformatik.kit.edu

For modules and courses with WIWI-Id

KIT Department of Economics and Management, Examination Office
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Build. 05.20, Room 3B 05.2
Kaiserstraße 89
D-76133 Karlsruhe
https://www.wiwi.kit.edu/
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](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/](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](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).
3 The Bachelor’s degree program in Information Engineering and Management

3.1 Qualification objectives of the Bachelor’s degree in Information Engineering and Management

Graduates with a Bachelor’s degree in Information Engineering and Management are equipped with strategically oriented basic knowledge in the fields of informatics (theoretical computer science, algorithms, programming technology and software engineering), economic sciences (business-related topics from the financial industry, information industry, production management, marketing and accounting as well as economic correlations of microeconomics) and law (basics of private law, private business law and of the constitutional and administrative law) as well as mathematics, statistics and operation research.

Through the comprehensive methodological basis, the graduates are in a position to acknowledge and apply specialized basic concepts, methods, models and approaches.

The graduates have an in-depth knowledge in computer science and law.

They can acknowledge, describe and communicate economic, IT and legal problems. This hereby entails planning, analyzing, comparing, reviewing and optimizing products, systems and processes. They make decisions, develop specialized solutions and implement their innovative ideas using methods and models from different disciplines within the framework of the available resources. They know how to illustrate, validate, review and guarantee the quality of the results achieved.

The practical use of their know-how also takes into account the social, scientific and ethical aspects.

Through the interdisciplinary nature of the course, the graduates can effectively respond at the interface of the different topics as well as set up targeted communication between the respective disciplines.

The graduates are in a position to work in a team and cope with challenges, e.g., those encountered in information and communication technology fields.

They have the ability to exercise career-related activities in the industry, service sector or in trade, start their own firms or take up a Master’s degree program in Information Engineering and Management or any other related course.

3.2 Structure of the Bachelor’s degree program in Information Engineering and Management SPO 2015

The Bachelor’s degree program in Information Engineering and Management SPO 2015 has 6 terms. The first four terms have a methodological orientation and provides the student with the foundations of informatics, business administration, economics and law. Terms 5 and 6 aim at the specialization and application of this knowledge. Figure 2 shows the structure of the subjects and the credits (CP) allocated to the subjects.

According to the European Credit Transfer System, one credit corresponds to a workload of 30 hours.
Based on a solid mathematical education, the modules of the first four terms of the Bachelor programme in information engineering and management are allocated in the proportion 40/40/20 to informatics (informatics, applied informatics, and computer engineering), economic sciences (business administration, economics, operations research), and law. The internship prepares the student for his profession. Figure 3 shows the allocation of courses to modules and the curriculum for the first four terms.

### Module and Course Allocation

<table>
<thead>
<tr>
<th>Term</th>
<th>Module ID</th>
<th>Course</th>
<th>Hours per week</th>
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In the 3rd year (5th and 6th term) of the Bachelor program the student must pass:

- module(s) with 18 credits in informatics
- a module with 9 credits in the subject Business Administration
- a module with 9 credits in the subject BA/OR/EC,
- a module with 6 credits in law,
two out of the three seminar modules with 3 credits each,
and the bachelor thesis with 12 credits.
# 4 Field of study structure

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**Prerequisites**

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<td>M-WIWI-101440</td>
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### 4.12 Advanced Studies in Economics and Management

**Credits** 18

#### Election block: Elective Modules in Business Administration (1 item)

- **M-WIWI-101434** eBusiness and Service Management 9 CR
- **M-WIWI-101421** Supply Chain Management 9 CR
- **M-WIWI-101402** eFinance 9 CR
- **M-WIWI-101425** Strategy and Organization 9 CR
- **M-WIWI-101437** Industrial Production I 9 CR
- **M-WIWI-101464** Energy Economics 9 CR
- **M-WIWI-101435** Essentials of Finance 9 CR
- **M-WIWI-101465** Topics in Finance I 9 CR
- **M-WIWI-101467** Design, Construction and Sustainability Assessment of Buildings 9 CR
- **M-WIWI-101466** Real Estate Management 9 CR
- **M-WIWI-101424** Foundations of Marketing 9 CR
- **M-WIWI-101513** Human Resources and Organizations 9 CR
- **M-WIWI-102752** Fundamentals of Digital Service Systems 9 CR
- **M-WIWI-101423** Topics in Finance II 9 CR
- **M-WIWI-105035** Empirical Finance 9 CR

#### Election block: Elective Modules in Economics and Management (1 item)

- **M-WIWI-101402** eFinance 9 CR
- **M-WIWI-101421** Supply Chain Management 9 CR
- **M-WIWI-101424** Foundations of Marketing 9 CR
- **M-WIWI-101425** Strategy and Organization 9 CR
- **M-WIWI-101434** eBusiness and Service Management 9 CR
- **M-WIWI-101435** Essentials of Finance 9 CR
- **M-WIWI-101437** Industrial Production I 9 CR
- **M-WIWI-101464** Energy Economics 9 CR
- **M-WIWI-101465** Topics in Finance I 9 CR
- **M-WIWI-101466** Real Estate Management 9 CR
- **M-WIWI-101467** Design, Construction and Sustainability Assessment of Buildings 9 CR
- **M-WIWI-101413** Applications of Operations Research 9 CR
- **M-WIWI-101499** Applied Microeconomics 9 CR
- **M-WIWI-101501** Economic Theory 9 CR
- **M-WIWI-101513** Human Resources and Organizations 9 CR
- **M-WIWI-101599** Statistics and Econometrics 9 CR
- **M-WIWI-101936** Methodical Foundations of OR 9 CR
- **M-WIWI-102752** Fundamentals of Digital Service Systems 9 CR
- **M-WIWI-103337** Optimization under Uncertainty 9 CR
- **M-WIWI-101403** Public Finance 9 CR
- **M-WIWI-101423** Topics in Finance II 9 CR
- **M-WIWI-101668** Economic Policy I 9 CR
- **M-WIWI-105035** Empirical Finance 9 CR

### 4.13 Advanced Studies in Law

**Credits** 6

#### Mandatory

- **M-INFO-101253** Intellectual Property and Data Protection 6 CR
### 4.14 Research Course

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<td>M/INFO-102058 Seminar Module Informatics</td>
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5 Modules

5.1 Module: Advanced Object Orientation [M-INFO-100809]

Responsible: Prof. Dr.-Ing. Gregor Snelting
Organisation: KIT Department of Informatics
Part of: Advanced Studies in Informatics

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<td>T-INFO-101346</td>
<td>Advanced Object Orientation</td>
<td>5 CR Snelting</td>
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**Content**

- Behaviour and semantics of dynamic dispatch
- Implementation of single and multiple inheritance
- Genericity, refactoring
- Traits and mixins, virtual classes
- Cardelli’s type system
- Analyses on the call graph, points-to analyses
- Operational semantics, type safety
- Bytecode JVM, bytecode verifier, dynamic compilation

**Annotation**

This is not a lecture on object-oriented software development! Rather, knowledge of object-oriented software engineering (e.g. Java, UML, Design Patterns) is required.
5.2 Module: Algorithmic Methods for Hard Optimization Problems [M-INFO-101237]

| Responsible: | Prof. Dr. Dorothea Wagner |
| Organisation: | KIT Department of Informatics |
| Part of: | Advanced Studies in Informatics |

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Mandatory

| T-INFO-103334 | Algorithmic Methods for Hard Optimization Problems | 5 CR Wagner |

Competence Goal
The goal of this course is to familiarize the students with hard problems and possible approaches to solve them. Online problems may also be part of the course.

Content
There are many practical problems that cannot be solved optimally - some not at all and some not in a resonable amount of time. An example is the “bin packing problem” where a collection of objects must be packed using a possibly small number of bins. Moreover, problems sometimes arise where knowledge about the future (or even about the present) is incomplete, but a decision is required nevertheless ("online problems"). Regarding bin packing, for example, there must be a point in time when you close the bins and send them away. Even if there are some more objects arriving later.
### 5.3 Module: Algorithms for Planar Graphs [M-INFO-101220]

**Responsible:** Prof. Dr. Dorothea Wagner  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

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**Mandatory**

| T-INFO-101986 | Algorithms for Planar Graphs | 5 CR | Wagner |

**Content**

A planar graph is defined as a graph that can be drawn in the plane such that no edges intersect. Planar graphs have many interesting properties that can be used to solve several problems in a particularly simple, fast and elegant way. In addition, some problems that are (NP-)hard in general graphs can be efficiently solved in planar graphs. The lecture presents a selection of these problems and corresponding algorithmic approaches.

**Annotation**

The module is offered irregularly.

**Workload**

approx. 150 h
5.4 Module: Algorithms I [M-INFO-100030]

**Responsible:** Prof. Dr. Peter Sanders

**Organisation:** KIT Department of Informatics

**Part of:** Informatics

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Information Engineering and Management B.Sc.
Module Handbook as of 18.02.2020
### 5.5 Module: Algorithms II [M-INFO-101173]

**Responsible:** Prof. Dr. Hartmut Prautzsch  
Prof. Dr. Peter Sanders  
Prof. Dr. Dorothea Wagner

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

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5.6 Module: Applications of Operations Research [M-WIWI-101413]

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

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

**Part of:** Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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

- **T-WIWI-102704** Facility Location and Strategic Supply Chain Management 4.5 CR Nickel
- **T-WIWI-102714** Tactical and Operational Supply Chain Management 4.5 CR Nickel

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

- **T-WIWI-102726** Global Optimization I 4.5 CR Stein
- **T-WIWI-106199** Modeling and OR-Software: Introduction 4.5 CR Nickel
- **T-WIWI-106545** Optimization under Uncertainty 4.5 CR Rebennack

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**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://doi.ior.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.

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**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.

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**Prerequisites**

At least one of the courses *Facility Location and strategic Supply Chain Management* and *Tactical and operational Supply Chain Management* has to be taken.

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**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.
5.7 Module: Applied Informatics [M-WIWI-101430]

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

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

**Part of:** Informatics

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<td>Applied Informatics – Modelling</td>
<td>4 CR</td>
<td>Oberweis, Sure-Vetter</td>
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**Competence Certificate**
The learning control for both courses takes the form of a written examination (60 minutes) in accordance with § 4(2), 1 SPO.

The module grade consists of the credit-weighted average of the grades for both courses.

**Competence Goal**
The student should:

- Becomes familiar with relevant modelling languages for describing application domains and aspects of early software system design.
- Gains insight into methods and systems of computer science for the design and development of distributed information systems (supporting electronic business),
- is able to select, design, and apply these methods and systems in a way that is appropriate for the application context.

**Prerequisites**
None.

**Content**
The course Applied Informatics - Modelling [2511030] mainly addresses the early phases of the development of database-supported information systems, distributed systems for information services, intelligent systems and software systems in general. Main topics are modelling concepts and languages for describing application domains as well as static and dynamic aspects of early software system design. The course addresses in detail the following approaches: Entity-Relationship model, advanced aspects of UML, description logic, relational model, Petri nets, and event-driven process chains.

The course Applied Informatics - Internet Computing [2511032] 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

**Recommendation**
Knowledge of the module Basic Notions of Computer Science as well as Algorithms I is expected.

**Workload**
See german version.
**5.8 Module: Applied Microeconomics [M-WIWI-101499]**

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

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

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<td>T-WIWI-102892</td>
<td>Economics and Behavior</td>
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<td>T-WIWI-102850</td>
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<td>4.5 CR</td>
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**Competence Certificate**

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

None.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.9 Module: Basic Notions of Computer Science [M/INFO-101170]

**Responsible:** Dr. Sebastian Stüker
Thomas Worsch

**Organisation:** KIT Department of Informatics

**Part of:** Informatics

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<td>6 CR</td>
<td>Stüker, Worsch</td>
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**Competence Goal**

- Students know the most important techniques for definitions and are able to read and understand such definitions.
- Students know the difference between syntax and semantics.
- Students know the most important notions from discrete mathematics and computer science and are able to use them for the description of problems and in proofs.

**Content**

- informal notion of algorithm, basics of correctness proofs
- computational complexity measures, hard problems
- big O notation, master theorem
- alphabets, words, formal languages
- finite acceptors, contextfree grammars
- inductive/recursive definitions, proofs by induction, closure
- relations and functions
- graphs

**Workload**

180 h
### 5.10 Module: Business Administration [M-WIWI-101492]

#### Responsible:
- Prof. Dr. Marliese Uhrig-Homburg
- Prof. Dr. Christof Weinhardt

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

#### Part of:
- Business Administration

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<td>Financial Accounting and Cost Accounting</td>
<td>4 CR</td>
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#### Competence Certificate

The assessments of the courses are written examinations (90 minutes each) according to §4(2), 1 of the examination regulation. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Competence Goal

The student should be able to

- deal with advanced topics in accounting,
- describe the impacts and features of marketing instruments,
- knows the problem formulation and theories of production management, including the areas of energy, construction, real-estate and ergonomics,
- evaluate information as a competitive factor and is in control of the terminology and the methods to asses information.

#### Prerequisites

None

#### Content

The institutional framework and the modelling and formal description of a company's decisions play an essential role in this module. This module contains problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. Advanced topics in accounting are also taught.

#### Recommendation

It is highly recommended to fulfil this module only after completing the module Foundations in Business Administration.

#### Workload

See German version.
Module: Business Processes and Information Systems [M-WIWI-101476]

5.11 Module: Business Processes and Information Systems [M-WIWI-101476]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: Advanced Studies in Informatics

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

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Election block: Supplementary Courses (between 0 and 1 items)

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Competence Certificate
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students

- design architecture models of enterprise information systems and compare alternative designs,
- explain the concepts and principles of process modeling languages and methods, apply the methods in a concrete situation and evaluate the results,
- choose an appropriate modeling language according to a given context for analysing, modeling and improving business processes.

Prerequisites
At least one of the courses "Business Process Modelling" or "Process Mining" has to be attended.

Content
Modeling the relevant aspects of a business process is the basis for efficient and effective support of this process in an enterprise information system. Detailed knowledge of languages, methods and software tools for supporting business process modeling is taught in this module.

Additionally fundamentals of software quality management are considered in this module. Maturity models like CMMI or SPICE for evaluation and improvement of a software development process are introduced.
5.12 Module: Commercial Law [M-INFO-101191]

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

**Organisation:** KIT Department of Informatics

**Part of:** Law

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**Mandatory**

| T-INFO-102013 | Exercises in Civil Law | 9 CR | Dreier, Matz |
5.13 Module: Communication and Database Systems [M-INFO-101178]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics
Part of: Advanced Studies in Informatics

Credits 8
Recurrence Each summer term
Duration 1 semester
Language German
Level 3
Version 1

Mandatory

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<td>Introduction in Computer Networks</td>
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Competence Goal
The students will

- have learned fundamentals of data communication as well as the design of communication systems,
- be familiar with the composition of the different protocols and their mechanisms and be able to design simple protocols on their own,
- have understood the relationships between the different communication layers,
- be able to explain the benefits of database technology at the end of the course,
- have understood the development of database applications and be able to set up and access simple databases,
- be familiar with the terminology and the underlying database theory.

Content
Distributed information systems are worldwide information repositories which are accessible by everybody at any place of the world at any time. The physical distance is bridged by telecommunication systems, while database management technology manages and coordinates data for arbitrary periods of time. In order to understand globally running processes, one has to understand both data transmission techniques and database technology. Besides the telecommunication and database technologies on their own, an understanding of their cooperation is required, too.

Workload
approx. 240 h
### 5.14 Module: Computer Architecture [M-INFO-100818]

**Responsible:** Prof. Dr.-Ing. Jörg Henkel  
Prof. Dr. Wolfgang Karl  

**Organisation:** KIT Department of Informatics  

**Part of:** Advanced Studies in Informatics  

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5.15 Module: Computer Engineering [M-INFO-101836]

**Responsible:** Prof. Dr. Wolfgang Karl

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

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5.16 Module: Constitutional and Administrative Law [M-INFO-101192]

**Responsible:** Prof. Dr. Nikolaus Marsch

**Organisation:** KIT Department of Informatics

**Part of:** Law

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**Mandatory**

| T-INFO-110300 | Public Law I & II | 6 CR | Marsch |

**Workload**

See German version.
5.17 Module: Database Systems in Theory and Practice [M-INFO-101229]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

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**Mandatory**

| T-INFO-103552 | Lab: Working with Database Systems | 4 CR | Böhm |

**Election block: Database Systems in Theory and Practice (at least 1 item as well as at least 5 credits)**

| T-INFO-101317 | Deployment of Database Systems | 5 CR | Böhm |
| T-INFO-101305 | Big Data Analytics | 5 CR | Böhm |

**Workload**

120 h
5.18 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:**
- Advanced Studies in Economics and Management (Elective Modules in Business Administration)
- Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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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.
# Module: Digital Circuits Design [M-INFO-102978]

**Responsible:** Prof. Dr.-Ing. Uwe Hanebeck  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

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5.20 Module: eBusiness and Service Management [M-WIWI-101434]

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

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<td>T-WIWI-109938 Digital Services</td>
<td>4,5 CR</td>
<td>Satzger, Weinhardt</td>
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<td>T-WIWI-110797 eFinance: Information Systems for Securities Trading</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal
The 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.
5.21 Module: Economic Policy I [M-WIWI-101668]

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

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Elective block: Compulsory Elective Courses (1 item)

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<td>Macroeconomic Theory</td>
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<td>T-WIWI-102739</td>
<td>Public Revenues</td>
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<td>T-WIWI-102908</td>
<td>Personnel Policies and Labor Market Institutions</td>
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<td>Competition in Networks</td>
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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.
5.22 Module: Economic Theory [M-WIWI-101501]

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

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

**Part of:** Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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

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<td>Auction &amp; Mechanism Design</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.
Module: Economics [M-WIWI-101431]

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

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

**Part of:** Economics

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**Competence Certificate**

The assessment of the module is a written examination according to §4(2), 1 of the examination regulation. The grade of the module corresponds to the grade of this examination.

The main exam takes place subsequent to the lecture. The re-examination is offered at the same examination period. 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.

**Competence Goal**

It is the main aim of this module 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.

**Prerequisites**

None

**Content**

In the two main parts of the course, problems of microeconomic decision making (household and firm behavior) and problems of commodity allocation on markets (market equilibria and their efficiency properties of markets) are discussed. In the final part of the course, basics of imperfect competition (oligopolistic markets) and of game theory as well as welfare economics are presented.

**Annotation**

When personal resources are available students’ tutorials will be established.

**Workload**

See German version.
5.24 Module: eFinance [M-WIWI-101402]

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

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**Election block: Supplementary Courses (at least 4.5 credits)**

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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.
5.25 Module: Empirical Finance [M-WIWI-105035]

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

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

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

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Election block: Supplementary Courses (3,5 credits)

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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.
**5.27 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:** Advanced Studies in Economics and Management (Elective Modules in Business Administration)  
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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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.
Module: Foundations in Business Administration [M-WIWI-101491]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg  
Prof. Dr. Christof Weinhardt

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

**Part of:** Business Administration

**Credits** 8  
**Recurrence** Each term  
**Duration** 2 semester  
**Level** 1  
**Version** 1

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**Competence Certificate**

The assessment is carried out as partial exams (according to §4(2), 1-3 of the examination regulation) of the single 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**

The objectives of this module are that the student is capable of dealing with issues in finance, investments, accounting and information engineering and management.

**Prerequisites**

None

**Content**

The institutional framework and the modelling and formal description of a company's decisions play an essential role in this module. The basic idea and the foundations of static and dynamic investment rules are presented and applied to problems in procurement and materials management as well as in logistics. Modern production processes for goods and services are systematically presented. Marketing research and knowledge of the range of marketing instruments are fundamental for decisions in a competitive market environment. The foundations of corporate finance are treated with a strong emphasis of the links to the capital market. Investment rules and corporate finance are instrumental for answering questions of source and application of funds, comparable to the lending and deposit business in banking. Also an introduction to financial and management accounting is provided. The organisation of company and the problems of management and control constitute an other important aspect of business administration and management science. Finally, the process of value creation and distribution as well as the principles of the taxation of a company are treated with an emphasis on the analysis of the profit and loss statement.

Two case studies, namely the foundation of an innovative information service company and the process chain of a B2B direct marketing company from the customer to the producer, focus on the interdisciplinary links between legal framework, advanced information technology, and the resulting design options for business processes.

**Workload**

See German version.
5.29 Module: Foundations of Information Systems [M-INFO-101193]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

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**Election block: Grundlagen von Informationssystemen (at least 1 item as well as at least 4 credits)**

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**Election block: Foundations of Information Systems (at least 1 item as well as at least 5 credits)**

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**Competence Goal**

The students

- see the necessity of specialised systems for information management and are able to define and deploy decision criteria for purchasing such software,
- are aware of the fundamental approaches in information systems and are able to judge their potential applications,
- understand database applications and develop simple database applications on their own,
- are able to communicate at a professional level about technical aspects of information and knowledge management.

**Prerequisites**

None

**Content**

This module aims at exposing students to modern information systems. Beyond fundamental theory and concepts, this module covers the deployment of such technology.

**Recommendation**

It is recommended to take this module after completion of the module Communication and Database Systems [IW3INKD].

**Annotation**

The courses in this module are offered irregularly, however, the exam can be taken anytime.

**Workload**

approx. 300 h

For further details see the German version.
Module: Foundations of Marketing [M-WIWI-101424]

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

Credits 9
Recurrence Each term
Duration 1 semester
Language German/English
Level 3
Version 5

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Elective block: Supplementary Courses (at least 4.5 credits)

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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.
5.31 Module: Fundamentals of Digital Service Systems [M-WIWI-102752]

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

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

**Part of:** Advanced Studies in Economics and Management (Elective Modules in Business Administration)  
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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**Compétence 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.

**Compétence 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.kسري.kit.edu/teaching.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
5.32 Module: Human Resources and Organizations [M-WIWI-101513]

**Responsible:** Prof. Dr. Petra Nieken

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

**Part of:**
- Advanced Studies in Economics and Management (Elective Modules in Business Administration)
- Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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**Elective block: Supplementary Courses (between 4.5 and 5.5 credits)**

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<td>CR</td>
<td>Lindstädt</td>
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<tr>
<td>T-WIWI-102908</td>
<td>Personnel Policies and Labor Market Institutions</td>
<td>4,5</td>
<td>CR</td>
<td>Nieken</td>
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<tr>
<td>T-WIWI-102871</td>
<td>Problem Solving, Communication and Leadership</td>
<td>2</td>
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**Competence Certificate**
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

**Competence Goal**
The student

- 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.
**Module: Industrial Production I [M-WIWI-101437]**

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

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

**Part of:**
- Advanced Studies in Economics and Management (Elective Modules in Business Administration)
- Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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**Mandatory**

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<td>Fundamentals of Production Management</td>
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**Election block: Supplementary Courses (3.5 credits)**

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<td>Logistics and Supply Chain Management</td>
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<td>Schultmann, Wiens</td>
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<tr>
<td>T-WIWI-102820</td>
<td>Production Economics and Sustainability</td>
<td>3.5 CR</td>
<td>Schultmann, Volk</td>
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**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.
**Module: Information Security [M-WIWI-104069]**

- **Responsible:** Prof. Dr. Melanie Volkamer
- **Organisation:** KIT Department of Economics and Management
- **Part of:** Advanced Studies in Informatics

### Mandatory

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<td>T-WIWI-110342</td>
<td>Applied Informatics – Information Security</td>
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### Election block: Compulsory Elective Courses (1 item)

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<td>T-WIWI-109786</td>
<td>Advanced Lab Security</td>
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<td>Volkamer</td>
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### Competence Certificate

The module examination is carried out in the form of partial examinations on the selected courses of the module, with which the minimum requirement at credit points is fulfilled. The learning control is described in each course. The overall score of the module is made up of the sub-scores weighted with credit points and is cut off after the first comma point.

### Competence Goal

The student can explain and apply the basics of information security, knows appropriate measures to achieve different protection goals and can implement these measures, 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 enterprise and in the private context, knows the areas of application of a variety of relevant standards and knows their weaknesses, knows and can explain the problems of information security which may arise from human-machine interaction, can assess messages about detected security problems in a critical way, can structure a software project in the field of information security and explain and present results in oral and written form, can use the techniques of Human Centred Security and Privacy by Design to create user-friendly software.

### Prerequisites

None

### Content

- 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.

### Annotation

This new module can be chosen from summer term 2018.

### Workload

The total workload for this module is approximately 270 hours.
## 5.35 Module: Information Services in Networks [M-WIWI-101440]

**Responsible:** N.N.
Prof. Dr. Hartmut Schmeck

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

**Part of:** Advanced Studies in Informatics

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

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<tr>
<td>T-INFO-101284</td>
<td>Integrated Network and Systems Management</td>
<td>4 CR</td>
<td>Neumair</td>
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<td>T-WIWI-110541</td>
<td>Advanced Lab Informatics (Master)</td>
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<td>Semantic Web Technologies</td>
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**Competence Certificate**
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

**Prerequisites**
None

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Intellectual Property and Data Protection [M/INFO-101253]

**Responsibility:** Prof. Dr. Thomas Dreier

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Law

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**Mandatory**

| T/INFO-109840 | Intellectual Property and Data Protection | 6 CR | Matz |

**Content**

Building onto what the students have learned in law during the first two years of Bachelor studies, the module Law in the third Bachelor years has the purpose of both deepening and specialising the legal studies in areas of practical importance for information economics and management...
5.37 Module: Internship [M-WIWI-101433]

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

Organisation: KIT Department of Economics and Management
Part of: Internship

Credits: 8
Recurrence: Once
Level: 1
Version: 1

Mandatory

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<td>8 CR</td>
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Studiendekan der KIT-Fakultät für Informatik,
Studiendekan der KIT-Fakultät für Wirtschaftswissenschaften

Competence Certificate
The assessment is in the form of a certificate of employment about at least 6 weeks, a written report (typewritten, not handwritten) and a short presentation. The internship is not graded.

Competence Goal
This module serves to impart interdisciplinary key qualifications:

The student
- carries out professional tasks in the context of Information Engineering and Management to learn about the requirements on the engineer,
- describes in a short report the executed activities precisely and coherent, and judges about them critically,
- presents effectively experiences gained during the internship using appropriate media support and gets involved professionally in the subsequent discussion, and
- trains via concrete and constructive criticism his/her competence for problem solving.

The presentation primarily serves for the communication between student, company, and examiner with the goal of initiating further cooperation in the context of the Bachelor thesis and/or a project

Prerequisites
None

Content
It is the responsibility of the students to apply for an internship in a suitable company or public organization at which the internship can be fulfilled.

The process for the internship has the following (sequential) steps:

1. Choice of the examiner and of the company or organization by the student.  
   During the internship each student is attended by an examiner of the degree programme and by an advisor of the company. In case a student does not succeed in finding an examiner for the internship, he can request the assignment of an examiner from the examination board of the Bachelor programme in Information Engineering and Management. When enrolling for the internship, the student fills the form for the internship and he hands the form over to the examiner and the students’ secretary. If required, the students’ secretary certifies the compulsory character of the internship as part of the Bachelor programme in Information Engineering and Management.

2. Internship
   The student passes the internship in the chosen company or organization.

3. Preparation of a short report and presentation:  
   At the end of the internship, the employment is proven by a certificate of employment. The examiner receives a report (maximal 2 A4 pages) and the student gives feedback on the internship with a short presentation (approx. 15 minutes) followed by a short discussion (approx. 5 minutes).

4. Presentation and proof of performance.
   The short presentation may by given in the form of a talk with the examiner, in a colloquium or in a seminar. The form is fixed at the registration of the internship with the examiner. The certificate of employment of the company and the short report must be delivered at the examiner before the presentation. Based on these, a certificate of performance if produced and transferred to the office of study ("Studienbüro").
Recommendation
It is recommended that the internship is taken between the 4th and the 5th term of the Bachelor programme Information Engineering and Management.

Annotation
The internship is regulated in §14a of the examination regulation.
Examiners are all lecturers of the degree programme.
The choice of the examiner has to be prior to the start of the internship (cf. content description).
The form for the internship is available at the examination offices of the two faculties participating in the programme.

Workload
See German version.
5.38 Module: Introduction to Civil Law [M-INFO-101190]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Law

<table>
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<td>Civil Law for Beginners</td>
<td>5</td>
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</table>
5.39 Module: Introduction to Data and Information Management [M-INFO-101235]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

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**Mandatory**

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<td>Database Systems</td>
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<tr>
<td>T-INFO-101305</td>
<td>Big Data Analytics</td>
<td>5</td>
</tr>
<tr>
<td>T-INFO-103552</td>
<td>Lab: Working with Database Systems</td>
<td>4</td>
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<td>T-INFO-101317</td>
<td>Deployment of Database Systems</td>
<td>5</td>
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<tr>
<td>T-INFO-101257</td>
<td>Mechanisms and Applications of Workflow Systems</td>
<td>5</td>
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<tr>
<td>T-INFO-101977</td>
<td>Selling IT-Solutions Professionally</td>
<td>1.5</td>
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<td>T-INFO-101975</td>
<td>Consulting in Practice</td>
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<tr>
<td>T-INFO-101976</td>
<td>Project Management in Practice</td>
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**Election block: Introduction to Data and Information Management (at least 1 item as well as at least 5 credits)**

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<td>Big Data Analytics</td>
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<td>Lab: Working with Database Systems</td>
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<td>T-INFO-101257</td>
<td>Mechanisms and Applications of Workflow Systems</td>
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<tr>
<td>T-INFO-101976</td>
<td>Project Management in Practice</td>
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**Competence Goal**

The students

- see the necessity of specialised systems for information and data management and are able to define and deploy decision criteria for purchasing such software,
- are aware of the fundamental approaches in information and database systems and are able to judge their potential applications,
- understand database applications and develop simple database applications on their own,
- are able to communicate at a professional level about technical aspects of information and knowledge management

**Prerequisites**

None

**Content**

This module aims at exposing students to modern information and database systems. Beyond fundamental theory and concepts, this module covers the deployment of such technology.
### 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

<table>
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**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 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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**Mandatory**

| T-WIWI-102737 | Statistics I | 5 CR | Grothe, Schienle |
| T-WIWI-102738 | Statistics II | 5 CR | Grothe, Schienle |

**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**
Keine

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

A. Descriptive Statistics: univariate und 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.
### 5.42 Module: IT-Security Management for Networked Systems [M-INFO-100786]

**Responsible:** Prof. Dr. Hannes Hartenstein  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

<table>
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| Mandatory |
|-----------|-----------------|----------|
| T-INFO-101323 | IT-Security Management for Networked Systems | 5 CR Hartenstein |
5.43 Module: Lego Mindstorms - Practical Course [M-INFO-102557]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

<table>
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<td>2</td>
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**Mandatory**

| T-INFO-107502 | Practical Course: Lego Mindstorms | 4 CR | Asfour |

**Competence Goal**
The participants are able to design and construct a robot with motors and sensors using the Lego Mindstorms kit. The students are familiar with programming the Lego EV3 components using the Java programming language. They are able to understand and solve several key problems in mobile robotics, such as autonomous navigation, detection of landmarks and objects as well as obstacle avoidance. The students know how to efficiently and independently solve problems in a small group in a given time frame and are able to systematically document their work and results.

**Content**
In this practical course, teams of three students build and program a mobile robot using Lego Mindstorms and the Java programming language. The robots are challenged to complete a versatile parkour including sections like the traversal of a maze, following a line, crossing a bridge or avoiding obstacle. After initial building of the robots, a section of the parkour will be set up each week and tackled by the robots, for which the students have to prepare their code beforehand. A final race of the robots on the entire parkour will be held at the end of the semester.

**Recommendation**
Basic knowledge in JAVA is necessary for successful completion of this course.
Competence Certificate
The assessment in this module consists of

1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics I (1 credit) and
2. a written examination of 60 minutes on the lectures mathematics I following §4(2), 1 of the examination regulations (7 credits).

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificate a weight of 20%.

Competence Goal
Mathematical models are an important part in economical sciences. Therefore, the students need a basic knowledge in mathematics. The aim is the instruction in a comprehension of basic methods in analysis and linear algebra.

The students learn

- to use simple concepts and structures in mathematics;
- to recognize the mathematical structure of practical applications and to solve in simple cases mathematical problems;
- to comprehend the mathematical structure of more complex applications;
- to understand the mathematical basics to develop mathematical models for applications in cooperation with experts;
- to explain as a group member in the tutorial elementary mathematical structures and to stimulate in the discussion of examples the success of the group;
- to be in time for the tutorial group and for the preparation of homeworks;
- to work with basic mathematical literature.

The provides the foundations for

- comprehending the mathematical structure of more complex applications;
- developing mathematical models for applications in cooperation with experts;
- constructing algorithmical solutions of mathematical models for applications in cooperation with experts.

Prerequisites
None

Content
The lectures mathematics I and II give an overview in basic mathematical knowledge which is required to understand modern computer science and economical sciences. Part I consist of linear algebra including the basic algebraic structures, vector spaces and linear mappings. Many algebraic concepts are important for computer science. Part II consists of analysis including an introduction into the calculus of functions of one or several variables.
5.45 Module: Mathematics II [M-MATH-101312]

**Responsible:** Prof. Dr. Andreas Rieder  
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematics

<table>
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<td>7</td>
<td>7 CR</td>
<td>Rieder, Weiß, Wieners</td>
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<td>T-MATH-102268</td>
<td>Mathematics II for Information Engineering and Management - Exercise</td>
<td>1</td>
<td>1 CR</td>
<td>Rieder, Weiß, Wieners</td>
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**Competence Certificate**

The assessment in this module consists of

1. a graded certificate of exercise following §4(2), 3 of the examination regulation from the exercises to mathematics II (1 credit) and
2. a written examination of 60 minutes on the lectures mathematics II following §4(2), 1 of the examination regulations (7 credits).

The grade of the module is computed as a weighted sum, where the grade of the written examination has a weight of 80% and the certificate a weight of 20%.

**Competence Goal**

Mathematical models are an important part in economical sciences. Therefore, the students need a basic knowledge in mathematics. The aim is the instruction in a comprehension of basic methods in analysis and linear algebra.

The students learn

- to use simple concepts and structures in mathematics;
- to recognize the mathematical structure of practical applications and to solve in simple cases mathematical problems;
- to comprehend the mathematical structure of more complex applications;
- to understand the mathematical basics to develop mathematical models for applications in cooperation with experts;
- to explain as a group member in the tutorial elementary mathematical structures and to stimulate in the discussion of examples the success of the group;
- to be in time for the tutorial group and for the preparation of homeworks;
- to work with basic mathematical literature.

The provides the foundations for

- comprehending the mathematical structure of more complex applications;
- developing mathematical models for applications in cooperation with experts;
- constructing algorithmical solutions of mathematical models for applications in cooperation with experts.

**Content**

The lectures mathematics I and II give an overview in basic mathematical knowledge which is required to understand modern computer science and economical sciences. Part I consist of linear algebra including the basic algebraic structures, vector spaces and linear mappings. Many algebraic concepts are important for computer science. Part II consists of analysis including an introduction into the calculus of functions of one or several variables.

**Workload**

See German version.
Module: Mechano-Informatics and Robotics [M-INFO-100757]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

<table>
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**Mandatory**

| T-INFO-101294 | Mechano-Informatics and Robotics | 4 CR | Asfour |

**Competence Goal**

Based on the example of robotics students understand the synergistic effects and interdisciplinarity of mechatronics and informatics, the embedded systems, the control, and the methods and the algorithms. They are acquainted with the basic terminology and the methods which are common in robotics, signal processing, action representation, machine learning and cognitive systems. They are capable of applying fundamental state-of-the-art methods and tools for the development and programming of robots. Based on examples originating from current research conducted in the fields of humanoid robotics, the students interactively learn how to identify and formalize problems and tasks and how to develop solutions in an analytical and goal-directed way.

**Content**

The lecture addresses various engineering and algorithmic aspects and topics in robotics which are illustrated and explained based on examples originating from current research conducted in the field of humanoid robotics. First, this lecture gives an introduction into the mathematical fundamentals which are needed to describe a robotic system as well as the basic algorithms commonly applied in motion planning.

Subsequently, models and methods are introduced with which dynamical systems can be formalized and which can be used to encode and represent robot actions. To do so, we will discuss linear time-invariant systems in statespace as well as non-linear systems described as a set of differential equations which are driven by canonical systems. Further topics include perception, exploration, and classification of objects using haptics, and the basics as well as advanced applications of (deep) neural networks. Applications and approaches are presented which address current problems in robotics such as grasping, walking, visual and tactile visual servoing, and the classification of actions.

**Recommendation**

Siehe Teilleistung.
Module: Methodical Foundations of OR [M-WIWI-101936]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

### Credits: 9  
**Recurrence:** Each term  
**Duration:** 1 semester  
**Language:** German  
**Level:** 3  
**Version:** 8

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

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<td>T-WIWI-102726</td>
<td>Global Optimization I</td>
<td>4,5 CR</td>
<td>Stein</td>
</tr>
<tr>
<td>T-WIWI-103638</td>
<td>Global Optimization I and II</td>
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<td>Stein</td>
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<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I</td>
<td>4,5 CR</td>
<td>Stein</td>
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<td>T-WIWI-103637</td>
<td>Nonlinear Optimization I and II</td>
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#### Election block: Supplementary Courses (at most 1 item)

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<th>Credits</th>
<th>Lecturer</th>
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<td>Global Optimization II</td>
<td>4,5 CR</td>
<td>Stein</td>
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<td>T-WIWI-102725</td>
<td>Nonlinear Optimization II</td>
<td>4,5 CR</td>
<td>Stein</td>
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<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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**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" and "Global Optimization I" has to be examined.

**Content**

The modul 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.

**Annotation**

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

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
## 5.48 Module: Mobile Computing and Internet of Things [M/INFO-101249]

**Responsible:** Prof. Dr.-Ing. Michael Beigl  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

<table>
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<th>Level</th>
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### Mandatory

| T/INFO-102061 | Mobile Computing and Internet of Things | 5 CR | Beigl |

### Prerequisites

None
5.49 Module: Mobile Robots – Practical Course [M-INFO-101184]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

<table>
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**Mandatory**

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<td>T-INFO-101992</td>
<td>Mobile Robots – Practical Course</td>
<td>4 CR</td>
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</table>

**Competence Goal**

The student is able to understand circuit diagrams and can assemble, test and debug complex PCBs. The student is familiar with programming microcontroller-based embedded systems using the C language and cross compilers. The student is able to use methods for controlling robotic sensors and actuators, can conduct experiments with robots and solve tasks in this context independently and in small groups.

**Content**

In this practical course, students assemble an ASURO robot in groups of two. Each student will be provided with his own robot, which he has to put into operation. While using the robots, a new set of problems will be solved each week. The students will need to prepare for each week given the provided material. Sets of problem be solved using the C language and focus on controlling the robot’s sensors and actuators as well as on the generation of reflex-based behavior. The course ends with a race, where the robots have to tackle an obstacle course.
5.50 Module: Module Bachelor Thesis [M-WIWI-101611]

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

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

**Part of:** Bachelor Thesis

<table>
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**Mandatory**

| T-WIWI-103095 | Bachelor Thesis | 12 CR | Abeck, Lindstädt |

**Competence Certificate**
The Bachelor thesis is examined by an examiner following the examination regulation. 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.

**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**
The regulations for the Bachelor thesis can be found in §14 of the examination regulation.

**Content**
The Bachelor thesis is a written report which shows that the student can autonomously investigate a scientific problem in Information Engineering and Management. The work load for the Bachelor thesis should be 360h. The recommended project time is 6 months. The Bachelor thesis may also be written in English.

**Workload**
The total workload for this module is approximately 360 hours. For further information see German version.
Module: Optimization under Uncertainty [M-WIWI-103337]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
Part of: Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

<table>
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**Mandatory**

- T-WIWI-106546 **Introduction to Stochastic Optimization** 4.5 CR Rebennack

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

- T-WIWI-102724 **Nonlinear Optimization I** 4.5 CR Stein
- T-WIWI-102714 **Tactical and Operational Supply Chain Management** 4.5 CR Nickel

**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**

The course *Introduction to Stochastic Optimization* 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](http://sop.ior.kit.edu/28.php).  

**Workload**

The total workload for this module is approximately 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module. The total number of hours per course is determined by the amount of time spent attending the lectures and exercises, as well as the exam times and the time required to achieve the module’s learning objectives for an average student for an average performance.
5.52 Module: Orientation Exam [M-WIWI-101528]

**Organisation:** University  
**Part of:** Orientation Exam

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<tr>
<td>T-INFO-101964</td>
<td>Basic Notions of Computer Science</td>
<td>6 CR</td>
<td>Stüker, Worsch</td>
</tr>
<tr>
<td>T-INFO-101531</td>
<td>Programming</td>
<td>5 CR</td>
<td>Koziolek, Reussner</td>
</tr>
<tr>
<td>T-WIWI-102708</td>
<td>Economics I: Microeconomics</td>
<td>5 CR</td>
<td>Puppe, Reiß</td>
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<td>T-INFO-101965</td>
<td>Basic Notions of Computer Science Pass</td>
<td>0 CR</td>
<td>Stüker, Worsch</td>
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<tr>
<td>T-INFO-101967</td>
<td>Programming Pass</td>
<td>0 CR</td>
<td>Koziolek, Reussner</td>
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</tbody>
</table>

**Modelled deadline**

This module must be passed until the end of the 3. term.

**Prerequisites**

None
5.53 Module: Programming [M-INFO-101174]

Responsible: Prof. Dr.-Ing. Anne Koziolek
Prof. Dr. Ralf Reussner
Prof. Dr.-Ing. Gregor Snelting

Organisation: KIT Department of Informatics
Part of: Informatics

<table>
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<td>T-INFO-101531</td>
<td>Programming</td>
<td>5</td>
<td>Koziolek, Reussner</td>
</tr>
</tbody>
</table>

Competence Goal

Students should learn

- basic structures of the programming language Java and how to apply them; in particular control and simple data structures, object orientation and implementation of basic algorithms
- basics of programming methodology and the ability to autonomously write executable small to medium sized Java programs

Content

- objects and classes
- types, values and variables
- methods
- control structures
- recursion
- references, lists
- inheritance
- input and output
- exceptions
- programming methodology
- implementation of basic algorithms in Java (such as sorting algorithms)
5.54 Module: Public Finance [M-WIWI-101403]

**Responsibility:** Prof. Dr. Berthold Wigger

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

**Part of:** Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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

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<td>4,5</td>
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<td>T-WIWI-108711</td>
<td>Basics of German Company Tax Law and Tax Planning</td>
<td>4,5</td>
<td>CR</td>
<td>Gutekunst, Wigger</td>
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<tr>
<td>T-WIWI-102739</td>
<td>Public Revenues</td>
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<td>4,5</td>
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**Competence Certificate**

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

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

**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.
5.55 Module: Real Estate Management [M-WIWI-101466]

**Responsibility:** Prof. Dr.-Ing. Thomas Lützkendorf
**Organisation:** KIT Department of Economics and Management
**Part of:** Advanced Studies in Economics and Management (Elective Modules in Business Administration)
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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**Mandatory**

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<td>Real Estate Management I</td>
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<tr>
<td>T-WIWI-102745</td>
<td>Real Estate Management II</td>
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<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

- 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.
Module: Security [M-INFO-100834]

**Responsible:** Prof. Dr. Jörn Müller-Quade

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

**Credits:** 6

**Recurrence:** Each summer term

**Duration:** 1 term

**Language:** German

**Level:** 3

**Version:** 1

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<td>Hofheinz, Müller-Quade</td>
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5.57 Module: Semantic Knowledge Management [M-WIWI-101438]

**Responsible:** Prof. Dr. York Sure-Vetter  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Advanced Studies in Informatics

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<td>Semantic Web Technologies</td>
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**Election block: Supplementary Courses (at least 1 item)**

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<td>Applied Informatics – Applications of Artificial Intelligence</td>
<td>4,5 CR</td>
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<tr>
<td>T-WIWI-102697</td>
<td>Business Process Modelling</td>
<td>4,5 CR</td>
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<td>T-WIWI-110541</td>
<td>Advanced Lab Informatics (Master)</td>
<td>4,5 CR</td>
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**Competence Certificate**  
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

**Competence Goal**  
Students

- know the motives for the application of knowledge management in organizations
- know the basic design dimensions of holistic knowledge management (organization, human, information technology, corporate culture)
- know the main group of IT systems for knowledge management and are able to describe the relevant application scenarios and basic operating modes of these systems
- know how to use the different IT systems for knowledge management in practice
- know the basic standards for the modeling of information and processes and are able to describe their formal structures
- know how to apply the different modeling languages
- know criteria to evaluate the success of knowledge management systems and are able to apply them to assess defined knowledge management scenarios

**Prerequisites**  
Lecture Semantic Web Technologien [2511310] is mandatory.

**Content**  
In modern companies the availability and usability of knowledge is an essential factor of success for central managerial tasks and duties such as the improvement of business processes, product innovation and the amelioration of customer satisfaction.

This module illustrates the typical problems of knowledge management in organizations and presents IT methods to approach these questions. The relevant groups of knowledge management systems are analyzed and expanded in the subject areas knowledge representation/semantic modeling and document management/groupware systems.

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

**Workload**  
The workload is app. 270 hours.
5.58 Module: Seminar Module Economic Sciences [M-WIWI-101826]

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

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

**Part of:** Research Course

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

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<td>Seminar in Operations Research (Bachelor)</td>
<td>3 CR</td>
<td>Nickel, Rebennack, Stein</td>
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<td>T-WIWI-103489</td>
<td>Seminar in Statistics (Bachelor)</td>
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<td>Grothe, Schienle</td>
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<td>T-WIWI-103487</td>
<td>Seminar in Economics (Bachelor)</td>
<td>3 CR</td>
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**Competence Certificate**

The assessment is done by a seminar with at least 3 CP. The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

**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**

None.

**Content**

The module consists of a seminar, that is related to the research field of economic sciences. A complete list of available seminars is published in the internet.

**Annotation**

The mentioned seminars in this module handbook are place holders. For each semester, a complete list of seminars are published in the Vorlesungsverzeichnis or at the web pages of the participating institutes. Often, the seminar topics for a given semester are published at the end of the preceding semester. Some seminars require an early sign-in deadline at the end of the of the preceding semester.

**Workload**

The total workload for this module is approximately 90 hours.
5.59 Module: Seminar Module Informatics [M-INFO-102058]

**Responsible:**
- Dr. Ioana Gheta
- Jürgen Weixler
- Dr. André Wiesner

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

**Part of:**
- Research Course

**Credits:** 3
**Recurrence:** Each term
**Language:** German/English
**Level:** 3
**Version:** 1

**Election block: Seminar Informatics (1 item)**

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<td>T-WIWI-103485</td>
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## 5.60 Module: Seminar Module Law [M-INFO-101218]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** Research Course

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5.61 Module: Software Engineering I [M-INFO-101175]

**Responsible:**
- Prof. Dr.-Ing. Anne Koziolek
- Prof. Dr. Ralf Reussner
- Prof. Dr. Walter Tichy

**Organisation:**
- KIT Department of Informatics

**Part of:** Informatics

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<td>T-INFO-101995</td>
<td>Software Engineering I Pass</td>
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**Competence Goal**
The students acquire basic knowledge about the principles, methods and tools of software engineering. They learn how to build and to maintain complex software systems in a systematic way.

**Content**
The content of the lecture is the entire lifecycle of software, spanning project planning, system analysis, cost estimation, design, implementation, validation, verification, and finally the maintaining of software. The covered topics include UML, design patterns, software tools, programming environments and configuration control/versioning systems.

**Workload**
approx. 180 h
5.62 Module: Software Engineering II [M-INFO-100833]

**Responsible:** Prof. Dr.-Ing. Anne Koziolek
Prof. Dr. Ralf Reussner
Prof. Dr. Walter Tichy

**Organisation:** KIT Department of Informatics

**Part of:** Advanced Studies in Informatics

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<td>Software Engineering II</td>
<td>6 CR Koziolek, Reussner, Tichy</td>
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**Content**
Requirements engineering, software development processes, software quality, software architectures, MDD, Enterprise Software Patterns software maintainability, software security, dependability, embedded software, middleware, statistic testing
5.63 Module: Statistics and Econometrics [M-WIWI-101599]

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

Organisation: KIT Department of Economics and Management

Part of: Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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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.
5.64 Module: Strategy and Organization [M-WIWI-101425]

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

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<td>T-WIWI-102630 Managing Organizations 3.5 CR Lindstädt</td>
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<tr>
<td>T-WIWI-102871 Problem Solving, Communication and Leadership 2 CR Lindstädt</td>
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<td>T-WIWI-102629 Management and Strategy 3.5 CR Lindstädt</td>
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Competence Certificate
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Competence Goal
- The student 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.
5.65 Module: Supply Chain Management [M-WIWI-101421]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Advanced Studies in Economics and Management (Elective Modules in Business Administration)
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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Election block: Supplementary Courses (1 item)

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

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

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

Competence Goal

The 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.
5.66 Module: Telematics [M/INFO-101194]

**Responsible:** Prof. Dr. Martina Zitterbart  
**Organisation:** KIT Department of Informatics  
**Part of:** Advanced Studies in Informatics

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<td>Introduction in Computer Networks</td>
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<td>Zitterbart</td>
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<tr>
<td>T/INFO-101338</td>
<td>Telematics</td>
<td>6 CR</td>
<td>Zitterbart</td>
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**Competence Goal**

The students will broaden their knowledge of computer networks initially learnt in the module Telematics [IW3INTM]. They learn about problems and solutions in the domains of wireless, multimedia, or secure communications and they will be able to analyse and evaluate specific solutions in those domains.

**Prerequisites**

None

**Content**

Selected protocols, architectures, mechanisms, and algorithms in the chosen domains will be analysed in detail. The student hereby may choose among mobile and wireless communications, principles of the design of secure communication protocols, and protocols and techniques for multimedia communication.

**Recommendation**

The lecture Telematics [24128] builds on the content of the lecture Introduction in Computer Networks [24519] and should therefore only be taken after successful completion of the lecture Introduction in Computer Networks [24519].

**Workload**

approx. 300 h

For further details see the German version.
### Module: Theoretical Informatics [M-INFO-101189]

**Responsible:** Prof. Dr. Jörn Müller-Quade  
Prof. Dr. Dorothea Wagner

**Organisation:** KIT Department of Informatics

**Part of:** Informatics

**Mandatory**

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| T-INFO-103235 | Theoretical Foundations of Computer Science | 6 CR Müller-Quade, Sanders, Wagner |

**Competence Certificate**

The assessment of the module consists of a written examination according to §4(2), 1 of the examination regulations. The grade of the module corresponds to the grade of the written examination. Further details see the German section.

**Competence Goal**

The student

- has a deeper insight into the fundamentals of theoretical computer science and knows the computation models and proof techniques,
- understands the limits and possibilities of computer science in relation to the solution of definable but only partially predictable problems
- knows basic aspects of computer science in contrast to specific circumstances, such as specific computers or programming languages and also can phrase general statements about the solvability of problems
- is able to apply the proof techniques learned for the specification of systems of computer science and for the systematic design of programs and algorithms

**Content**

There are important problems whose solutions can clearly be defined but one will never be able to calculate such a solution systematically. Other problems are "likely" to be solved only through trial and error. Other topics of the module provide the basis for circuit design, design of compilers, and many others. Most results are rigorously proved. The proof techniques learned by the way are important for the specification of systems of computer science and for the systematic design of programs and algorithms.

The module provides a deep insight into the principles and methods of theoretical computer science. In particular, this will be discussed on the basic properties of Formal Languages as foundations of programming languages and communication protocols (regular, context-free Chomsky hierarchy), machine models (finite automata, pushdown automata, Turing machines, non determinism, and relations to families of formal languages), equivalence of sufficiently powerful computation models (Church’s thesis), non computable important functions (halting problem,...), Gödel’s incompleteness theorem and introduction to complexity theory, NP-complete problems and polynomial reductions.

**Workload**

approx. 210 h
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:**  
Advanced Studies in Economics and Management (Elective Modules in Business Administration)  
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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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 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.
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:** Advanced Studies in Economics and Management (Elective Modules in Business Administration) 
Advanced Studies in Economics and Management (Elective Modules in Economics and Management)

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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.
### 6.1 Course: Advanced Lab Informatics (Master) [T-WIWI-110541]

**Responsibility:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101438 - Semantic Knowledge Management  
- M-WIWI-101440 - Information Services in Networks  
- M-WIWI-101476 - Business Processes and Information Systems

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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 these 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**  
**Practical course (P)**

**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.

### Project lab Information Service Engineering

**2512600, WS 19/20, 2 SWS, Language: English, Open in study portal**  
**Practical course (P)**

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Module Handbook as of 18.02.2020
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.
6.2 Course: Advanced Lab Security [T-WIWI-109786]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104069 - Information Security

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**Exams**

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**Competence Certificate**
The alternative exam assessment consists of:

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

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

**Prerequisites**
None

**Recommendation**
Knowledge from the lecture "Information Security" is recommended.

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

**Security**
2512100, WS 19/20, 4 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/goto_productiv_crs_998421.html)

**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_productiv_crs_998421.html](https://ilias.studium.kit.edu/goto_productiv_crs_998421.html)
6.3 Course: Advanced Lab Security, Usability and Society [T-WWI-108439]

Responsibility: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WWI-104069 - Information Security

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Exams

| WS 19/20 | 7900116 | Advanced Lab Security, Usability and Society | Prüfung (PR) |          |

Competition 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
6.4 Course: Advanced Object Orientation [T-INFO-101346]

**Responsible:** Prof. Dr.-Ing. Gregor Snelting

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-100809 - Advanced Object Orientation
- M-INFO-102060 - Further Examinations

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6.5 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 (60 min) (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**  
V 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.
6.6 Course: Algorithmic Methods for Hard Optimization Problems [T-INFO-103334]

Responsibility: Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of:
- M-INFO-101237 - Algorithmic Methods for Hard Optimization Problems
- M-INFO-102060 - Further Examinations

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6.7 Course: Algorithms for Planar Graphs [T-INFO-101986]

**Responsible:** Prof. Dr. Dorothea Wagner

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101220 - Algorithms for Planar Graphs
- M-INFO-102060 - Further Examinations

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### 6.8 Course: Algorithms I [T-INFO-100001]

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### 6.9 Course: Algorithms II [T-INFO-102020]

**Responsible:** Prof. Dr. Hartmut Prautzsch  
Prof. Dr. Peter Sanders  
Prof. Dr. Dorothea Wagner

**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101173 - Algorithms II  
M-INFO-102060 - Further Examinations

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6.10 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

### Events

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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.

### 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

---

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

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

**Lecture (V)**
### 6.11 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-101438 - Semantic Knowledge Management

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**Competence Certificate**  
Written Examination (60 min) according to §4, Abs. 2, 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:*
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.

**Responsible:** Prof. Dr. Melanie Volkamer

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

**Part of:** M-WIWI-104069 - Information Security

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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.

**Annotation**

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

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

**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.

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

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

**Part of:** M-WIWI-101430 - 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](#)
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

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-101430 - Applied Informatics

**Type**  
Written examination

**Credits**  
4

**Recurrence**  
Each summer term

**Version**  
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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

**Recommendation**

Knowledge of content of the modules Basic Notions of Computer Science and Algorithms I is expected.

**Annotation**

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

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

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

Lecture (V)

2511032, SS 2020, 2 SWS, Language: German, [Open in study portal](#)
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.
6.15 Course: Auction & Mechanism Design [T-WIWI-102876]

**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:*

**Auction and Mechanism Design**

2560550, SS 2020, 2 SWS, Language: English, [Open in study portal]
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
6.16 Course: Bachelor Thesis [T-WIWI-103095]

**Responsible:** Prof. Dr. Sebastian Abeck  
Prof. Dr. Hagen Lindstädt

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101611 - Module Bachelor Thesis

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**Competence Certificate**  
see module description

**Prerequisites**  
see module description

**Final Thesis**  
This course represents a final thesis. The following periods have been supplied:

- **Submission deadline**: 6 months
- **Maximum extension period**: 1 months
- **Correction period**: 6 weeks
6.17 Course: Basic Notions of Computer Science [T-INFO-101964]

**Responsible:** Dr. Sebastian Stüker
Thomas Worsch

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101170 - Basic Notions of Computer Science
M-WIWI-101528 - Orientation Exam

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### 6.18 Course: Basic Notions of Computer Science Pass [T-INFO-101965]

| Responsible | Dr. Sebastian Stüker  
Thomas Worsch |
| Organisation | KIT Department of Informatics |
| Part of | M-INFO-101170 - Basic Notions of Computer Science  
M-WIWI-101528 - Orientation Exam |

| Type | Completed coursework |
| Credits | 0 |
| Recurrence | Each winter term |
| Version | 1 |

#### Events

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### 6.19 Course: Basic Principles of Economic Policy [T-WIWI-103213]

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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:

V Basic Principles of Economic Policy
2560280, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)
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

- Klump, Rainer (2013): Wirtschaftspolitik, Pearson Studium
- Lecture slides
- Exercises

Exercises of Basic Principles of Economic Policy
2560281, SS 2020, 1 SWS, Language: German, Open in study portal

Literature

- Klump, Rainer (2013): Wirtschaftspolitik, Pearson Studium
- Lecture slides
- Exercises
6.20 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**
2560134, WS 19/20, 3 SWS, Language: German, Open in study portal

**Notes**
**Workload:**
The total workload for this course is approximately 135.0 hours. For further information see German version.
# 6.21 Course: Big Data Analytics [T-INFO-101305]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101193 - Foundations of Information Systems  
- M-INFO-101193 - Foundations of Information Systems  
- M-INFO-10129 - Database Systems in Theory and Practice  
- M-INFO-101235 - Introduction to Data and Information Management  
- M-INFO-102060 - Further Examinations  

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## 6.22 Course: Big Data Analytics 2 [T-INFO-105742]

### Responsible
- Prof. Dr.-Ing. Klemens Böhm

### Organisation
- KIT Department of Informatics

### Part of
- M-INFO-101193 - Foundations of Information Systems
- M-INFO-102060 - Further Examinations

### Type
- Oral examination

### Credits
- 3

### Recurrence
- Irregular

### Version
- 1

### Events

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### Prerequisites
- none
6.23 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-101491 - Foundations in Business Administration

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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:

V 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.
6.24 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-101492 - Business Administration

Type: Written examination
Credits: 4
Recurrence: Each summer term
Version: 1

Events

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Exams

| WS 19/20        | 7900246 | Business Administration: Production Economics and Marketing | Prüfung (PR) |         |
|                 |         |                    | Klarmann, Schultmann |         |

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

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 foresights, 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.
6.25 Course: Business Process Modelling [T-WIWI-102697]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101438 - Semantic Knowledge Management  
M-WIWI-101476 - Business Processes and Information Systems

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**Competence Certificate**  
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**  
None

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

**Notes**  
The proper modeling of relevant aspects of business processes is essential for an efficient and effective design and implementation of processes. This lecture presents different classes of modeling languages and discusses the respective advantages and disadvantages of using actual application scenarios. For that simulative and analytical methods for process analysis are introduced. In the accompanying exercise the use of process modeling tools is practiced.

**Learning objectives:**  
Students

- describe goals of business process modeling and apply different modeling languages,
- choose the appropriate modeling language according to a given context,
- use suitable tools for modeling business processes,
- apply methods for analysing and assessing process models to evaluate specific quality characteristics of the process model.

**Recommendations:**  
Knowledge of course Applied Informatics I - Modelling is expected.

**Workload:**  
- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h
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
### 6.27 Course: Civil Law for Beginners [T-INFO-103339]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101190 - Introduction to Civil Law

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### 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

**Type:** Written examination  
**Credits:** 4.5  
**Recurrence:** Each winter term  
**Version:** 3

#### Events

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<td>Competition in Networks</td>
<td>Prüfung (PR)</td>
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**Competence Certificate**  
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC). Examination is offered every semester and can be retried at any regular examination date.

**Prerequisites**  
None.

**Recommendation**  
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.
### 6.29 Course: Computer Architecture [T-INFO-101355]

**Responsible:** Prof. Dr.-Ing. Jörg Henkel  
Prof. Dr. Wolfgang Karl  

**Organisation:** KIT Department of Informatics  

**Part of:**  
M-INFO-100818 - Computer Architecture  
M-INFO-102060 - Further Examinations  

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6.30 Course: Computer Organization [T-INFO-103531]

**Responsible:** Prof. Dr. Wolfgang Karl

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101836 - Computer Engineering
- M-INFO-102060 - Further Examinations

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6.31 Course: Consulting in Practice [T-INFO-101975]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101193 - Foundations of Information Systems
- M-INFO-101235 - Introduction to Data and Information Management
- M-INFO-102060 - Further Examinations

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

**Praxis der Unternehmensberatung**

Description

The market for consulting services grows annually by 20% and is therefore one of the leading growth sectors and professional fields in the future. This trend is in particular driven by the IT industry. Here, widely used standard software moves the focus of the future professional field from software development to consulting. In this context, consulting services have usually a broad definition, reaching from pure IT-focused consulting (e.g., deployment of SAP) to strategic consulting (strategy, organisation etc). In contrast to common rumors, a qualification in business studies is not a must. This opens up a diversified and exciting field with exceptional development perspectives for computer science students. The course deals thematically with the two fields consulting in general and function-specific consulting (with IT consulting as an example).

The structure of the course is oriented along the phases of a consulting project:

- Diagnosis: The consultant as an analytic problem solver.
- Strategic adjustment/redesign of the core processes: Optimisation/redesign of essential business functionality to solve the diagnosed problems in cooperation with the client.
- Implementation: Installation of the solutions in the clients’ organisation for assuring the implementation.

Emphasised topics in the course are:

- Elementary problem solving: Problem definition, structuring of problems and focussing through the usage of tools (e.g., logic and hypothesis trees), creative techniques, solution systems etc.
- Obtaining information effectively: Access of information sources, interview techniques etc.
- Effective communication of findings/recommendations. Analysis/planning of communication (media, audience, formats), communication styles (e.g., top-down vs. bottom-up), special topics (e.g., arrangement of complex information) etc.
- Efficient teamwork: Tools for optimising efficient work, collaboration with clients, intellectual and process leadership in the team etc.
Notes
The market for consulting services grows annually by 20% and is therefore one of the leading growth sectors and professional fields in the future. This trend is in particular driven by the IT industry. Here, widely used standard software moves the focus of the future professional field from software development to consulting. In this context, consulting services have usually a broad definition, reaching from pure IT-focused consulting (e.g., deployment of SAP) to strategic consulting (strategy, organisation etc). In contrast to common rumors, a qualification in business studies is not a must. This opens up a diversified and exciting field with exceptional development perspectives for computer science students. The course deals thematically with the two fields consulting in general and function-specific consulting (with IT consulting as an example).

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- Diagnosis: The consultant as an analytic problem solver.
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Emphasised topics in the course are:

- Elementary problem solving: Problem definition, structuring of problems and focussing through the usage of tools (e.g., logic and hypothesis trees), creative techniques, solution systems etc.
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- Effective communication of findings/recommendations. Analysis/planning of communication (media, audience, formats), communication styles (e.g., top-down vs. bottom-up), special topics (e.g., arrangement of complex information) etc.
- Efficient teamwork: Tools for optimising efficient work, collaboration with clients, intellectual and process leadership in the team etc.

At the end of the course, the participants

- have gained knowledge and understanding for the activities of the consulting process in general,
- have gained function-specific knowledge and understanding of IT consulting,
- have an overview about consulting companies,
- know concrete consulting examples,
- have experienced how effective teams work and
- have got an insight into the professional field "consulting".
6.32 Course: Data and Storage Management [T-INFO-101276]

**Responsible:** Prof. Dr. Bernhard Neumair

**Organisation:** KIT Department of Informatics

**Part of:**
- M/INFO-102060 - Further Examinations
- M/WIWI-101440 - Information Services in Networks

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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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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:


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
### 6.34 Course: Database Systems [T-INFO-101497]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101178 - Communication and Database Systems  
- M-INFO-101235 - Introduction to Data and Information Management  
- M-INFO-102060 - Further Examinations

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6.35 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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**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.
6.36 Course: Deployment of Database Systems [T-INFO-101317]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101193 - Foundations of Information Systems
- M-INFO-101193 - Foundations of Information Systems
- M-INFO-101229 - Database Systems in Theory and Practice
- M-INFO-101235 - Introduction to Data and Information Management
- M-INFO-102060 - Further Examinations

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6.37 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

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**Exams**
- WS 19/20 7900051 Derivatives Prüfung (PR) Uhrig-Homburg

**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**
- 2530550, SS 2020, 2 SWS, Language: German, Open in study portal

**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, 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 takes 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:**

**Design and Construction of Buildings**  
2586404, WS 19/20, 2 SWS, Language: German, [Open in study portal]

**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 [WW3BWL0U1] 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.
Course: Design, Construction and Sustainability Assessment of Buildings II [T-WIWI-102743]

**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 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.
## 6.40 Course: Digital Circuits Design [T-INFO-103469]

**Responsible:** Prof. Dr. Wolfgang Karl  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-102060 - Further Examinations  
M-INFO-102978 - Digital Circuits Design

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### Exams

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6.41 Course: Digital Services [T-WIWI-109938]

**Responsibility:** 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

**Events**

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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

**Lecture (V)**

**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
- Meffert, H./Bruhn, M. (2006), Dienstleistungsmarketing. 5. Auflage,
- Teboul, (2007), Services is Front Stage.
6.42 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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Events

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Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. 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 Lecture (V)
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
6.43 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-101431 - Economics  
M-WIWI-101528 - Orientation Exam

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**Events**

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**Exams**

**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 lectur. 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. München, 2005

**Responsibility:** 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 an 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

- Schneeweß: Ökonometrie ISBN 3-7908-0008-2

Elective literature:
Additional literature will be suggested in course
Below you will find excerpts from events related to this course:

### 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

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### 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:

6.46 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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**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**
2500001, WS 19/20, 4 SWS, Language: English, Open in study portal

**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.
**6.47 Course: Energy Policy [T-WIWI-102607]**

**Responsible:** Prof. Dr. Martin Wietschel

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

**Part of:** M-WIWI-101464 - Energy Economics

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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.

**Prerequisites**
None.

*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.
6.48 Course: Enterprise Architecture Management [T-WIWI-102668]

Responsible: Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101476 - Business Processes and Information Systems

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Competence Certificate

Please note that the exam for first writers will be offered for the last time in winter semester 2019/2020. A last examination possibility exists in the summer semester 2020 (only for repeaters).

The assessment of this course is a written (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

Prerequisites

None

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

Enterprise Architecture Management

2511600, WS 19/20, 2 SWS, Language: German, Open in study portal

Notes

The following topics will be covered: components of enterprise architecture, enterprise strategy including methods to develop strategies, business process (re)engineering, methods to implement changes within enterprises (management of change).

Learning objectives:

Students understand the connection between enterprise strategy, business processes and business objects and IT architecture; they know methods to depict these connections and how they can be developed based on each other.
## 6.49 Course: Exercises in Civil Law [T-INFO-102013]

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

**Organisation:** KIT Department of Informatics  

**Part of:** M-INFO-101191 - Commercial Law  

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</table>
6.50 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-101421 - Supply Chain Management
- M-WIWI-101936 - Methodical Foundations of OR

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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.

**Responsible:** Dr. Jan-Oliver Strych

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

**Part of:** M-WIWI-101492 - Business Administration

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**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:

**V 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.
6.52 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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**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**

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
6.53 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

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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 financical 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
# 6.54 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

**Code:** 2530232, **WS 19/20**, 2 SWS, **Language:** German, [Open in study portal](#)

**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:**

6.55 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

**Type:** Written examination  
**Credits:** 4.5  
**Recurrence:** Each summer term  
**Version:** 1

### Events

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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:**

6.56 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

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**Events**

| SS 2020 | 2540560 | Foundations of Interactive Systems | 3 SWS | Lecture (V) | Mädche, Loewe |

**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**

None

**Annotation**

New course starting summer term 2019.

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

**V Foundations of Interactive Systems**

2540560, SS 2020, 3 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

**Description**

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

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This lecture introduces foundations on design processes and principles for interactive systems.

The lecture focuses on 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.
6.57 Course: Foundations of Mobile Business [T-WIWI-104679]

**Responsible:** Prof. Dr. Andreas Oberweis

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

**Part of:** M-WIWI-101476 - Business Processes and Information Systems

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**Exams**

WS 19/20 
7900118 
Foundations of mobile Business 
Prüfung (PR) 
Oberweis

**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:*

**Grundlagen für mobile Business**

2511226, SS 2020, 2 SWS, Language: German, Open in study portal

**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).
### 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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#### Events

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| Exams                | 7981950 | Fundamentals of Production Management | Prüfung (PR) | Schultmann |

#### 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**

**Lecture (V)**

**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
6.59 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-101936 - Methodical Foundations of OR

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Exams

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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.
**6.60 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-101936 - 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.
6.61 Course: Global Optimization II [T-WIWI-102727]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101936 - Methodical Foundations of OR

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**Exams**

| WS 19/20 | 7900006_WS1920_NK | Global Optimization II | Prüfung (PR) | Stein |

**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.

**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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**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
6.63 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**

| SS 19/20 | 7900310 | Industrial Organization | Prüfung (PR) |

**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:*

**Industrial Organization**

2560238, SS 2020, 2 SWS, Language: German, Open in study portal

**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:**
6.64 Course: Integrated Network and Systems Management [T-INFO-101284]

**Responsible:** Prof. Dr. Bernhard Neumair

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-102060 - Further Examinations
- M-WIWI-101440 - Information Services in Networks

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### 6.65 Course: Intellectual Property and Data Protection [T-INFO-109840]

**Responsible:** Dr. Yvonne Matz  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101253 - Intellectual Property and Data Protection

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6.66 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:
**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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**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:*
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.ism.kit.edu).
6.68 Course: Internship [T-WIWI-103093]

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

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

**Part of:**  M-WIWI-101433 - Internship

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**Competence Certificate**
see module description

**Prerequisites**
see module description

**Annotation**
see module description
### 6.69 Course: Introduction in Computer Networks [T-INFO-102015]

**Responsible:** Prof. Dr. Martina Zitterbart  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101178 - Communication and Database Systems  
- M-INFO-101194 - Telematics  
- M-INFO-102060 - Further Examinations

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6.70 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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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
6.71 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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**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]

**Notes**
The course focuses 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.

**Recommendations:**
Basic knowledge of mathematics and statistics is assumed.

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

This course offers an introduction to the theoretical analysis of strategic interaction situations. At the end of the course, students 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.

**Compulsory textbook:**

**Additional Literature:**
6.72 Course: Introduction to Information Engineering and Management [T-WIWI-102757]

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

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

**Part of:** M-WIWI-101491 - Foundations in Business Administration

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**Competence Certificate**  
Oral examination

**Prerequisites**  
None
6.73 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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**Exams**

| WS 19/20 | 7900001_WS1920_HK | Introduction to Operations Research I and II | Prüfung (PR) | 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.

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:

**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, dyanal 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.
6 COURSES

6.74 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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**Competence Certificate**
The assessment consists of a written exam (60 min.).

**Prerequisites**
None

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

**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
6.75 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

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

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

**Part of:** M-WIWI-103337 - 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: Investments [T-WIWI-102604]

Responsibility: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101435 - Essentials of Finance

Type: Written examination
Credits: 4.5
Recurrence: Each summer term
Version: 1

Events

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WS 19/20 7900054, Investments, Prüfung (PR), Uhrig-Homburg

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

# 6.77 Course: IT-Security Management for Networked Systems [T-INFO-101323]

**Responsible:** Prof. Dr. Hannes Hartenstein  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-100786 - IT-Security Management for Networked Systems  
- M-INFO-102060 - Further Examinations

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### Course: Lab: Working with Database Systems [T-INFO-103552]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101193 - Foundations of Information Systems  
- M-INFO-101229 - Database Systems in Theory and Practice  
- M-INFO-101235 - Introduction to Data and Information Management  
- M-INFO-102060 - Further Examinations  

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6.79 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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**Exams**

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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 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
6.80 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:*

**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.
### 6.81 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](#)

**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.


**6.82 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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**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

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

**Managing Organizations**

2577902, WS 19/20, 2 SWS, Language: German, Open in study portal

**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.
6.83 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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**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:**

- 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.
### 6.84 Course: Mathematics I for Information Engineering and Management - Exam [T-MATH-102266]

**Responsible:** Prof. Dr. Andreas Rieder  
Dr. Daniel Weiß  
Prof. Dr. Christian Wieners  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-101311 - Mathematics I

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### Course: Mathematics I for Information Engineering and Management - Exercise [T-MATH-102267]

**Responsible:** Prof. Dr. Andreas Rieder  
Dr. Daniel Weiß  
Prof. Dr. Christian Wieners  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101311 - Mathematics I

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**Course: Mathematics II for Information Engineering and Management - Exam [T-MATH-102269]**

**Responsible:** Prof. Dr. Andreas Rieder  
Dr. Daniel Weiß  
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101312 - Mathematics II

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### 6.87 Course: Mathematics II for Information Engineering and Management - Exercise [T-MATH-102268]

**Responsible:** Prof. Dr. Andreas Rieder  
Dr. Daniel Weiß  
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101312 - Mathematics II

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6.88 Course: Mechanisms and Applications of Workflow Systems [T-INFO-101257]

**Responsibility:** Jutta Mülle  
**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101193 - Foundations of Information Systems  
- M-INFO-101193 - Foundations of Information Systems  
- M-INFO-101235 - Introduction to Data and Information Management  
- M-INFO-102060 - Further Examinations

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6.89 Course: Mechano-Informatics and Robotics [T-INFO-101294]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-100757 - Mechano-Informatics and Robotics

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

**Mechano-Informatics and Robotics**

2400077, WS 19/20, 2 SWS, Language: German/English, [Open in study portal](#)

**Lecture (V)**

**Notes**

The lecture addresses various engineering and algorithmic aspects and topics in robotics which are illustrated and explained based on examples originating from current research conducted in the field of humanoid robotics. First, this lecture gives an introduction into the mathematical fundamentals which are needed to describe a robotic system as well as the basic algorithms commonly applied in motion planning.

Subsequently, models and methods are introduced with which dynamical systems can be formalized and which can be used to encode and represent robot actions. To do so, we will discuss linear time-invariant systems in state.

**Learning Objectives:**

Based on the example of robotics students understand the synergistic effects and interdisciplinarity of mechatronics and informatics, the embedded systems, the control, and the methods and the algorithms. They are acquainted with the basic terminology and the methods which are common in robotics, signal processing, action representation, machine learning and cognitive systems. They are capable of applying fundamental state-of-the-art methods and tools for the development and programming of robots. Based on examples originating from current research conducted in the fields of humanoid robotics, the students interactively learn how to identify and formalize problems and tasks and how to develop solutions in an analytical and goal-directed way.

**Learning Content**

The lecture addresses various engineering and algorithmic aspects and topics in robotics which are illustrated and explained based on examples originating from current research conducted in the field of humanoid robotics. First, this lecture gives an introduction into the mathematical fundamentals which are needed to describe a robotic system as well as the basic algorithms commonly applied in motion planning.

Subsequently, models and methods are introduced with which dynamical systems can be formalized and which can be used to encode and represent robot actions. To do so, we will discuss linear time-invariant systems in state.
6.90 Course: Mobile Computing and Internet of Things [T-INFO-102061]

**Responsible:** Prof. Dr.-Ing. Michael Beigl

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101249 - Mobile Computing and Internet of Things
- M-INFO-102060 - Further Examinations

**Type:** Oral examination

**Credits:** 5

**Recurrence:** Each winter term

**Version:** 1

### Events

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- WS 19/20 2400051 Mobile Computing and Internet of Things 2+1 SWS Lecture / Practice (VÜ) Beigl, Exler
- WS 19/20 7500042_03-03-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_09-04-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_11-02-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_11-05-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_19-11-19 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_20-01-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_20-02-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_23-03-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- WS 19/20 7500042_02-04-20 Mobile Computing and Internet of Things Prüfung (PR) Beigl
- SS 2020 7500107 Mobile Computing and Internet of Things Prüfung (PR) Beigl
6.91 Course: Mobile Robots – Practical Course [T-INFO-101992]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101184 - Mobile Robots – Practical Course  
M-INFO-102060 - Further Examinations

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**Events**  
SS 2020 | 24624 | Mobile Robots - Practical Course | 4 SWS | Practical course (P) | Asfour, Beil

**Exams**  
SS 2020 | 7500264 | Mobile Robots – Practical Course | Prüfung (PR) | Asfour

**Notes**  
In this practical course, students assemble an ASURO robot in groups of two. Each student will be provided with his own robot, which he has to put into operation. While using the robots, a new set of problems will be solved each week. The students will need to prepare for each week given the provided material. Sets of problem be solved using the C language and focus on controlling the robot's sensors and actuators as well as on the generation of reflex-based behavior. The course ends with a race, where the robots have to tackle an obstacle course.

**Learning Objectives:**  
The student is able to understand circuit diagrams and can assemble, test and debug complex PCBs. The student is familiar with programming microcontroller-based embedded systems using the C language and cross compilers. The student is able to use methods for controlling robotic sensors and actuators, can conduct experiments with robots and solve tasks in this context independently and in small groups.

**Learning Content**  
In this practical course, students assemble an ASURO robot in groups of two. Each student will be provided with his own robot, which he has to put into operation. While using the robots, a new set of problems will be solved each week. The students will need to prepare for each week given the provided material. Sets of problem be solved using the C language and focus on controlling the robot's sensors and actuators as well as on the generation of reflex-based behavior. The course ends with a race, where the robots have to tackle an obstacle course.

**Workload**  
120 h
6.92 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>
<td>Practical course (P)</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**  
2550490, SS 2020, 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.
6.93 Course: Nonlinear Optimization I [T-WIWI-102724]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101936 - Methodical Foundations of OR  
M-WIWI-103337 - Optimization under Uncertainty

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**Type**  
- Written examination  
- 4.5 credits  
- Each winter term  
- Version 4

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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.
### 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-101936 - 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:

### Nonlinear Optimization I

**2550111, WS 19/20, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**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.
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.
### Course: Nonlinear Optimization II [T-WIWI-102725]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101936 - 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**

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**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.
**6.96 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

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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.

**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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**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
6.98 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

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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](#)

**Lecture (V)**

**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).
6.99 Course: Practical Course: Lego Mindstorms [T-INFO-107502]

**Responsible:** Prof. Dr.-Ing. Tamim Asfour  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-102060 - Further Examinations  
M-INFO-102557 - Lego Mindstorms - Practical Course

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**Exams**

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**Recommendation**

Basic knowledge in JAVA is necessary for successful completion of this course.

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

### Lego Mindstorms - Laboratory

24306. WS 19/20, 3 SWS, Language: German. [Open in study portal]

#### Notes

In this practical course, teams of three students build and program a mobile robot using Lego Mindstorms and the Java programming language. The robots are challenged to complete a versatile parkour including sections like the traversal of a maze, following a line, crossing a bridge or avoiding obstacle. After initial building of the robots, a section of the parkour will be set up each week and tackled by the robots, for which the students have to prepare their code beforehand. A final race of the robots on the entire parkour will be held at the end of the semester.

#### Learning Objectives:

The participants are able to design and construct a robot with motors and sensors using the Lego Mindstorms kit. The students are familiar with programming the Lego EV3 components using the Java programming language. They are able to understand and solve several key problems in mobile robotics, such as autonomous navigation, detection of landmarks and objects as well as obstacle avoidance. The students know how to efficiently and independently solve problems in a small group in a given time frame and are able to systematically document their work and results.

#### Learning Content

In this practical course, teams of three students build and program a mobile robot using Lego Mindstorms and the Java programming language. The robots are challenged to complete a versatile parkour including sections like the traversal of a maze, following a line, crossing a bridge or avoiding obstacle. After initial building of the robots, a section of the parkour will be set up each week and tackled by the robots, for which the students have to prepare their code beforehand. A final race of the robots on the entire parkour will be held at the end of the semester.

#### Workload

120 h
### 6.100 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.
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

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

**Problem solving, communication and leadership**

2577910, WS 19/20, 1 SWS, Language: German, Open in study portal

**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.

Lecture (V)
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.
Course: Process Mining [T-WIWI-109799]

**Responsibility:** Prof. Dr. Andreas Oberweis

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

**Part of:** M-WIWI-101476 - Business Processes and Information Systems

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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

**Annotation**
Former name (up to winter semester 2018/1019) "Workflow Management".

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

**Process Mining**
2511204, SS 2020, 2 SWS, Language: German, [Open in study portal]

**Lecture (V)**

**Notes**
The area of process mining covers approaches which aim at deducting new knowledge on the basis of logfiles generated by information systems. Such information systems are e.g., workflow-management-systems which are used for an efficient control of processes in enterprises and organisations. The lecture introduces the foundations of processes and respective modeling and analysis techniques. In the following, the foundations of process mining and the three classical types of approaches - discovery, conformance and enhancement - will be taught. In addition to the theoretical basics, tools, application scenarios in practice and open research questions are covered as well.

**Learning objectives:**
Students
- understand the concepts and approaches of process mining and know how they are applied,
- create and evaluate business process models,
- analyze static and dynamic properties of workflows,
- apply approaches and tools of process mining.

**Recommendations:**
Knowledge of course Applied Informatics - Modelling is expected.

**Workload:**
- Lecture 30h
- Exercise 15h
- Preparation of lecture 24h
- Preparation of exercises 25h
- Exam preparation 40h
- Exam 1h
6 COURSES
Course: Production Economics and Sustainability [T-WIWI-102820]

6.103 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:

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
# 6.104 Course: Programming [T-INFO-101531]

**Responsible:**  
Prof. Dr.-Ing. Anne Koziolek  
Prof. Dr. Ralf Reussner  

**Organisation:**  
KIT Department of Informatics  

**Part of:**  
M-INFO-101174 - Programming  
M-WIWI-101528 - Orientation Exam

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### 6.105 Course: Programming Pass [T-INFO-101967]

**Responsible:** Prof. Dr.-Ing. Anne Koziolek  
Prof. Dr. Ralf Reussner  

**Organisation:** KIT Department of Informatics  
**Part of:**  
- M-INFO-101174 - Programming  
- M-WIWI-101528 - Orientation Exam

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6.106 Course: Project Management in Practice [T-INFO-101976]

Responsibility: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101193 - Foundations of Information Systems
          M-INFO-101235 - Introduction to Data and Information Management
          M-INFO-102060 - Further Examinations

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

Project Management in Practice
2400019, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Notes

At the end of the course, the participants:

- Know the principles of project management and are able to make use of them in real-world case studies.
- Have profound knowledge about project phases, principles of project planning, fundamental elements such as project charter & scope definitions, descriptions of project goals, activity planning, milestones, project-structure plans, agenda and cost planning and risk management. Further, they know principle elements of project implementation, crisis management, escalation and, last but not least, project-termination activities.
- Understand and are able to adopt the fundamentals of planning as well as the subjective factors which are relevant in a project. This includes topics such as communication, group processes, teambuilding, leadership, creative solution methods and risk-assessment methods.

The following key skills are taught:

- Project planning
- Project control
- Communication
- Leadership behavior
- Crisis management
- Identification of and solutions of difficult situations
- Team building
- Motivation (of oneself and of others)

Learning Content

- General project conditions
- Project goals / creative methods for identifying project goals and priorities
- Project planning
- Activity planning
- Cost/time/resource planning
- Phase models
- Risk management
- Project control / success control / monitoring
- Crisis management
- Project termination / lessons learned
6.107 Course: Public Law I & II [T-INFO-110300]

**Responsible:** Prof. Dr. Nikolaus Marsch

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101192 - Constitutional and Administrative Law

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

**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 debt-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 debt-incurring.

**Learning goals:**
See German version.

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

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.
# 6.110 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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<td>Python for Empirical Finance</td>
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**Exams**

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<td>Python for Empirical Finance</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.
Responsible: Prof. Dr.-Ing. Thomas Lützkendorf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101466 - Real Estate Management

Type | Credits | Recurrence | Version |
-----|---------|------------|---------|
Written examination | 4.5 | Each winter term | 1 |

Events

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<td>2</td>
<td>Lecture (V)</td>
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<td>Übungen zu 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
2586400, WS 19/20, 2 SWS, Language: German, Open in study portal

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 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 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.

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)

Workload
The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

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

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 course is replenished by excursions and guest lectures by practitioners out of the real estate business.

The course is replenished by excursions and guest lectures by practitioners out of the real estate business.

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:

6.112 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

Events
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<td>Written examination</td>
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<td>Each summer term</td>
<td>Practice (Ü)</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). Reexaminations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
A combination with the module Design Construction and Assessment of Green Buildings I 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.

**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>WS 19/20</td>
<td>7981012</td>
<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:*

**V 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
   - Hydro
   - Wind
   - Solar
   - Biomass
   - Geothermal
3. Other renewable energies
4. Promotion of renewable energies
5. Interactions in systemic context
6. 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:
Course: Security [T-INFO-101371]

**Responsible:** Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-100834 - Security
- M-INFO-102060 - Further Examinations

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</table>
6.115 Course: Selling IT-Solutions Professionally [T-INFO-101977]

**Responsible:** Prof. Dr.-Ing. Klemens Böhm

**Organisation:** KIT Department of Informatics

**Part of:**
- M-INFO-101193 - Foundations of Information Systems
- M-INFO-101235 - Introduction to Data and Information Management
- M-INFO-102060 - Further Examinations

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**Course: Semantic Web Technologies [T-WIWI-110848]**

**Type**: Written examination

**Credits**: 4.5

**Recurrence**: Each summer term

**Version**: 1

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

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

**Part of**: M-WIWI-101438 - Semantic Knowledge Management

M-WIWI-101440 - Information Services in Networks

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<td>Sure-Vetter, Acosta Deibe, Käfer</td>
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<td><strong>Exercises to Semantic Web Technologies</strong></td>
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<td>Sure-Vetter, Acosta Deibe, Käfer</td>
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**Competence Certificate**

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

**Prerequisites**

None

**Recommendation**

Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required.

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

**Semantic Web Technologies**

2511310, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)
Notes
The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals.

Central concepts are the representation of knowledge in form of RDF and ontologies, the access via Linked Data, as well as querying the data by using SPARQL. This lecture provides the foundations of knowledge representation and processing for the corresponding technologies and presents example applications.

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:
The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:
Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.

Workload:

- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours

---

Exercises to Semantic Web Technologies
2511311, SS 2020, 1 SWS, Language: English, Open in study portal

Notes
The exercises are related to the lecture Semantic Web Technologies.

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

The following topics are covered:

- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:
The student

- understands the motivation and foundational ideas behind Semantic Web and Linked Data technologies, and is able to analyse and realise systems
- demonstrates basic competency in the areas of data and system integration on the web
- masters advanced knowledge representation scenarios involving ontologies

Recommendations:
Lectures on Informatics of the Bachelor on Information Systems (Semester 1-4) or equivalent are required. Knowledge of modeling with UML is required.
# 6.117 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-101826 - Seminar Module Economic Sciences

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<td>Digital Experience and Participation</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:

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
Literature
Elective literature:


**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
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.

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 at the end of the semester.

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.
## Course: Seminar in Economics (Bachelor) [T-WIWI-103487]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101826 - Seminar Module Economic Sciences

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### Events

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### Exams

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### Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

### Prerequisites

None.
**Recommendation**
See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

**Annotation**
The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.
The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

- **Topics in Econometrics**
  2521310, WS 19/20, 2 SWS, Language: German, [Open in study portal](https://portal.wiwi.kit.edu/)

*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](https://portal.wiwi.kit.edu/)

**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)

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 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](https://portal.wiwi.kit.edu/)

**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)

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%).

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](https://portal.wiwi.kit.edu/)
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 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.

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.
### Course: Seminar in Informatics (Bachelor) [T-WIWI-103485]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-INFO-102058 - Seminar Module Informatics

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<td>3 SWS</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:

Linkable 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.
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.

Cognitive Automobiles and Robots
2513500, SS 2020, 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.

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.
## 6.120 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-101826 - Seminar Module Economic Sciences

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### Exams

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### Competence Certificate

Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:

- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

The point scheme for the assessment is determined by the lecturer of the respective course. It will be announced at the beginning of the course.

### Prerequisites

None.

### Recommendation

See seminar description in the course catalogue of the KIT (https://campus.kit.edu/)

### Annotation

The listed seminar titles are placeholders. Currently offered seminars of each semester will be published on the websites of the institutes and in the course catalogue of the KIT. In general, the current seminar topics of each semester are already announced at the end of the previous semester. Furthermore for some seminars there is an application required.

The available places are listed on the internet: https://portal.wiwi.kit.edu.

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

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Information Engineering and Management B.Sc.  
Module Handbook as of 18.02.2020
Seminar on Methodical Foundations of Operations Research
2550131, WS 19/20, 2 SWS, Language: German, Open in study portal

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.

Seminar: Modern OR and Innovative Logistics
2550491, WS 19/20, 2 SWS, Language: German, Open in study portal

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 rhetorical 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.

Seminar: Modern OR and Innovative Logistics
2550491, SS 2020, 2 SWS, Language: German, Open in study portal

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 rhetorical 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-101826 - Seminar Module Economic Sciences

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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/](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/](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.
6.122 Course: Seminar Informatics A [T-INFO-104336]

**Responsible:** Prof. Dr. Sebastian Abeck

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-102058 - Seminar Module Informatics  
M-INFO-102060 - Further Examinations

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

**Seminar: Neuronale Netze und künstliche Intelligenz**

2400078, WS 19/20, SWS, Language: German/English, [Open in study portal](#)

**Notes**

In many tasks that appear natural to us, the fastest computers are unable to match the performance of the human brain. Neural networks attempt to simulate the parallel and distributed architecture of the brain in order to master these skills with learning algorithms. In this context, focus is being put on neural network approaches to computer vision and speech recognition, robotics and other areas.

In this seminar students will acquaint themselves with literature from provided topics and will present their results as a talk supported by slides to the other participants of the seminar.

**Recommendations:**

- Finishing the module "Kognitive Systeme" prior to the seminar is recommended.
- Attending the lecture "Deep Learning und Neuronale Netze" prior to the seminar is of advantage
Notes

Prerequisites: CS Master’s level seminar. Participants must have attended and passed the course on "Introduction to Bioinformatics for Computer Scientists" in one of the preceding winter terms.

Task: You will need to select papers to present, give a presentation and write a report.

This main seminar allows students to understand and present the contents of current papers in Bioinformatics such as published for instance in the journals *Bioinformatics, BMC Bioinformatics, Journal of Computational Biology* etc. or at conferences such as ISMB or RECOMB.

We will provide a list of interesting papers, but students can also propose papers they are interested in. Students may also choose to cover broader topics of more general interest such as multiple sequence alignment, Bayesian phylogenetic inference, read assembly etc.

Each student will be assigned a lab member for help with understanding the article and preparing the slides as well as the report.

Students should give a 35 minute presentation on their topic of choice and write a report (Seminararbeit) comprising 8 pages.

Goals: Participants are able to understand, critically assess, and compare current research papers in Bioinformatics. They are able to present algorithms and models from current research papers in oral and written form at a level that corresponds to that of scientific publications and conference presentations. Participants are able to suggest extension to current methods.

Credits: 3 ECTS

Advanced Methods of Information Fusion

24344, SS 2020, 2 SWS, Language: German/English, Open in study portal

Learning Content

- The students will research selected theoretical works of the field of information fusion and data analysis, and present the results to their colleagues.
- The Seminar will prepare the students to write their Master thesis.
- Moreover, the students will learn to work with LaTeX and Powerpoint.
### Course: Seminar: Legal Studies I [T-INFO-101997]

**Responsible:** Prof. Dr. Thomas Dreier  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101218 - Seminar Module Law  
M-INFO-102060 - Further Examinations

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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

**Notes**  
Registration via https://portal.wiwi.kit.edu/ys/2708
6.124 Course: Services Marketing and B2B Marketing [T-WIWI-102806]

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<th>Prof. Dr. Martin Klarmann</th>
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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**

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**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).
6.125 Course: Software Engineering I [T-INFO-101968]

**Responsible:** Prof. Dr.-Ing. Anne Koziolke
Prof. Dr. Ralf Reussner
Prof. Dr. Walter Tichy

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101175 - Software Engineering I

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### 6.126 Course: Software Engineering I Pass [T-INFO-101995]

**Responsible:** Prof. Dr. Walter Tichy  
**Organisation:** KIT Department of Informatics  
**Part of:** M-INFO-101175 - Software Engineering I

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6.127 Course: Software Engineering II [T-INFO-101370]

**Responsible:** Prof. Dr.-Ing. Anne Koziolek  
Prof. Dr. Ralf Reussner  
Prof. Dr. Walter Tichy  

**Organisation:** KIT Department of Informatics  

**Part of:** M-INFO-100833 - Software Engineering II  
M-INFO-102060 - Further Examinations  

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

**Software Engineering II**

24076, WS 19/20, 4 SWS, Language: German, Open in study portal

**Description**

Students learn methods and techniques for systematic software development. Advanced topics of software engineering are covered.

**Literature**

6.128 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

Exams

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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

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.
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

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
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

**Type**
Written examination

**Credits**
5

**Recurrence**
Each summer term

**Version**
1

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**Events**

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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

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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

Events

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Exams

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Competence Certificate

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

The exam 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 ist 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:

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 ist 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:
6.132 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.
6.133 Course: Supplement Applied Informatics [T-WIWI-110711]

Responsible: Professorenschaft des Fachbereichs Informatik
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101476 - Business Processes and Information Systems

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.
6 COURSES

Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

6.134 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-103337 - 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.
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
6.135 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
6.136 Course: Telematics [T-INFO-101338]

**Responsible:** Prof. Dr. Martina Zitterbart
**Organisation:** KIT Department of Informatics
**Part of:** M-INFO-101194 - Telematics
M-INFO-102060 - Further Examinations

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**Description**

The lecture covers (i.a.) protocols, architectures, as well as methods and algorithms, for routing and establishing reliable end-to-end connections in the Internet. In addition to various methods for media access control in local area networks, the lecture also covers other communication systems, e.g. circuit-switched systems such as ISDN. Participants should also have understood the possibilities for managing and administering networks.

Below you will find excerpts from events related to this course:
Notes
The lecture covers (i.a.) protocols, architectures, as well as methods and algorithms, for routing and establishing reliable end-to-end connections in the Internet. In addition to various methods for media access control in local area networks, the lecture also covers other communication systems, e.g. circuit-switched systems such as ISDN. Participants should also have understood the possibilities for managing and administering networks.

Familiarity with the contents of the lecture *Einführung in Rechnernetze* or comparable lectures is assumed.

Learning Objectives
After attending this lecture, the students will

- have a profound understanding of protocols, architectures, as well as procedures and algorithms used for routing and for establishing reliable end-to-end connections in the Internet
- have a profound understanding of different media access control procedures in local networks and other communication systems like circuit-switched ISDN
- have a profound understanding of the problems that arise in large scale dynamic communication systems and are familiar with mechanism to deal with these problems
- be familiar with current developments such as SDN and data center networking
- be familiar with different aspects and possibilities for network management and administration

Students have a profound understanding of the basic protocol mechanisms that are necessary to establish reliable end-to-end communication. Students have detailed knowledge about the congestion and flow control mechanisms used in TCP and can discuss fairness issue in the context of multiple parallel transport streams. Students can analytically determine the performance of transport protocols and know techniques for dealing with specific constraints in the context of TCP, e.g., high data rates and low latencies. Students are familiar with current topics such as the problem of middle boxes on the Internet, the usage of TCP in data centers or multipath TCP. Students are also familiar with practical aspects of modern transport protocols and know practical ways to overcome heterogeneity in the development of distributed applications.

Students know the functions of (Internet) routing and routers and can explain and apply common routing algorithms. Students are familiar with routing architectures and different alternatives for buffer placement as well as their advantages and disadvantages. Students understand the classification into interior and exterior gateway protocols and have in-depth knowledge of the functionality and features of common protocols such as RIP, OSPF, and BGP. Students are also familiar with current topics such as label switching, IPv6 and SDN.

Students know the function of media access control and are able to classify and analytically evaluate different media access control mechanisms. Students have an in-depth knowledge of Ethernet and various Ethernet variants and characteristics, which especially includes current developments such as real-time Ethernet and data center Ethernet. Students can explain and apply the Spanning Tree Protocol.

Students know the architecture of ISDN and can reproduce the peculiarities of setting up the ISDN subscriber line. Students are familiar with the technical features of DSL.
### 6.137 Course: Theoretical Foundations of Computer Science [T-INFO-103235]

**Responsible:** Prof. Dr. Jörn Müller-Quade  
Prof. Dr. Peter Sanders  
Prof. Dr. Dorothea Wagner

**Organisation:** KIT Department of Informatics

**Part of:** M-INFO-101189 - Theoretical Informatics

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6.138 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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**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 course Economics I: Microeconomics [2610012] has to be completed beforehand.

**Recommendation**
None