Module Handbook
Economathematics M.Sc.
SPO 2016
Winter term 2020/21
Date: 01/10/2020
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<td>T-MATH-110302</td>
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<td>8.263. Wave Propagation in Periodic Waveguides</td>
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<td>8.266. Web Science</td>
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<td>8.268. Workshop Current Topics in Strategy and Management</td>
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1 General information

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! In the following we would like to give you a short introduction to the most important terms and rules that are important in connection with the choice of modules, courses and examinations.

1.1 Structural elements

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

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

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

1.2 Begin and completion of a module

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

1.3 Module versions

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

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

1.4 General and partial examinations

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

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

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

1.5 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.
1.6 Repeating exams
Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after loosing the examination claim. A counseling interview is mandatory.
For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

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

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

1.9 Further information
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/amtlcheBekanntmachungen.php).
2 Qualification objectives and profile of the degree program

The interdisciplinary Master's degree program in Economathematics provides the qualification for a professional activity in the areas of industry, banking, insurance, logistics, software development and research. Through the research-oriented training, the graduates are prepared especially for lifelong learning.

2.1 Professional key qualifications

Graduates have a broad knowledge of mathematical and economic sciences, including specific methods and techniques in the fields of analysis / numerics / optimization, stochastics, finance / risk management / managerial economics and operations management / data analysis / Informatics. They are able to analyze and explain current, complex questions in these fields. They can use methods from economics and mathematics, combine them and work interdisciplinarily. Based on these methods, they are able to handle practical and research-relevant questions. Graduates have trained analytical thinking and can work independently and reflectively. They are also able to acquire additional knowledge for further questions themselves.

2.2 Interdisciplinary qualifications

Graduates can analyze, evaluate and solve problems in new and unfamiliar situations in a multidisciplinary context. They are able to integrate their knowledge independently, deal with high complexity, and they have endurance in solving difficult problems. Graduates are capable of documenting, illustrating and interpreting results which have been obtained. They always take into account social, scientific and ethical conditions. They can argue and defend a position with experts as well as with laymen, on problems and solutions at a scientific level. In addition, they have the ability to work in a team and are able to use their knowledge effectively.

2.3 Learning outcomes

The graduates can name, explain and apply deepening mathematical methods in economics. They are also able to identify the application of these methods. The graduates have an understanding of economic processes and can comment on economic issues. They will gain an in-depth understanding of mathematical methods in the fields of analysis / numerics / optimization and stochastics.
3 Structure of the degree program

The courses are held in the form of modules, with most modules consisting of at least one course (with or without an exercise) or a seminar. Each module closes with a learning control. The average workload is measured in credit points (CP). In general, modules are graded. The grade is included in the final score. The master thesis consists of a separate module with 30 CP. In total, 120 credits must be earned in the Master’s degree, approximately evenly distributed over four semesters.

The Master’s degree in Economathematics is based on the two disciplines mathematics and economics, which are offered by the department of Mathematics and the department of Economics and Management. Modules from both disciplines must be selected as follows.

3.1 1. Subject: Mathematical Methods

There are the following four mathematical fields:

- Stochastics
- Applied and Numerical Mathematics / Optimization
- Analysis
- Algebra and Geometry

A minimum of 36 credits must be earned, with 8 credits from the field of Stochastics and 8 credits from one of the fields of Analysis or Applied and Numerical Mathematics / Optimization. The remaining credits must be obtained by any examination from the four mathematical fields. The modules belonging to these fields can be found in the module handbook.

3.2 2. Subject: Finance - Risk Management - Managerial Economics

18 CP must be acquired. The modules belonging to the three fields can be found in the module handbook.

3.3 3. Subject: Operations Management - Data Analysis - Informatics

18 CP must be acquired. The modules belonging to the three fields can be found in the module handbook.

3.4 Seminars

Furthermore, two seminar modules with 3 CP have to be taken. Precisely each one has to be chosen from the two disciplines mathematics and economics.

3.5 Elective subject

A further 12 credits are to be earned flexibly from the above-mentioned mathematical or economics modules or as a maximum of one seminar in economics. In particular, this gives the possibility of professional deepening in preparation for the Master Thesis. All modules in the elective subject must be graded.

3.6 Master Thesis

The master's thesis is usually written in the fourth semester and has 30 credits. Prerequisite for admission to the master's thesis module is that the student successfully completed module examinations of 70 credits. The master's thesis can be supervised in both participating departments and should, as far as possible, deal with a topic relevant to content and methodology for business mathematics / economathematics. A prerequisite is an appropriate deepening in the subject field of the work.
4 Key qualifications

Part of the degree program is also the acquisition of key and interdisciplinary qualifications. This field includes over-arching events on social topics, complementary scientific programs, the application of specialist knowledge in the field of work, competence training for the targeted training of soft skills as well as foreign language training in the scientific context.

The master's degree program in Economathematics at the Departments for Mathematics and Economics and Management is characterized by an exceptionally high degree of interdisciplinarity. With the combination of mathematical and economics subjects, the acquisition of knowledge from different disciplines is an integral part of the course. Interdisciplinary thinking in connections is thereby naturally promoted. In addition, the seminars of the Master's degree program contribute significantly to the promotion of the soft skills by the training of scientifically highly qualified editing and presentation of special topics.

The key competences integrally shared within the degree program can be assigned to the following fields:

4.1 Basic skills (soft skills)

- Teamwork, social communication and creativity techniques (for example, working in small groups, working together on the homework and reworking the course material)
- Presentation creation and techniques
- Logical and systematic argumentation and writing (for example, in exercises, seminars, courses and writing homework)
- Structured problem solving and communication

4.2 Practice orientation (enabling skills)

- Empowerment in a professional context
- Competences in project management
- Business basic knowledge
- English as a technical language

4.3 Orientation knowledge

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

Courses that provide the necessary competencies are summarized in the module for key qualifications and are regularly updated in the relevant module description of the module handbook. This list is coordinated with the House of Competence.
5 Exemplary study courses
The following versions are just a few of the many options of available study courses.

5.1 Version 1

5.1.1 Semester 1: 30 CP, 5 examinations
Subject 1: Analysis 8 CP, Stochastics 8 CP, choice 5 CP = 21 CP Subject 2: Finance 1 9 CP (SS) and Insurance Management I 9 CP (WS)

5.1.2 Semester 2: 28 CP, 6 examinations
Subject 1: Choice 6 CP + Choice 4 CP (or 5 + 5 or 7 + 5) = 10 CP Subject 2: Finance 2 9 CP (WS) or Finance 1 (SS) Subject 3: Informatics 9 CP

5.1.3 Semester 3: 32 CP, 6 examinations, 1 non exam assessment
Subject 1: choice 5 CP Subject 3: Stochastic Methods and Simulation 9 CP Subject 4: 3 CP (Seminar WiWi) Subject 5: 3 CP (Seminar Math) Optional compulsory: 8 CP + 4 CP (or other partitioning) = 12 CP

5.1.4 Semester 4: 30 CP
Master Thesis

5.2 Version 2

5.2.1 Semester 1: 33 CP, 5 examinations
Subject 1: Analysis 8 CP, Stochastics 8 CP, choice 8 CP = 24 CP Subject 2: Finance 1 9 CP (SS) and Insurance Management I 9 CP (WS)

5.2.2 Semester 2: 30 CP, 6 examinations
Subject 1: Option 8 CP + choice 4 CP (or other partitioning like 6 + 6 or 7 + 5) = 12 CP Subject 2: Finance 2 9 CP (WS) or Finance 1 (SS) Subject 3: Informatics 9 CP

5.2.3 Semester 3: 27 CP, 5 examinations, 1 non exam assessment
Subject 3: Stochastic Methods and Simulation 9 CP Subject 4: 3 CP (Seminar WiWi) Subject 5: 3 CP (Seminar Math) Optional: 8 CP + 4 CP (or other partitioning such as 6 + 6 or 7 + 5) = 12 CP

5.2.4 Semester 4: 30 CP
Master Thesis

5.3 Version 3

5.3.1 Semester 1: 30 CP, 5 examinations
Subject 1: Analysis 8 CP, Stochastics 8 CP, choice 5 CP = 21 CP Subject 2: Finance 1 9 CP

5.3.2 Semester 2: 30 CP, 6 examinations, 1 non exam assessment
Subject 2: Finance 2 9 CP Subject 3: Informatics 9 CP, Stochastic Methods and Simulation 9 CP = 18 CP Subject 5: 3 CP (Seminar Math)

5.3.3 semester 3: 30 credits, 5 - 6 examinations (depending on denomination)
Subject 1: Option 15 CP (conceivable in various forms, for example 5 + 5 + 5, 8 + 7, 6 + 4 + 5) Optional compulsory: 12 CP (e.g., 8 + 4 CP or 9 + 3 CP) Subject 4: 3 CP (Seminar WiWi)

5.3.4 Semester 4: 30 CP
Master Thesis
5.4 Version 4: Start in summer term (with specific possible choices)

5.4.1 Semester 1: 29 CP, 5 examinations
Subject 1: Introduction to Scientific Computing (Numerics and Applied Mathematics) 8 CP, Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 20 CP Subject 2: Finance 1: Derivatives 4.5 CP, Asset Pricing 4.5 CP = 9 CP

5.4.2 Semester 2: 30 CP, 5 examinations
Subject 1: Functional Analysis (Analysis) 8 CP, Spatial Stochastics (Stochastics) (8 CP) = 16 CP Subject 2: Finance 2: Fixed-income securities 4.5 CP, Credit Risks 4.5 CP = 9 CP Subject 3: Informatics: Algorithms for Internet Applications 5 CP

5.4.3 Semester 3: 31 CP, 6 examinations, 1 non exam assessment
Subject 3: Informatics: Smart Energy Distribution 4 CP Subject 3: Operations Research in Supply Chain Management and Healthcare Management: Tactical and Operational Supply Chain Management 4.5 CP + Event Discrete Simulation in Production and Logistics 4.5 CP = 9 CP Subject 4: Seminar WiWi 3 CP (examination) Subject 5: Seminar Math 3 CP (study performance) Optional subject: Stochastic Geometry (Stochastics) 8 CP, Generalized Regression Models (Stochastics) 4 CP = 12 CP

5.4.4 Semester 4: 30 CP
Master Thesis

5.5 Version 5: Start in summer term (with specific possible choices)

5.5.1 Semester 1: 29 CP, 5 examinations
Subject 1: Introduction to Scientific Computing (Numerics and Applied Mathematics) 8 CP, Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 20 CP Subject 2: Finance 1: Derivatives 4.5 CP, Asset Pricing 4.5 CP = 9 CP

5.5.2 Semester 2: 33 CP, 5 examinations, 1 non exam assessment
Subject 1: Functional analysis (analysis) 8 CP, asymptotic stochastics (stochastics) 8 CP = 16 CP Subject 2: Finance 2: Fixed-income securities 4.5 CP, credit risks 4.5 CP = 9 CP Subject 3: Informatics: Algorithms for Internet Applications 5 CP Subject 5: 3 CP (Seminar math) 3 CP (Study performance)

5.5.3 Semester 3: 28 CP, 6 examinations
Subject 3: Informatics: Smart Energy Distribution 4 CP Subject 3: Operations Research in Supply Chain Management and Healthcare Management: Tactical and Operational Supply Chain Management 4.5 CP + Event Discrete Simulation in Production and Logistics 4.5 CP = 9 CP Subject 4: Seminar WiWi 3 CP (examination) Optional subject: boundary and eigenvalue problems (analysis) 8 CP, generalized regression models (stochastics) 4 CP = 12 CP

5.5.4 Semester 4: 30 CP
Master Thesis

5.6 Version 6: Start in winter term (with specific possible choices)

5.6.1 Semester 1: 31.5 CP, 5 examinations
Subject 1: Functional Analysis (Analysis) 8 CP, Financial Mathematics in Discrete Time (Stochastics) 8 CP, Algebra 8 CP = 24 CP Subject 2: Finance 1: Valuation 4.5 CP Subject 4: Seminar WiWi 3 CP

5.6.2 Semester 2: 32.5 CP, 6 examinations
Subject 1: Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 12 CP Subject 2: Finance 1: Derivatives 4.5 CP Subject 3: Informatics: Document Management and Groupware Systems 4 CP Scope: Boundary and eigenvalue problems 8 CP, Generalized regression models (stochastics) 4 CP = 12 CP

5.6.3 Semester 3: 26 CP, 5 examination credits, 1 non exam assessment
5.6.4 Semester 4: 30 CP
Master Thesis

5.7 Version 7: Start in winter term (with specific possible choices)

5.7.1 Semester 1: 31.5 CP, 5 examinations
Subject 1: Functional Analysis (Analysis) 8 CP, Financial Mathematics in Discrete Time (Stochastics) 8 CP, Algebra 8 CP = 24 CP
Subject 2: Finance 1: Valuation 4.5 CP Subject 4: Seminar WiWi 3 CP

5.7.2 Semester 2: 32.5 CP, 6 examinations
Subject 1: Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 12 CP Subject 2: Finance 1: Derivatives 4.5 CP Subject 3: Informatics: Document Management and Groupware Systems 4 CP Compulsory subject: Introduction to scientific computing (numerics and applied mathematics) 8 CP, Generalized Regression Models (Stochastics) 4 CP = 12 CP

5.7.3 Semester 3: 26.5 CP, 5 examinations, 1 non exam assessment

5.7.4 Semester 4: 30 CP
Master Thesis

5.8 Version 8: Start in winter term (with specific possible choices)

5.8.1 Semester 1: 31.5 CP, 5 examinations
Subject 1: Functional Analysis (Analysis) 8 CP, Financial Mathematics in Discrete Time (Stochastics) 8 CP, Algebra 8 CP = 24 CP
Subject 2: Finance 1: Valuation 4.5 CP Subject 4: Seminar WiWi 3 CP

5.8.2 Semester 2: 29.5 CP, 6 examinations
Subject 1: Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 12 CP Subject 2: Finance 1: Derivatives 4.5 CP Subject 3: Informatics: Document Management and Groupware Systems 4 CP + Efficient Algorithms 5 CP = 9 CP Compulsory subject: Generalized regression models (stochastics) 4 CP

5.8.3 Semester 3: 29 CP, 5 examinations, 1 non exam assessment
Subject 2: Finance 2: Financial Intermediation 4.5 CP + eFinance: Information Management for Securities Trading 4.5 CP = 9 CP Subject 3: Operations Research in Supply Chain Management: Graph Theory and Advanced Location Models 4.5 CP, Site Planning and Strategic Supply Chain Management 4.5 CP = 9 CP Subject 5: Seminar Math 3 CP Required field: differential geometry (algebra and geometry) 8 CP

5.8.4 Semester 4: 30 CP
Master Thesis

5.9 Version 9: Start in winter term (with specific possible choices)

5.9.1 Semester 1: 31.5 CP, 5 examinations
Subject 1: Functional Analysis (Analysis) 8 CP, Financial Mathematics in Discrete Time (Stochastics) 8 CP, Algebra 8 CP = 24 CP
Subject 2: Insurance Management I: Insurance Production 4.5 CP Subject 4: Seminar WiWi 3 CP

5.9.2 Semester 2: 29.5 CP, 6 examinations
Subject 1: Financial Mathematics in Continuous Time (Stochastics) 8 CP, Time Series (Stochastics) 4 CP = 12 CP Subject 2: Insurance Management I: Insurance Marketing 4.5 CP Subject 3: Stochastic modeling and optimization: Simulation I 4.5 CP + Simulation II 4.5 CP = 9 CP Required field: Computer science: Smart Energy Distribution 4 CP
5.9.3 Semester 3: 29 CP, 6 examinations, 1 non exam assessment
Subject 2: Decision-making and game theory: auction theory 4.5 CP + experimental economic research 4.5 CP = 9 CP Subject 3: Operations Research in Supply Chain Management: Graph Theory and Advanced Location Models 4.5 CP, Site Planning and Strategic Supply Chain Management 4.5 CP = 9 CP Subject 5: Seminar Math 3 CP Required field: Informatics: Knowledge Discovery 5 CP + Seminar Informatik B (Master) 3 CP = 8 CP

5.9.4 Semester 4: 30 CP
Master Thesis
### 6 Field of study structure

<table>
<thead>
<tr>
<th>Mandatory</th>
<th>Credits</th>
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<td>Master Thesis</td>
<td>30 CR</td>
</tr>
<tr>
<td>Mathematical Methods</td>
<td>36 CR</td>
</tr>
<tr>
<td>Finance - Risk Management - Managerial Economics</td>
<td>18 CR</td>
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<tr>
<td>Operations Management - Data Analysis - Informatics</td>
<td>18 CR</td>
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<td>Seminar in Economics and Management</td>
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<td>Mathematical Seminar</td>
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<tr>
<td>Elective Field</td>
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#### 6.1 Master Thesis

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<tr>
<td>M-MATH-102917 Master Thesis</td>
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### 6.2 Mathematical Methods

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<td>M-MATH-102860</td>
<td>Continuous Time Finance</td>
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<tr>
<td>M-MATH-102865</td>
<td>Stochastic Geometry</td>
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<td>M-MATH-102902</td>
<td>Asymptotic Stochastics</td>
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<td>M-MATH-102903</td>
<td>Spatial Stochastics</td>
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<td>M-MATH-102904</td>
<td>Brownian Motion</td>
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<td>M-MATH-102905</td>
<td>Percolation</td>
<td>6 CR</td>
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<td>M-MATH-102906</td>
<td>Generalized Regression Models</td>
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<td>M-MATH-102907</td>
<td>Markov Decision Processes</td>
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<td>Stochastic Control</td>
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<td>M-MATH-102909</td>
<td>Mathematical Statistics</td>
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<td>Nonparametric Statistics</td>
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<td>Time Series Analysis</td>
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<td>M-MATH-102919</td>
<td>Discrete Time Finance</td>
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<td>M-MATH-102922</td>
<td>Poisson Processes</td>
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<td>Extreme Value Theory</td>
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<td>Stochastic Evolution Equations</td>
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<td>Stein's Method</td>
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<td>Probability Theory and Combinatorial Optimization</td>
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<td>Random Graphs</td>
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<td>M-MATH-102956</td>
<td>Forecasting: Theory and Practice</td>
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<td>Ruin Theory</td>
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<td>Introduction to Homogeneous Dynamics</td>
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<td>M-MATH-105487</td>
<td>Topological Data Analysis new</td>
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**Election block: Stochastics (at least 8 credits)**

**Election block: Analysis or Applied and Numerical Mathematics, Optimization (at least 8 credits)**
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<td>M-MATH-103539</td>
<td>Nonlinear Analysis</td>
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<td>Harmonic Analysis for Dispersive Equations</td>
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<td>M-MATH-102884</td>
<td>Scattering Theory</td>
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<td>M-MATH-104059</td>
<td>Mathematical Topics in Kinetic Theory</td>
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<td>Dispersive Equations</td>
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<td>Selected Topics in Harmonic Analysis</td>
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<td>M-MATH-101338</td>
<td>Parallel Computing</td>
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<td>Introduction to Scientific Computing</td>
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<td>M-MATH-102891</td>
<td>Finite Element Methods</td>
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<td>Numerical Optimisation Methods</td>
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<td>Numerical Methods in Computational Electrodynamics</td>
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<td>Wavelets</td>
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<td>Mathematical Methods in Signal and Image Processing</td>
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<td>Optimisation and Optimal Control for Differential Equations</td>
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7 Modules

7.1 Module: Adaptive Finite Elemente Methods [M-MATH-102900]

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<th>Prof. Dr. Willy Dörfler</th>
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Mandatory

| T-MATH-105898 | Adaptive Finite Element Methods | 6 CR   | Dörfler |

Prerequisites
none
7.2 Module: Advanced Inverse Problems: Nonlinearity and Banach Spaces [M-MATH-102955]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization) Elective Field

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**Prerequisites**

none
Module: Advanced Topics in Strategy and Management [M-WIWI-103119]

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

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

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field**

**Credits** 9

**Recurrence** Each term

**Language** German

**Level** 4

**Version** 1

**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), 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**

**Students**

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

**Prerequisites**

None

**Content**

The module is divided into three main topics:

The students

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

**Recommendation**

None

**Annotation**

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

Every course of this module will be at least offered every second term. Thus, it will be possible to complete the module within two terms.
### 7.4 Module: Algebra [M-MATH-101315]

**Responsible:** Prof. Dr. Frank Herrlich  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

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**Prerequisites**

None
### 7.5 Module: Algebraic Geometry [M-MATH-101724]

**Responsible:** Prof. Dr. Frank Herrlich  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field:**

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7.6 Module: Algebraic Number Theory [M-MATH-101725]

**Responsible:** Dr. Stefan Kühnlein  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

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7.7 Module: Algebraic Topology [M-MATH-102948]

**Responsible:** Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

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**Prerequisites**

none
7.8 Module: Algebraic Topology II [M-MATH-102953]

**Responsible:** Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

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**Prerequisites**

none
### 7.9 Module: Analytics and Statistics [M-WIWI-101637]

**Responsible:** Prof. Dr. Oliver Grothe  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Finance - Risk Management - Managerial Economics

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#### Election block: Supplementary Courses (between 4,5 and 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) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

**Competence Goal**

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

**Prerequisites**

The course "Advanced Statistics" is compulsory.

**Content**

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

**Annotation**

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

**Workload**

The total workload for this module is approximately 270 hours.

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

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

**Part of:** Operations Management - Data Analysis - Informatics

**Elective Field**

<table>
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<th>Language</th>
<th>Level</th>
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**Election block: Compulsory Elective Courses (between 1 and 2 items)**

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<th>Course Title</th>
<th>Credits</th>
<th>Teacher</th>
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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>
</tr>
<tr>
<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>4.5 CR</td>
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**Election block: Supplementary Courses (at most 1 item)**

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<tr>
<td>T-WIWI-102726</td>
<td>Global Optimization I</td>
<td>4.5 CR</td>
<td>Stein</td>
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<tr>
<td>T-WIWI-106199</td>
<td>Modeling and OR-Software: Introduction</td>
<td>4.5 CR</td>
<td>Nickel</td>
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<td>T-WIWI-106545</td>
<td>Optimization under Uncertainty</td>
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**Competence Certificate**

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

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

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

**Competence Goal**

The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of 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.

**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.

**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.
# 7.11 Module: Asymptotic Stochastics [M-MATH-102902]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field:**

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<td>T-MATH-105866</td>
<td>Asymptotic Stochastics</td>
<td>8 CR</td>
<td>Fasen-Hartmann, Henze, Klar</td>
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**Prerequisites**  
none
7.12 Module: Bifurcation Theory [M-MATH-103259]

**Responsible:** Dr. Rainer Mandel

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**
None

**Annotation**
Course is held in English
7.13 Module: Bott Periodicity [M-MATH-104349]

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

Elective Field

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<td>T-MATH-108905</td>
<td>Bott Periodicity</td>
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**Prerequisites**

None
7.14 Module: Boundary and Eigenvalue Problems [M-MATH-102871]

**Responsible:** Prof. Dr. Wolfgang Reichel

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization) Elective Field

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<th>8 CR</th>
<th>Frey, Hundertmark, Lamm, Plum, Reichel, Schnaubelt</th>
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### Module: Boundary Element Methods [M-MATH-103540]

**Responsible:** PD Dr. Tilo Arens  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization) Elective Field

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#### Prerequisites

None
### Module: Brownian Motion [M-MATH-102904]

**Responsible:** Prof. Dr. Nicole Bäuerle  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field:**

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**Prerequisites**

none
### 7.17 Module: Classical Methods for Partial Differential Equations [M-MATH-102870]

**Responsible:** Prof. Dr. Michael Plum  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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Economathematics M.Sc.  
Module Handbook as of 01/10/2020
Module: Collective Decision Making [M-WIWI-101504]

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

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field**

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

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**Competence Certificate**

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

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

**Competence Goal**

Students

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

**Prerequisites**

None

**Content**

The focus of the module is on mechanisms of public decisions making, including voting and the aggregation of preferences and judgements.

**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Combinatorics [M-MATH-102950]

**Mandatory**

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**Competence Certificate**
The final grade is given based on the written final exam (3h).

By successfully working on the problem sets, a bonus can be obtained. If the grade in the final written exam is between 4.0 and 1.3, then the bonus improves the grade by one step (0.3 or 0.4).

**Competence Goal**
The students understand, describe, and use fundamental notions and techniques in combinatorics. They can analyze, structure, and formally describe typical combinatorial questions. The students can use the results and methods such as inclusion-exclusion, generating functions, Young tableaux, as well as the developed proof ideas, in solving combinatorial problems. In particular, they can analyze the existence and the number of ordered and unordered arrangements of a given size. The students understand and critically use the combinatorial methods. Moreover, the students can communicate using English technical terminology.

**Prerequisites**
none

**Content**
The course is an introduction into combinatorics. Starting with counting problems and bijections, classical methods such as inclusion-exclusion principle and generating functions are discussed. Further topics include Catalan families, permutations, Young tableaux, partial orders, and combinatorial designs.

**Annotation**
- Regular cycle: every 2nd year, summer semester
- Course is held in English
7.20 Module: Commutative Algebra [M-MATH-104053]

**Responsible:** Prof. Dr. Frank Herrlich

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

**Elective Field**

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**Prerequisites**

None
7.21 Module: Comparison Geometry [M-MATH-102940]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

Elective Field

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**Mandatory**

| T-MATH-105917 | Comparison Geometry | 5 CR | Tuschmann |

**Prerequisites**

none
7.22 Module: Comparison of Numerical Integrators for Nonlinear Dispersive Equations [M-MATH-104426]

Responsible: Prof. Dr Katharina Schratz
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits: 4
Recurrence: Irregular
Duration: 1 semester
Level: 4
Version: 1

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<td>Comparison of Numerical Integrators for Nonlinear Dispersive Equations</td>
<td>4 CR</td>
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Prerequisites

None

Content

We will compare numerical integrators (e.g., splitting methods, exponential integrators) for nonlinear dispersive equations such as the nonlinear Schrödinger equation and Kortweg-de Vries equation. We will analyze their convergence properties with regard to the regularity assumptions on the solution.
7.23 Module: Complex Analysis [M-MATH-102878]

**Responsible:** Dr. Christoph Schmoeger  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**  
**Credits:** 8  
**Recurrence:** Irregular  
**Duration:** 1 semester  
**Level:** 5  
**Version:** 1

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**Content**
- infinite products  
- Mittag-Leffler theorem  
- Montel's theorem  
- Riemann mapping theorem  
- conformal mappings  
- univalent (schlicht) functions  
- automorphisms of some domains  
- harmonic functions  
- Schwarz reflection principle  
- regular and singular points of power series
## 7.24 Module: Compressive Sensing [M-MATH-102935]

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**Responsible:** Prof. Dr. Michael Plum

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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<td>T-MATH-105854</td>
<td>Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems</td>
<td>8</td>
<td>Plum</td>
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## 7.26 Module: Continuous Time Finance [M-MATH-102860]

**Responsible:** Prof. Dr. Nicole Bäuerle  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field**

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<td>T-MATH-105930</td>
<td>Continuous Time Finance</td>
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### 7.27 Module: Control Theory [M-MATH-102941]

- **Responsible:** Prof. Dr. Roland Schnaubelt
- **Organisation:** KIT Department of Mathematics
- **Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
  Elective Field

<table>
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#### Prerequisites

none
7.28 Module: Convex Geometry [M-MATH-102864]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

Credits 8
Recurrence Irregular
Duration 1 semester
Level 4
Version 1

Mandatory
T-MATH-105831 Convex Geometry 8 CR Hug

Competence Goal
The students
- know fundamental combinatorial, geometric and analytic properties of convex sets and convex functions and apply these to related problems,
- are familiar with fundamental geometric and analytic inequalities for functionals of convex sets and their applications to geometric extremal problems and can present central ideas and techniques of proofs,
- know selected integral formulas for convex sets and the required results on invariant measures.
- know how to work self-organized and self-reflexive.

Content
1. Convex Sets
   1.1. Combinatorial Properties
   1.2. Support and Separation Properties
   1.3. Extremal Representations
2. Convex Functions
   2.1. Basic Properties
   2.2. Regularity
   2.3. Support Function
3. Brunn-Minkowski Theory
   3.1. Hausdorff Metric
   3.2. Volume and Surface Area
   3.3. Mixed Volumes
   3.4. Geometric Inequalities
   3.5. Surface Area Measures
   3.6. Projection Functions
4. Integralgeometric Formulas
   4.1. Invariant Measures
   4.2. Projection and Section Formulas
Module: Data Science for Finance [M-WIWI-105032]

**M 7.29 Module: Data Science for Finance [M-WIWI-105032]**

**Responsible:** Prof. Dr. Maxim Ulrich

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

**Part of:** Finance - Risk Management - Managerial Economics

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<tr>
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<td>Python for Computational Risk and Asset Management</td>
<td>4.5 CR</td>
<td>Ulrich</td>
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**Competence Certificate**

The module examination takes the form of an alternative exam assessment. The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 12 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

**Competence Goal**

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

**Content**

The course covers several topics, among them:

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

**Recommendation**

Basic knowledge of capital market theory.

**Workload**

The total workload for this module is 270 hours (9 credit points). The total number of hours resulting from income from studying online video, answering quizzes, studying iPython notebooks, active and interactive "Python Data Sessions" and reading literature you have heard.
Module: Decision and Game Theory [M-WIWI-102970]

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

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field**

**Credits** 9

**Language** German

**Level** 4

**Version** 1

### Election block: Wahlpflichtangebot (9 credits)

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<td>Experimental Economics</td>
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<td>Advanced Game Theory</td>
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**Ehrhart**

**Weinhardt**

**Ehrhart, Puppe, Reiß**

### Competence Certificate

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

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

### Competence Goal

The student learns the basics of individual and strategic decisions on an advanced and formal level.

He learns to analyze economic problems through abstract and method-based thinking and to design solution strategies. In the tutorials, the concepts and results of the lecture will be applied in case studies.

### Prerequisites

None

### Content

See German version.

### Workload

The total workload for this module is approximately 270 hours. For further information see German version.
7.31 Module: Differential Geometry [M-MATH-101317]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry) Elective Field

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**Prerequisites**

None
7.32 Module: Discrete Dynamical Systems [M-MATH-105432]

**Responsible:** PD Dr. Gerd Herzog

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**
none
# Module: Discrete Time Finance [M-MATH-102919]

## Responsible:
- Prof. Dr. Nicole Bäuerle

## Organisation:
- KIT Department of Mathematics

## Part of:
- Mathematical Methods (Stochastics)
- Elective Field

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## Bäuerle, Fasen-Hartmann

## Prerequisites
- none
7.34 Module: Dispersive Equations [M-MATH-104425]

**Responsible:** Prof. Dr. Wolfgang Reichel

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

- Credits: 6
- Recurrence: Irregular
- Duration: 1 semester
- Level: 4
- Version: 1

**Mandatory**

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**Prerequisites**

None
### 7.35 Module: Dynamical Systems [M-MATH-103080]

**Responsible:** Prof. Dr. Jens Rottmann-Matthes  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**  

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**Prerequisites**

none
7.36 Module: Econometrics and Statistics I [M-WIWI-101638]

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

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field:**

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

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<td>Data Mining and Applications</td>
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<td>T-WIWI-103127</td>
<td>Panel Data</td>
<td>4,5</td>
<td>Heller</td>
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<td>T-WIWI-110868</td>
<td>Predictive Modeling</td>
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<td>Statistical Modeling of Generalized Regression Models</td>
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<td>Financial Econometrics II</td>
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**Competence Certificate**

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

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

**Competence Goal**

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

**Prerequisites**

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

The course Financial Econometrics [2520022] can only be passed if the course Time Series Analysis in the module Time Series Analysis and the course Generalized Regression Models in the module Generalized Regression Models have not been passed.

**Content**

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

**Workload**

The total workload for this module is approximately 270 hours.
7.37 Module: Econometrics and Statistics II [M-WIWI-101639]

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

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field**

**Credits:** 9

**Recurrence:** Each term

**Language:** German

**Level:** 4

**Version:** 3

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

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

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

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

The course Financial Econometrics [2520022] can only be passed if the course Time Series Analysis in the module Time Series Analysis and the course Generalized Regression Models in the module Generalized Regression Models have not be passed.

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

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

**Responsible:** Prof. Dr. Kay Mitusch  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Finance - Risk Management - Managerial Economics  
**Elective Field**

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

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

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<td>Asset Pricing</td>
<td>4.5 CR</td>
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<td>T-WIWI-102622</td>
<td>Corporate Financial Policy</td>
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#### Competence Certificate

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

#### Competence Goal

The students

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

#### Prerequisites

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

#### Content

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

#### Workload

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

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics

Elective Field

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

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<td>T-WIWI-107504</td>
<td>Smart Grid Applications</td>
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Competence Certificate

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

Competence Goal

The student

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

Prerequisites

None.

Content

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

Annotation

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

Workload

The total workload for this module is approximately 270 hours. For further information see German version.
### 7.40 Module: Energy Economics and Technology [M-WIWI-101452]

**Responsible:** Prof. Dr. Wolf Fichtner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Management - Data Analysis - Informatics  
**Elective Field:**

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

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<td>Energy and Environment</td>
<td>4.5</td>
<td>Karl</td>
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<td>T-WIWI-102830</td>
<td>Energy Systems Analysis</td>
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<td>T-WIWI-107464</td>
<td>Smart Energy Infrastructure</td>
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### Competence Certificate

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

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

### Competence Goal

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

### Prerequisites

To integrate the module "Energy Economics and Technology" in the degree programme "Wirtschaftsmathematik" it is compulsory to choose the course „Energy Systems Analysis”.

### Content

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

### Workload

The total workload for this module is approximately 270 hours. For further information see German version.
7.41 Module: Evolution Equations [M-MATH-102872]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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

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<tr>
<td>T-MATH-105844</td>
<td>Evolution Equations</td>
<td>8 CR</td>
<td>Frey, Kunstmann, Schnaubelt</td>
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Module: Experimental Economics [M-WIWI-101505]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
  Elective Field

Credits: 9  Recurrence: Each term  Language: German  Level: 4  Version: 5

Election block: Compulsory Elective Courses (2 items)

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<td>T-WIWI-105781</td>
<td>Incentives in Organizations</td>
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<td>Predictive Mechanism and Market Design</td>
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<td>Topics in Experimental Economics</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

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

Prerequisites
None.

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

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

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
7.43 Module: Exponential Integrators [M-MATH-103700]

**Responsible:** Prof. Dr. Marlis Hochbruck

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

<table>
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**Competence Certificate**

Oral exam of approximately 20 minutes

**Prerequisites**

None

**Content**

In this class we consider the construction, analysis, implementation and application of exponential integrators. The focus will be on two types of stiff problems.

The first one is characterized by a Jacobian that possesses eigenvalues with large negative real parts. Parabolic partial differential equations and their spatial discretization are typical examples. The second class consists of highly oscillatory problems with purely imaginary eigenvalues of large modulus.

Apart from motivating the construction of exponential integrators for various classes of problems, our main intention in this class is to present the mathematics behind these methods. We will derive error bounds that are independent of stiffness or highest frequencies in the system.

Since the implementation of exponential integrators requires the evaluation of the product of a matrix function with a vector, we will briefly discuss some possible approaches as well.
### 7.44 Module: Extremal Graph Theory [M-MATH-102957]

**Responsible:** Prof. Dr. Maria Aksenovich  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

**Credits:** 8  
**Recurrence:** Irregular  
**Language:** English  
**Level:** 4  
**Version:** 1

| Mandatory | T-MATH-105931 | Extremal Graph Theory | 8 CR | Aksenovich |

**Competence Certificate**  
The final grade is given based on an oral exam (approx. 30 min.).

**Competence Goal**  
The students understand, describe, and use fundamental notions and techniques in extremal graph theory. They can analyze, structure, and formally describe typical combinatorial questions. The students understand and use Szemeredi’s regularity lemma and Szemeredi’s theorem, can use probabilistic techniques, such as dependent random choice and multistep random colorings, know the best bounds for the extremal numbers of complete graphs, cycles, complete bipartite graphs, and bipartite graphs with bounded maximum degree. They understand and can use the Ramsey theorem for graphs and hypergraphs, as well as stepping-up techniques for bounding Ramsey numbers. Moreover, the students know and understand the behavior of Ramsey numbers for graphs with bounded maximum degree. The students can communicate using English technical terminology.

**Content**  
The course is concerned with advanced topics in graph theory. It focuses on the areas of extremal functions, regularity, and Ramsey theory for graphs and hypergraphs. Further topics include Turán's theorem, Erdős-Stone theorem, Szemerédi’s lemma, graph colorings and probabilistic techniques.

**Recommendation**  
Basic knowledge of linear algebra, analysis and graph theory is recommended.

**Annotation**  
Course is held in English
Module: Extreme Value Theory [M-MATH-102939]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

**Elective Field**

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**Mandatory**

| T-MATH-105908 | Extreme Value Theory | 4 CR | Fasen-Hartmann, Henze |

**Prerequisites**

None
Module: Finance 1 [M-WIWI-101482]

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

Organisation: KIT Department of Economics and Management

Part of: Finance - Risk Management - Managerial Economics
Elective Field

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Election block: Compulsory Elective Courses (9 credits)

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<td>Derivatives</td>
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<td>Valuation</td>
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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal
The student

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

Prerequisites
None

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
7.47 Module: Finance 2 [M-WIWI-101483]

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

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

**Part of:** Finance - Risk Management - Managerial Economics
Elective Field

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

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<td>Asset Pricing</td>
<td>4,5 CR</td>
<td>Ruckes, Uhrig-Homburg</td>
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<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
<td>4,5 CR</td>
<td>Schuster, Uhrig-Homburg</td>
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<td>T-WIWI-110995</td>
<td>Bond Markets</td>
<td>4,5 CR</td>
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<tr>
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<td>Bond Markets - Models &amp; Derivatives</td>
<td>3 CR</td>
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<td>4,5 CR</td>
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<td>Derivatives</td>
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<td>Uhrig-Homburg</td>
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<td>4,5 CR</td>
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<td>Fixed Income Securities</td>
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<td>T-WIWI-102626</td>
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**Competence Certificate**

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

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

**Competence Goal**

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

**Prerequisites**

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

**Content**

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

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
7.48 Module: Finance 3 [M-WIWI-101480]

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

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

**Part of:** Finance - Risk Management - Managerial Economics  
Elective Field

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**Credits:** 9  
**Recurrence:** Each term  
**Duration:** 1 semester  
**Language:** German/English  
**Level:** 4  
**Version:** 6

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

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<td>Asset Pricing</td>
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<td>T-WIWI-108880</td>
<td>Blockchains &amp; Cryptofinance</td>
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**Competence Certificate**

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

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

---

**Competence Goal**

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

---

**Prerequisites**

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

---

**Content**

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

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**Workload**

The total workload for this module is approximately 270 hours. For further information see German version.
7.49 Module: Finite Element Methods [M-MATH-102891]

**Responsible:** Prof. Dr. Willy Dörfler
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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### 7.50 Module: Finite Group Schemes [M-MATH-103258]

**Responsible:** Prof. Dr. Frank Herrlich  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field:**  
**Credits:** 4  
**Recurrence:** Once  
**Language:** German  
**Level:** 4  
**Version:** 1  
**Mandatory**

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Januszewski
7.51 Module: FinTech Innovations [M-WIWI-105036]

**Responsible:** Prof. Dr. Maxim Ulrich

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

**Part of:** Finance - Risk Management - Managerial Economics

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<td>9 CR</td>
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**Competence Certificate**

The assessment is carried out in form of a written thesis based on the course "Engineering FinTech Solutions".

**Competence Goal**

Students will learn to connect innovative financial research with modern information technology to build a prototype that solves some daunting tasks for professional end-users in the field of modern asset and risk management. Students with correspondingly good technological knowledge and a corresponding affinity for IT applications independently create their own prototypes in order to solve an extensive FinTech problem. Students learn to organize themselves in a team in a goal-oriented manner and to bring a comprehensive software project from the field of financial technology to success in partial steps. In addition, students deepen their financial and IT skills and are therefore able to successfully complete this interface, which is important for the booming FinTech market. Students of this module are particularly well prepared for management tasks in various innovation projects (not only in the area of FinTech).

**Prerequisites**

see T-WIWI-106193 "Engineering FinTech Solutions"

**Content**

The module is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

**Recommendation**

None

**Workload**

Total effort for 9 credit points: approx. 270 hours.
7.52 Module: Forecasting: Theory and Practice [M-MATH-102956]

**Responsibility:** Prof. Dr. Tilmann Gneiting

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

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**Prerequisites**

None

**Annotation**

- Regular cycle: every 2nd year, starting winter semester 16/17
- Course is held in English
# 7.53 Module: Foundations of Continuum Mechanics [M-MATH-103527]

**Responsible:** Prof. Dr. Christian Wieners  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

none
7.54 Module: Fourier Analysis [M-MATH-102873]

**Responsible:** Prof. Dr. Roland Schnaubelt

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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<td>8 CR Schnaubelt</td>
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**Content**

- Fourier series
- Fourier transform on L1 and L2
- Tempered distributions and their Fourier transform
- Explicit solutions of the Heat-, Schrödinger- and Wave equation in \( \mathbb{R}^n \)
- the Hilbert transform
- the interpolation theorem of Marcinkiewicz
- Singular integral operators
- the Fourier multiplier theorem of Mihlin
7.55 Module: Fourier Analysis and its Applications to PDEs [M-MATH-104827]

**Responsible:** Jun.-Prof. Dr. Xian Liao

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

Elective Field

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### 7.56 Module: Functional Analysis [M-MATH-101320]

**Responsible:** Prof. Dr. Roland Schnaubelt  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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#### Prerequisites

None
7.57 Module: Functions of Matrices [M-MATH-102937]

**Responsible:** PD Dr. Volker Grimm

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**
none
### 7.58 Module: Functions of Operators [M-MATH-102936]

**Responsible:** PD Dr. Volker Grimm  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**  

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Module: Generalized Regression Models [M-MATH-102906]

**Responsible:** PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

**Elective Field:**

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**Prerequisites**

None
7.60 Module: Geometric Group Theory [M-MATH-102867]

**Responsible:** Prof. Dr Roman Sauer  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field:**

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### 7.61 Module: Geometric Numerical Integration [M-MATH-102921]

**Responsible:** Prof. Dr Tobias Jahnke  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

None
7.62 Module: Geometry of Schemes [M-MATH-102866]

**Responsible:** Prof. Dr. Frank Herrlich

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

**Elective Field**

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7.63 Module: Global Differential Geometry [M-MATH-102912]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

**Elective Field**

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**Prerequisites**

none
7.4 Module: Graph Theory [M-MATH-101336]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

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Mandatory

| T-MATH-102273 | Graph Theory | 8 CR | Aksenovich |

Competence Certificate
The final grade is given based on the written final exam (3h). By successfully working on the problem sets, a bonus can be obtained. If the grade in the final written exam is between 4.0 and 1.3, then the bonus improves the grade by one step (0.3 or 0.4).

Competence Goal
The students understand, describe and use fundamental notions and techniques in graph theory. They can represent the appropriate mathematical questions in terms of graphs and use the results such as Menger’s theorem, Kuratowski’s theorem, Turan’s theorem, as well as the developed proof ideas, to solve these problems. The students can analyze graphs in terms of their characteristics such as connectivity, planarity, and chromatic number. They are well positioned to understand graph theoretic methods and use them critically. Moreover, the students can communicate using English technical terminology.

Prerequisites
None

Content
The course Graph Theory treats the fundamental properties of graphs, starting with basic ones introduced by Euler and including the modern results obtained in the last decade. The following topics are covered: structure of trees, paths, cycles and walks in graphs, minors, unavoidable subgraphs in dense graphs, planar graphs, graph coloring, Ramsey theory, and regularity in graphs.

Annotation
- Regular cycle: every 2nd year, winter semester
- Course is held in English
7.65 Module: Group Actions in Riemannian Geometry [M-MATH-102954]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)

**Elective Field:**

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**Prerequisites**

none
7.66 Module: Growth and Agglomeration [M-WIWI-101496]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

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Election block: Compulsory Elective Courses (9 credits)

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

Competence Goal
The student

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

Prerequisites
None

Content
The module includes the contents of the lectures Endogenous Growth Theory [2561503], Spatial Economics [2561260] and International Economic Policy [2560254]. While the first two lectures have a more formal-analytic focus, the third lecture approaches fundamental ideas and problems from the field of international economic policy from a more verbal perspective. The common underlying principle of all three lectures in this module is that, based on different theoretical models, economic policy recommendations are derived.

Recommendation
Attendance of the course Introduction Economic Policy [2560280] is recommended.
Successful completion of the courses Economics I: Microeconomics and Economics II: Macroeconomics is required.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
7.67 Module: Harmonic Analysis [M-MATH-105324]

Responsible: Prof. Dr. Dorothee Frey
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

Credits: 8
Recurrence: Irregular
Duration: 1 semester
Level: 4
Version: 1

Mandatory

| T-MATH-110804 | Harmonic Analysis | 8 CR | Frey, Kunstmann, Schnaubelt |

Content

- Fourier series
- Fourier transform on L1 and L2
- Tempered distributions and their Fourier transform
- Explizit solutions of the Heat-, Schrödinger- and Wave equation in Rn
- the Hilbert transform
- the interpolation theorem of Marcinkiewicz
- Singular integral operators
- the Fourier multiplier theorem of Mihlin
Module: Harmonic Analysis for Dispersive Equations [M-MATH-103545]

**Responsible:** apl. Prof. Dr. Peer Kunstmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

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**Prerequisites**

None

**Content**

Fourier transform, Fourier multipliers, interpolation, singular integral operators, Mihlin's Theorem, Littlewood-Paley decomposition, oscillating integrals, dispersive estimates, Strichartz estimates, nonlinear equations.
## 7.69 Module: Homotopy Theory [M-MATH-102959]

**Responsible:** Prof. Dr Roman Sauer  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

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### 7.00 Module: Informatics [M-WIWI-101472]

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

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

**Part of:**
Operations Management - Data Analysis - Informatics

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

| T-WIWI-102680 | Computational Economics | 4,5 CR | Shukla |
| T-WIWI-109248 | Critical Information Infrastructures | 4,5 CR | Sunyaev |
| T-WIWI-109246 | Digital Health | 4,5 CR | Sunyaev |
| T-WIWI-109270 | Human Factors in Security and Privacy | 4,5 CR | Volkamer |
| T-WIWI-102661 | Database Systems and XML | 4,5 CR | Oberweis |
| T-WIWI-102668 | Enterprise Architecture Management | 4,5 CR | Wolf |
| T-WIWI-110346 | Supplement Enterprise Information Systems | 4,5 CR | Oberweis |
| T-WIWI-110372 | Supplement Software- and Systemsengineering | 4,5 CR | Oberweis |
| T-WIWI-106423 | Information Service Engineering | 4,5 CR | Sack |
| T-WIWI-110863 | Introduction to Data Science | 4,5 CR | Herbold |
| T-WIWI-102666 | Knowledge Discovery | 4,5 CR | Oberweis |
| T-WIWI-102667 | Management of IT-Projects | 4,5 CR | Schätzle |
| T-WIWI-106340 | Machine Learning 1 - Basic Methods | 4,5 CR | Zöllner |
| T-WIWI-106341 | Machine Learning 2 – Advanced Methods | 4,5 CR | Zöllner |
| T-WIWI-102697 | Business Process Modelling | 4,5 CR | Oberweis |
| T-WIWI-102679 | Nature-Inspired Optimization Methods | 4,5 CR | Sunyaev |
| T-WIWI-109799 | Process Mining | 4,5 CR | Oberweis |
| T-WIWI-110848 | Semantic Web Technologies | 4,5 CR | Sure-Vetter |
| T-WIWI-102895 | Software Quality Management | 4,5 CR | Oberweis |
| T-WIWI-102669 | Strategic Management of Information Technology | 4,5 CR | Wolf |
| T-WIWI-103112 | Web Science | 4,5 CR | Sure-Vetter |

**Election block: Seminars and Advanced Labs (between 0 and 1 items)**

| T-WIWI-1110144 | Emerging Trends in Digital Health | 4,5 CR | Sunyaev |
| T-WIWI-1110143 | Emerging Trends in Internet Technologies | 4,5 CR | Sunyaev |
| T-WIWI-109249 | Sociotechnical Information Systems Development | 4,5 CR | Sunyaev |
| T-WIWI-111126 | Advanced Lab Blockchain Hackathon (Master) | 4,5 CR | Sunyaev |
| T-WIWI-111125 | Advanced Lab Sociotechnical Information Systems Development (Master) | 4,5 CR | Sunyaev |
| T-WIWI-110548 | Advanced Lab Informatics (Master) | 4,5 CR | Professorenschaft des Fachbereichs Informatik |
| T-WIWI-108439 | Advanced Lab Security, Usability and Society | 4,5 CR | Volkamer |
| T-WIWI-109786 | Advanced Lab Security | 4,5 CR | Volkamer |
Competence Certificate
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. For passing the module exam in every singled partial exam the respective minimum requirements has to be achieved. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

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

Competence Goal
The student

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

Prerequisites
It is only allowed to choose one lab.

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

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Information Systems in Organizations [M-WIWI-104068]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

Credits 9
Recurrence Each term
Language German
Level 4
Version 4

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

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<td>4.5 CR</td>
<td>Mädche, Nadj, Toreini</td>
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<td>Designing Interactive Systems</td>
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<td>Practical Seminar: Information Systems and Service Design</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

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

Prerequisites
None

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

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

Annotation
New module starting summer term 2018.

Workload
The total workload for this module is approximately 270 hours.
7.72 Module: Innovation and Growth [M-WIWI-101478]

**Responsible:** Prof. Dr. Ingrid Ott

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

**Part of:** Finance - Risk Management - Managerial Economics

**Elective Field**

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

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<td>Dynamic Macroeconomics</td>
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<td>Brumm</td>
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<td>T-WIWI-102785</td>
<td>Theory of Endogenous Growth</td>
<td>4.5</td>
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<td>T-WIWI-102840</td>
<td>Innovation Theory and Policy</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**

Students shall be given the ability to

- know the basic techniques for analyzing static and dynamic optimization models that are applied in the context of micro- and macroeconomic theories
- understand the important role of innovation to the overall economic growth and welfare
- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

**Prerequisites**

None

**Content**

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

**Recommendation**

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

**Workload**

Total expenditure of time for 9 credits: 270 hours

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

The exact distribution is subject to the credits of the courses of the module.
7.73 Module: Integral Equations [M-MATH-102874]

Responsible: PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics

Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

Elective Field

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Mandatory

| T-MATH-105834 | Integral Equations | 8 CR | Arens, Griesmaier, Hettlich |

Economathematics M.Sc.
Module Handbook as of 01/10/2020
**M 7.74 Module: Introduction into Particulate Flows [M-MATH-102943]**

**Responsible:** Prof. Dr. Willy Dörfler  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

none
## 7.75 Module: Introduction to Aperiodic Order [M-MATH-105331]

**Responsible:** Prof. Dr. Tobias Hartnick  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field:***

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**Prerequisites:** None
Module: Introduction to Geometric Measure Theory [M-MATH-102949]

**Responsible:** PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)  
Elective Field

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**Prerequisites**
none
Module: Introduction to Homogeneous Dynamics [M-MATH-105101]

**Responsible:** Prof. Dr. Tobias Hartnick

**Organisation:** KIT Department of Mathematics

**Part of:**
- Mathematical Methods (Stochastics)
- Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
- Mathematical Methods (Algebra and Geometry)
- Elective Field

**Credits:** 6

**Recurrence:** Irregular

**Duration:** 1 semester

**Level:** 4

**Version:** 1

### Mandatory

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<td>T-MATH-110323</td>
<td>Introduction to Homogeneous Dynamics</td>
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**Prerequisites**

None
7.78 Module: Introduction to Kinetic Theory [M-MATH-103919]

**Responsible:** Prof. Dr. Martin Frank

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

- **Elective Field**
- **Credits:** 4
- **Recurrence:** Each winter term
- **Duration:** 1 semester
- **Language:** English
- **Level:** 4
- **Version:** 1

**Mandatory**

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<td>T-MATH-108013</td>
<td>Introduction to Kinetic Theory</td>
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**Competence Goal**

After successfully taking part in the module’s classes and exams, students have gained knowledge and abilities as described in the “Inhalt” section. Specifically, students know common means of mesoscopic and macroscopic description of particle systems. Furthermore, students are able to describe the basics of multiscale methods, such as the asymptotic analysis and the method of moments. Students are able to apply numerical methods to solve engineering problems related to particle systems. They can name the assumptions that are needed to be made in the process. Students can judge whether specific models are applicable to the specific problem and discuss their results with specialists and colleagues.

**Prerequisites**

None

**Content**

- From Newton's equations to Boltzmann's equation
- Rigorous derivation of the linear Boltzmann equation
- Properties of kinetic equations (existence & uniqueness, H theorem)
- The diffusion limit
- From Boltzmann to Euler & Navier-Stokes
- Method of Moments
- Closure techniques
- Selected numerical methods

**Recommendation**

Partial Differential Equations, Functional Analysis
### 7.79 Module: Introduction to Matlab and Numerical Algorithms [M-MATH-102945]

**Responsible:** Dr. Daniel Weiß  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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<td>Introduction to Matlab and Numerical Algorithms</td>
<td>5</td>
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**Prerequisites**  
none
7.80 Module: Introduction to Scientific Computing [M-MATH-102889]

**Responsible:** Prof. Dr. Willy Dörfler  
Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
Elective Field

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<td>T-MATH-105837</td>
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**Prerequisites**  
None
7.81 Module: Inverse Problems [M-MATH-102890]

**Responsible:** Prof. Dr. Roland Griesmaier

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization) Elective Field

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<td>Inverse Problems</td>
<td>8 CR</td>
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Module: Key Moments in Geometry [M-MATH-104057]

Responsible: Prof. Dr. Wilderich Tuschmann
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
Elective Field

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<td>Key Moments in Geometry</td>
<td>5 CR</td>
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**Prerequisites**

None
### 7.83 Module: L2-Invariants [M-MATH-102952]

| Responsible: | Dr. Holger Kammeyer |
| Organisation: | KIT Department of Mathematics |
| Part of: | Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
Mathematical Methods (Algebra and Geometry)  
Elective Field |

| Credits | 5 |
| Recurrence | Irregular |
| Duration | 2 term |
| Level | 4 |
| Version | 1 |

#### Mandatory

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**Prerequisites**

none
### Module: Lie Groups and Lie Algebras [M-MATH-104261]

**Responsible:** Prof. Dr. Enrico Leuzinger  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field:**

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

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics

Elective Field
Credits: 9
Recurrence: Each summer term
Duration: 1 semester
Language: German/English
Level: 4
Version: 3

Election block: Compulsory Elective Courses (at least 1 item)
T-WIWI-111100 Current Directions in Consumer Psychology 3 CR Scheibehenne
T-WIWI-111099 Judgment and Decision Making 4.5 CR Scheibehenne
T-WIWI-107720 Market Research 4.5 CR Klarmann
T-WIWI-109864 Product and Innovation Management 3 CR Klarmann

Election block: Supplementary Courses (at most 1 item)
T-WIWI-102834 Case Studies in Sales and Pricing 1.5 CR Klarmann
T-WIWI-106981 Digital Marketing and Sales in B2B 1.5 CR Konhäuser
T-WIWI-110985 International Business Development and Sales 6 CR Casenave, Klarmann, Terzidis
T-WIWI-102835 Marketing Strategy Business Game 1.5 CR Klarmann
T-WIWI-102891 Price Negotiation and Sales Presentations 1.5 CR Klarmann, Schröder
T-WIWI-102883 Pricing 4.5 CR Feurer

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

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

Competence Goal
Students
- have an advanced knowledge about central marketing contents
- have a fundamental understanding of the marketing instruments
- know and understand several strategic concepts and how to implement them
- are able to implement their extensive marketing knowledge in a practical context
- know several qualitative and quantitative approaches to prepare decisions in Marketing
- have the theoretical knowledge to write a master thesis in Marketing
- have the theoretical knowledge to work in/together with the Marketing department

Prerequisites
The course "Market Research" is obligatory.

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

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

Workload
The total workload for this module is approximately 270 hours.
7.86 Module: Markov Decision Processes [M-MATH-102907]

**Responsible:** Prof. Dr. Nicole Bäuerle

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)  
Elective Field

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**Mandatory**

| T-MATH-105921 | Markov Decision Processes | 5 CR | Bäuerle |

**Prerequisites**

none
### 7.87 Module: Master Thesis [M-MATH-102917]

**Responsible:** Dr. Sebastian Grensing  
**Organisation:** KIT Department of Mathematics  
**Part of:** Master Thesis

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### Module: Mathematical Methods in Signal and Image Processing [M-MATH-102897]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**  

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**Prerequisites**  
none
7.89 Module: Mathematical Methods of Imaging [M-MATH-103260]

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

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**

None
Module: Mathematical Modelling and Simulation in Practise [M-MATH-102929]

**Responsible:** PD Dr. Gudrun Thäter

**Organisation:** KIT Department of Mathematics

**Part of:**
- Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
- Elective Field

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**Prerequisites**
None
7.91 Module: Mathematical Programming [M-WIWI-101473]

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:** Operations Management - Data Analysis - Informatics

**Elective Field**

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**Election block: Compulsory Elective Courses (at most 2 items)**

- **T-WIWI-102719** Mixed Integer Programming I 4.5 CR Stein
- **T-WIWI-102726** Global Optimization I 4.5 CR Stein
- **T-WIWI-103638** Global Optimization I and II 9 CR Stein
- **T-WIWI-102856** Convex Analysis 4.5 CR Stein
- **T-WIWI-102724** Nonlinear Optimization I 4.5 CR Stein
- **T-WIWI-103637** Nonlinear Optimization I and II 9 CR Stein
- **T-WIWI-102855** Parametric Optimization 4.5 CR Stein

**Election block: Supplementary Courses (at most 2 items)**

- **T-WIWI-106548** Advanced Stochastic Optimization 4.5 CR Rebennack
- **T-WIWI-102720** Mixed Integer Programming II 4.5 CR Stein
- **T-WIWI-102727** Global Optimization II 4.5 CR Stein
- **T-WIWI-102723** Graph Theory and Advanced Location Models 4.5 CR Nickel
- **T-WIWI-106549** Large-scale Optimization 4.5 CR Rebennack
- **T-WIWI-103124** Multivariate Statistical Methods 4.5 CR Grothe
- **T-WIWI-102725** Nonlinear Optimization II 4.5 CR Stein
- **T-WIWI-102715** Operations Research in Supply Chain Management 4.5 CR Nickel
- **T-WIWI-110162** Optimization Models and Applications 4.5 CR Sudermann-Merx

**Competence Certificate**

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

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

**Competence Goal**

The student

- names and describes basic notions for advanced optimization methods, in particular from continuous and mixed integer programming,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies optimization problems and chooses the appropriate solution methods to solve also challenging optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

**Prerequisites**

At least one of the courses "Mixed Integer Programming I", "Parametric Optimization", "Convex Analysis", "Nonlinear Optimization I" and "Global Optimization I" has to be taken.

**Content**

The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables.
**Annotation**
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).
For the lectures of Prof. Stein a grade of 30% of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
7.92 Module: Mathematical Statistics [M-MATH-102909]

**Responsible:** PD Dr. Bernhard Klar  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field**

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**Mandatory**

| T-MATH-105872 | Mathematical Statistics | 4 CR | Henze, Klar |

**Prerequisites**

none
7.93 Module: Mathematical Topics in Kinetic Theory [M-MATH-104059]

Responsible: Prof. Dr. Dirk Hundertmark
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Competence Goal
The students are familiar with the basic questions in kinetic theory and methodical approaches to their solutions. With the acquired knowledge they are able to understand the required analytical methods and are able to apply them to the basic equations in kinetic theory.

Prerequisites
None

Content
- Boltzmann equation: Cauchy problem and properties of solutions
- entropy and H theorem
- equilibrium and convergence to equilibrium
- other models of kinetic theory
7.94 Module: Maxwell's Equations [M-MATH-102885]

**Responsible:** PD Dr. Frank Hettlich

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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Arens, Griesmaier, Hettlich
Module: Medical Imaging [M-MATH-102896]

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

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

Elective Field

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**Mandatory**

| T-MATH-105861 | Medical Imaging | 8 CR | Rieder |

**Prerequisites**

None
Module: Methodical Foundations of OR [M-WIWI-101414]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Management - Data Analysis - Informatics Elective Field

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

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**Election block: Supplementary Courses ()**

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

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

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

**Workload**
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Microeconomic Theory [M-WIWI-101500]

Responsibility: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: Finance - Risk Management - Managerial Economics
Elective Field

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

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

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

Competence Goal
Students
- are able to model practical microeconomic problems mathematically and to analyze them with respect to positive and normative questions,
- understand individual incentives and social outcomes of different institutional designs.

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

Prerequisites
None

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# Module: Monotonicity Methods in Analysis [M-MATH-102887]

**Responsible:** PD Dr. Gerd Herzog  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Responsible:** Prof. Dr. Tobias Lamm

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**

None
Module: Nonlinear Maxwell Equations [M-MATH-103257]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

Elective Field

Credits: 3
Recurrence: Irregular
Duration: 1 semester
Level: 4
Version: 1

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Prerequisites
none

Content

- Short introduction to nonlinear contraction semigroups in Hilbert spaces and to the spaces H(curl) and H(div).
- Semilinear case:
- Quasilinear case:
  Maxwell's equations with nonlinear instantaneous material laws. Local wellposedness on the whole space via linearisation, apriori estimates and regularization. Blow-up examples. Outlook to results on domains.
Module: Nonlinear Maxwell Equations [M-MATH-105066]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Prerequisites
none
### 7.102 Module: Nonlinear Wave Equations [M-MATH-105326]

**Responsible:** Dr. Birgit Schörkhuber  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

None
7.103 Module: Nonparametric Statistics [M-MATH-102910]

**Responsible:** PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics) Elective Field

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**Mandatory**

| T-MATH-105873 | Nonparametric Statistics | 4 CR | Henze, Klar |

**Prerequisites**

None
### 7.104 Module: Numerical Continuation Methods [M-MATH-102944]

**Responsible:** Prof. Dr. Jens Rottmann-Matthes  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**

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**Prerequisites:**
none
7.105 Module: Numerical Linear Algebra for Scientific High Performance Computing
[M-MATH-103709]

Responsible: Dr. Hartwig Anzt
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Mandatory

| T-MATH-107497 | Numerical Linear Algebra for Scientific High Performance Computing | 3 CR | Anzt |

Prerequisites
None
7.106 Module: Numerical Linear Algebra in Image Processing [M-MATH-104058]

**Responsible:** PD Dr. Volker Grimm  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**  

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**Prerequisites**

None

**Responsible:** Prof. Dr. Willy Dörfler  
Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
Elective Field

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| T-MATH-105836 | Numerical Methods for Differential Equations | 8 CR  
Dörfler, Hochbruck, Jahnke, Rieder, Wieners |
### 7.108 Module: Numerical Methods for Hyperbolic Equations [M-MATH-102915]

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**Competence Goal**

- 

**Prerequisites**

- none
# 7.109 Module: Numerical Methods for Integral Equations [M-MATH-102930]

**Responsible:** PD Dr. Tilo Arens  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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### Mandatory

| T-MATH-105901 | Numerical Methods for Integral Equations | 8 CR | Arens, Hettlich |

**Responsible:** Prof. Dr. Marlis Hochbruck  
Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
Elective Field

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### 7.111 Module: Numerical Methods for Time-Dependent Partial Differential Equations [M-MATH-102928]

**Responsible:** Prof. Dr. Marlis Hochbruck  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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### 7.112 Module: Numerical Methods in Computational Electrodynamics [M-MATH-102894]

**Responsible:** Prof. Dr. Willy Dörfler  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

none
Module: Numerical Methods in Fluid Mechanics [M-MATH-102932]

**Responsible:** Prof. Dr. Willy Dörfler
PD Dr. Gudrun Thäter

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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7.114 Module: Numerical Methods in Mathematical Finance [M-MATH-102901]

**Responsible:** Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Mandatory**

T-MATH-105865  Numerical Methods in Mathematical Finance  8 CR  Jahnke

**Prerequisites**

none
7 MODULES

Module: Numerical Methods in Mathematical Finance II [M-MATH-102914]

7.115 Module: Numerical Methods in Mathematical Finance II [M-MATH-102914]

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Mandatory

| T-MATH-105880 | Numerical Methods in Mathematical Finance II | 8 CR | Jahnke |

Prerequisites

none
7.116 Module: Numerical Optimisation Methods [M-MATH-102892]

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

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

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**Recurrence:** Irregular

**Duration:** 1 semester

**Level:** 4

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Dörfler, Hochbruck, Jahnke, Rieder, Wieners
7.117 Module: Numerical Simulation in Molecular Dynamics [M-MATH-105327]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Prerequisites
None

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

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

**Part of:** Operations Management - Data Analysis - Informatics

*Elective Field*

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**Election block: Compulsory Elective Courses (at most 2 items)**

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<td>Modeling and OR-Software: Advanced Topics</td>
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<td>Operations Research in Supply Chain Management</td>
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**Election block: Supplementary Courses (at most 2 items)**

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<td>Large-scale Optimization</td>
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**Competence Certificate**

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

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

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

**Competence Goal**

The student

- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of SCM and their respective optimization problems,
- is acquainted with classical location problem models (in planes, in networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

**Prerequisites**

At least one of the courses "Operations Research in Supply Chain Management", "Graph Theory and Advanced Location Models", "Modeling and OR-Software: Advanced Topics" and "Special Topics of Stochastic Optimization (elective)" has to be taken.
Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in Supply Chain Management, including methods of scheduling as well as different approaches in procurement and distribution logistics. Finally, issues of warehousing and inventory management will be discussed.

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

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

Workload
Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours
7.119 Module: Optimisation and Optimal Control for Differential Equations [M-MATH-102899]

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

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**

none
### 7.120 Module: Optimization in Banach Spaces [M-MATH-102924]

**Responsible:** Prof. Dr. Roland Griesmaier  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

none
7.121 Module: Parallel Computing [M-MATH-101338]

**Responsible:** Dr. rer. nat. Mathias Krause

Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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**Prerequisites**

None
7.122 Module: Percolation [M-MATH-102905]

**Responsible:** Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

**Elective Field**

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**Mandatory**

| T-MATH-105869 | Percolation | 6 CR | Last |

**Competence Goal**

The students

- are acquainted with basic models of discrete and continuum percolation,
- acquire the skills needed to use specific probabilistic and graph-theoretical methods for the analysis of these models,
- know how to work self-organised and self-reflexive.

**Prerequisites**

none
Module: Poisson Processes [M-MATH-102922]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field**

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**Competence Certificate**

oral exam

**Competence Goal**

The students know about important properties of the Poisson process. The focus is on probabilistic methods and results which are independent of the specific phase space. The students understand the central role of the Poisson process as a specific point process and as a random measure.

**Module grade calculation**

Marking: grade of exam

**Prerequisites**

none

**Content**

- Distributional properties of Poisson processes
- The Poisson process as a particular point process
- Stationary Poisson and point processes
- Random measures and Cox processes
- Poisson cluster processes and compound Poisson processes
- The spatial Gale-Shapley algorithm
### Module: Potential Theory [M-MATH-102879]

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Authors: Arens, Hettlich, Kirsch, Reichel
### Module: Probability Theory and Combinatorial Optimization [M-MATH-102947]

<table>
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<tr>
<th>Responsible</th>
<th>Prof. Dr. Daniel Hug</th>
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**Prerequisites**

none
### 7.126 Module: Project Centered Software-Lab [M-MATH-102938]

**Responsible:** PD Dr. Gudrun Thäter  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**  
none
7.127 Module: Random Graphs [M-MATH-102951]

**Responsible:** Dr. Matthias Schulte

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

**Elective Field**

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**Prerequisites**

none
7.128 Module: Ruin Theory [M-MATH-104055]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

Elective Field

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**Prerequisites**

None
### Module: Scattering Theory [M-MATH-102884]

**Responsible:** PD Dr. Frank Hettlich  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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Arens, Griesmaier, Hettlich
Module: Selected Topics in Harmonic Analysis [M-MATH-104435]

**Responsible:** Prof. Dr. Dirk Hundertmark

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

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<td>Selected Topics in Harmonic Analysis</td>
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**Competence Goal**

The students are familiar with the concepts of singular integral operators and weighted estimates in Harmonic Analysis. They know the relations between the BMO space and the Muckenhoupt weights and also how to use dyadic analysis operators to obtain estimates for Calderon-Zygmund operators.

**Prerequisites**

None

**Content**

- Calderon-Zygmund and Singular Integral operators
- BMO space and Muckenhoupt weights
- Reverse Holder Inequality and Factorisation of Ap weights
- Extrapolation Theory and weighted norm inequalities for singular integral operators
7.131 Module: Seminar [M-WIWI-102971]

Responsibility: Prof. Dr. Hagen Lindstädt
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management

Part of: Seminar in Economics and Management
Elective Field

Credits: 3
Language: German
Level: 4
Version: 1

Election block: Wahlpflichtangebot (3 credits)

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</table>

Competence Certificate
The module examination consists of one seminar (according to §4 (3), 3 of the examination regulation). A detailed description of the assessment is given in the specific course characterization.
The final mark for the module is the mark of the seminar.

Competence Goal
The students are in a position to independently handle current, research-based tasks according to scientific criteria.

• They are able to research, analyze, abstract and critically review the information.
• They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
• They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Prerequisites
None.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section "Key Qualifications" of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

Recommendation
None.

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.
Module: Seminar [M-WIWI-102973]

**Responsible:** Prof. Dr. Hagen Lindstädt  
Prof. Dr. Oliver Stein

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

**Part of:** Seminar in Economics and Management  
Elective Field

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**Election block: Wahlpflichtangebot (3 credits)**

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<td>T-WIWI-103481</td>
<td>Seminar in Operations Research A (Master)</td>
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</table>

**Competence Certificate**  
The modul examination consists of one seminar (according to §4 (3), 3 of the examintaion regulation). A detailed description of the assessment is given in the specific course characerization.

The final mark for the module is the mark of the seminar.

**Competence Goal**  
The students are in a position to independently handle current, research-based tasks according to scientific criteria.

- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

**Prerequisites**  
None.

**Content**  
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well. A detailed description of these qualifications is given in the section "Key Qualifications" of the module handbook.

Furthermore, the module also includes additional key qualifications provided by the KQ-courses.

**Recommendation**  
None.

**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.
### 7.133 Module: Seminar [M-MATH-102730]

- **Responsible:** Dr. Stefan Kühnlein
- **Organisation:** KIT Department of Mathematics
- **Part of:** Mathematical Seminar

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#### Election block: Elective Seminar (1 item)

| T-MATH-105686 | Seminar Mathematics | 3 CR |

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**Credits:** 3

**Recurrence:** Each term

**Language:** German

**Level:** 4

**Version:** 3
Module: Seminar [M-WIWI-102974]

Responsible: Prof. Dr. Hagen Lindstädt
Prof. Dr. Oliver Stein

Organisation: KIT Department of Economics and Management
Part of: Elective Field

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Election block: Wahlpflichtangebot (1 item)

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<td>T-WIWI-103482</td>
<td>Seminar in Operations Research B (Master)</td>
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</table>

Professorenschaft des Fachbereichs Informatik
Nickel, Rebennack, Stein

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

The final mark for the module is the mark of the seminar

Competence Goal
- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Prerequisites
None.

Content
Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well.

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

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

Workload
he total workload for this module is approximately 90 hours.
Module: Seminar [M-WIWI-102972]

**Responsible:** Prof. Dr. Hagen Lindstädt  
Prof. Dr. Oliver Stein

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

**Credits** 3  
**Recurrence** Each term  
**Language** German/English  
**Level** 4  
**Version** 1

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**Election block: Wahlplfichtangebot (1 item)**

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</table>

**Competence Certificate**

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

The final mark for the module is the mark of the seminar.

**Competence Goal**

- The students are in a position to independently handle current, research-based tasks according to scientific criteria.
- They are able to research, analyze, abstract and critically review the information.
- They can draw own conclusions using their interdisciplinary knowledge from the less structured information and selectively develop current research results.
- They can logically and systematically present the obtained results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

**Prerequisites**

None.

**Content**

Competences which are gained in the seminar module especially prepare the student for composing the final thesis. Within the term paper and the presentation the student exercises himself in scientific working techniques supported by the supervisor.

Beside advancing skills in techniques of scientific working there are gained integrative key qualifications as well.

**Annotation**

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

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

**Workload**

The total workload for this module is approximately 90 hours.
Module: Service Operations [M-WIWI-102805]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: Operations Management - Data Analysis - Informatics

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Election block: Compulsory Elective Courses (at most 2 items)

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<td>T-WIWI-102884</td>
<td>Operations Research in Health Care Management</td>
<td>4.5</td>
<td>Nickel</td>
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<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management</td>
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<td>T-WIWI-102716</td>
<td>Practical Seminar: Health Care Management (with Case Studies)</td>
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Election block: Supplementary Courses (at most 2 items)

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<td>Demand-Driven Supply Chain Planning</td>
<td>4.5</td>
<td>Packowski</td>
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Competence Certificate
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO), whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Competence Goal
Students

- knows the theoretical bases and the key components of Business Intelligence systems,
- acquires the basic skills to make use of business intelligence and analytics software in the service context
- are introduced into various application scenarios of analytics in the service context
- are able to distinguish different analytics methods and apply them in context
- learn how to apply analytics software in the service context
- are trained for the structured compilation and solution of practice relevant problems with the help of commercial business intelligence software packages as well as analytics methods and tools

Prerequisites
At least one of the four courses Operations Research in Supply Chain Management, Operations Research in Health Care Management, Practical seminar: Health Care Management or Discrete-Event Simulation in Production and Logistics has to be assigned.

Content
The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data “Big Data” and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.

It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

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

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
### 7.137 Module: Sobolev Spaces [M-MATH-102926]

**Responsible:** Prof. Dr. Andreas Kirsch  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**

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<td>Sobolev Spaces</td>
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<td>Kirsch</td>
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7.138 Module: Spatial Stochastics [M-MATH-102903]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field**

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<td>Spatial Stochastics</td>
<td>8 CR Hug. Last</td>
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**Competence Goal**
The students are familiar with some basic spatial stochastic processes. They do not only understand how to deal with general properties of distributions, but also know how to describe and apply specific models (Poisson process, Gaussian random fields). They know how to work self-organised and self-reflexive.

**Prerequisites**
none

**Content**
- Point processes
- Random measures
- Poisson processes
- Gibbs point processes
- Ralm distributions
- Spatial ergodic theorem
- Spectral Theory of random fields
- Gaussian fields

**Recommendation**
It is recommended to attend the following modules previously: Probability Theory
### Module: Special Functions and Applications in Potential Theory [M-MATH-101335]

**Responsible:** Prof. Dr. Andreas Kirsch  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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**Prerequisites**

None
### 7.140 Module: Special Topics of Numerical Linear Algebra [M-MATH-102920]

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<th>Responsible:</th>
<th>Prof. Dr. Marlis Hochbruck</th>
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#### Mandatory

| T-MATH-105891 | Special Topics of Numerical Linear Algebra | 8 CR | Hochbruck |

#### Prerequisites

none
7.141 Module: Spectral Theory [M-MATH-101768]

**Responsible:** Prof. Dr. Dorothee Frey

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field**

**Credits:** 8

**Recurrence:** Each summer term

**Language:** German

**Level:** 5

**Version:** 1

**Mandatory**

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**Recommendation**

It is recommended to attend the module ‘Functional Analysis’ previously.
### Module: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature [M-MATH-102958]

**Responsible:** Prof. Dr. Wilderich Tuschmann  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

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<td>Spin Manifolds, Alpha Invariant and Positive Scalar Curvature</td>
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7.143 Module: Splitting Methods for Evolution Equations [M-MATH-105325]

Responsible: Prof. Dr Tobias Jahnke
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Prerequisites
None
Module: Stein's Method [M-MATH-102946]

**Responsible:** Dr. Matthias Schulte

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics) 
Elective Field

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**Mandatory**

| T-MATH-105914 | Stein's Method | 5 CR | Schulte |

**Prerequisites**

none
# 7.145 Module: Stochastic Control [M-MATH-102908]

**Responsible:** Prof. Dr. Nicole Bäuerle  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Stochastics)  
**Elective Field**

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### Prerequisites

none
Module: Stochastic Differential Equations [M-MATH-102881]

Responsible: Prof. Dr. Dorothee Frey
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Elective Field

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Mandatory

T-MATH-105852 Stochastic Differential Equations 8 CR Frey, Schnaubelt

Content

- Brownian motion
- Martingales and Martingal inequalities
- Stochastic integrals and Ito's formula
- Existence and uniqueness of solutions for systems of stochastic differential equations
- Perturbation and stability results
- Application to equations in financial mathematics, physics and engineering
- Connection with diffusion equations and potential theory
7.147 Module: Stochastic Evolution Equations [M-MATH-102942]

Responsible: Prof. Dr. Lutz Weis
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
          Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
          Elective Field

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Prerequisites

none
7.148 Module: Stochastic Geometry [M-MATH-102865]

Responsible: Prof. Dr. Daniel Hug
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Stochastics)
Mathematical Methods (Algebra and Geometry)
Elective Field

Credits: 8
Recurrence: Each summer term
Duration: 1 semester
Level: 5
Version: 1

Mandatory

| T-MATH-105840 | Stochastic Geometry | 8 CR | Hug, Last |

Competence Goal
The students

- know the fundamental geometric models and characteristics in stochastic geometry,
- are familiar with properties of Poisson processes of geometric objects,
- know examples of applications of models of stochastic geometry,
- know how to work self-organised and self-reflexive.

Content

- Random Sets
- Geometric Point Processes
- Stationarity and Isotropy
- Germ Grain Models
- Boolean Models
- Foundations of Integral Geometry
- Geometric densities and characteristics
- Random Tessellations

Recommendation
It is recommended to attend the module 'Spatial Stochastics' previously.
### 7.149 Module: Stochastic Optimization [M-WIWI-103289]

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:** Operations Management - Data Analysis - Informatics  
**Elective Field**

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

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<td>T-WIWI-106548</td>
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**Election block: Supplementary Courses (at most 1 item)**

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<td>T-WIWI-102719</td>
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<td>Optimization Models and Applications</td>
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**Competence Certificate**

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

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

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

**Competence Goal**

The student

- names and describes basic notions for advanced stochastic optimization methods, in particular, ways to algorithmically exploit the special model structures,
- knows the indispensable methods and models for quantitative analysis of stochastic optimization problems,
- models and classifies stochastic optimization problems and chooses the appropriate solution methods to solve also challenging stochastic optimization problems independently and, if necessary, with the aid of a computer,
- validates, illustrates and interprets the obtained solutions,
- identifies drawbacks of the solution methods and, if necessary, is able to makes suggestions to adapt them to practical problems.

**Prerequisites**

At least one of the courses "Advanced Stochastic Optimization", "Large-scale Optimization" or "Introduction to Stochastic Optimization" has to be taken.

**Content**

The module focuses on the modeling as well as the imparting of theoretical principles and solution methods for optimization problems with special structure, which occur for example in the stochastic optimization.

**Recommendation**

It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.
Annotation
The course "Introduction to Stochastic Optimization" will be offered until the winter semester 2020/21 as an additional option in the elective offer of the module. Thereafter, the course can only be selected in the supplementary offer.

The courses are sometimes offered irregularly. The curriculum, planned for three years in advance, can be found on the Internet at http://sop.ior.kit.edu/28.php.

Workload
The total workload for this module is approximately 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module. The total number of hours per course is determined by the amount of time spent attending the lectures and exercises, as well as the exam times and the time required to achieve the module's learning objectives for an average student for an average performance.
Module: Structural Graph Theory [M-MATH-105463]

Responsible: Prof. Dr. Maria Aksenovich
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Algebra and Geometry)
          Elective Field

<table>
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Competence Goal
After successful completion of the course, the participants should be able to present and analyse main results in Structural Graph Theory. They should be able to establish connections between graph minors and other graph parameters, give examples, and apply fundamental results to related problems.

Prerequisites
None

Content
The purpose of this course is to provide an introduction to some of the central results and methods of structural graph theory. Our main point of emphasis will be on graph minor theory and the concepts devised in Robertson and Seymour’s intricate proof of the Graph Minor Theorem: in every infinite set of graphs there are two graphs such that one is a minor of the other.

Our second point of emphasis (time permitting) will be on Hadwiger’s conjecture: that every graph with chromatic number at least \( r \) has a \( K_r \) minor. We shall survey what is known about this conjecture, including some very recent progress.

Recommendation
A solid background in the fundamentals of graph theory.
### 7.151 Module: The Riemann Zeta Function [M-MATH-102960]

**Responsible:** Dr. Fabian Januszewski  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Algebra and Geometry)  
**Elective Field**

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7.152 Module: Time Series Analysis [M-MATH-102911]

**Responsible:** PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)

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**Mandatory**

| T-MATH-105874 | Time Series Analysis | 4 CR | Henze, Klar |

**Prerequisites**

None
7.153 Module: Topological Data Analysis [M-MATH-105487]

**Responsible:** Prof. Dr. Tobias Hartnick
Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Stochastics)
Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)
Mathematical Methods (Algebra and Geometry)
Elective Field

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Hartnick, Sauer
## 7.154 Module: Topological Groups [M-MATH-105323]

**Responsible:** Dr. rer. nat. Rafael Dahmen  
Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Algebra and Geometry)  
Elective Field

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**Mandatory**

| T-MATH-110802 | Topological Groups | 5 CR | Dahmen, Tuschmann |

**Prerequisites**

None
### 7.155 Module: Traveling Waves [M-MATH-102927]

**Responsible:** Prof. Dr. Jens Rottmann-Matthes  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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7.156 Module: Uncertainty Quantification [M-MATH-104054]

Responsible: Prof. Dr. Martin Frank
Organisation: KIT Department of Mathematics
Part of: Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization) Elective Field

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Mandatory

| T-MATH-108399 | Uncertainty Quantification | 4 CR | Frank |

Competence Goal
After successfully taking part in the module's classes and exams, students have gained knowledge and abilities as described in the "Inhalt" section.
Specifically, students know several parametrization methods for uncertainties. Furthermore, students are able to describe the basics of several solution methods (stochastic collocation, stochastic Galerkin, Monte-Carlo). Students can explain the so-called curse of dimensionality.
Students are able to apply numerical methods to solve engineering problems formulated as algebraic or differential equations with uncertainties. They can name the advantages and disadvantages of each method. Students can judge whether specific methods are applicable to the specific problem and discuss their results with specialists and colleagues. Finally, students are able to implement the above methods in computer codes.

Prerequisites
None

Content
In this class, we learn to propagate uncertain input parameters through differential equation models, a field called Uncertainty Quantification (UQ). Given uncertain input (parameter values, initial or boundary conditions), how uncertain is the output? The first part of the course ("how to do it") gives an overview on techniques that are used. Among these are:

- Sensitivity analysis
- Monte-Carlo methods
- Spectral expansions
- Stochastic Galerkin method
- Collocation methods, sparse grids

The second part of the course ("why to do it like this") deals with the theoretical foundations of these methods. The so-called "curse of dimensionality" leads us to questions from approximation theory. We look back at the very standard numerical algorithms of interpolation and quadrature, and ask how they perform in many dimensions.

Recommendation
Numerical methods for differential equations
### Module: Variational Methods [M-MATH-105093]

**Responsible:** Prof. Dr. Wolfgang Reichel  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field:**

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7.158 Module: Wave Propagation in Periodic Waveguides [M-MATH-105462]

**Responsible:** Prof. Dr. Roland Griesmaier

**Organisation:** KIT Department of Mathematics

**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)

**Elective Field:**

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**Mandatory**

<table>
<thead>
<tr>
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<th>Title</th>
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<tr>
<td>T-MATH-111002</td>
<td>Wave Propagation in Periodic Waveguides</td>
<td>8 CR</td>
<td>Griesmaier</td>
<td></td>
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</tbody>
</table>

**Prerequisites**

None
## 7.159 Module: Wavelets [M-MATH-102895]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** Mathematical Methods (Analysis or Applied and Numerical Mathematics, Optimization)  
**Elective Field**

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

| T-MATH-105838 | Wavelets | 8 CR | Rieder |

**Prerequisites**  
none
8 Courses

8.1 Course: Adaptive Finite Element Methods [T-MATH-105898]

**Responsible:** Prof. Dr. Willy Dörfler

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102900 - Adaptive Finite Elemente Methods

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

**Prerequisites**

none
8.2 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

Responsiable: Jun.-Prof. Dr. Julian Thimme
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

<table>
<thead>
<tr>
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<tr>
<td>WS 20/21 2530601</td>
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<td>Each winter term</td>
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<th>Exams</th>
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</thead>
<tbody>
<tr>
<td>SS 2020 7900321</td>
<td></td>
<td>Prüfung (PR)</td>
<td>Thimme</td>
</tr>
</tbody>
</table>

Competence Certificate
The success control takes place in form of a written examination (60 min) during the semester break (according to §4(2), 1 SPO). If the number of participants is low, an oral examination (according to §4 (2), 2 SPO) may also be offered. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Recommendation
We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course. In addition, prior participation in the Asset Pricing Master course is strongly recommended.

Annotation
New course from winter semester 2019/2020.

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

Advanced Empirical Asset Pricing
2530601, WS 20/21, 2 SWS, Language: English, Open in study portal

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

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

zur Vertiefung/ Wiederholung
8.3 Course: Advanced Game Theory [T-WIWI-102861]

**Responsible:**  
Prof. Dr. Karl-Martin Ehrhart  
Prof. Dr. Clemens Puppe  
Prof. Dr. Johannes Philipp Reiß

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

**Part of:**  
M-WIWI-101500 - Microeconomic Theory  
M-WIWI-101502 - Economic Theory and its Application in Finance  
M-WIWI-102970 - Decision and Game Theory

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**Events**

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<th>Recurrence</th>
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<tr>
<td>WS 20/21</td>
<td>2521533</td>
<td>Advanced Game Theory</td>
<td>2 SWS</td>
<td>Lecture (V)/🖥</td>
<td>Puppe</td>
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<tr>
<td>WS 20/21</td>
<td>2521534</td>
<td>Übung zu Advanced Game Theory</td>
<td>1 SWS</td>
<td>Practice (Ü)/🖥</td>
<td>Puppe</td>
</tr>
<tr>
<td>SS 2020</td>
<td>7900317</td>
<td>Advanced Game Theory</td>
<td>Prüfung (PR)</td>
<td>Reiß</td>
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**Exams**

<table>
<thead>
<tr>
<th>Term</th>
<th>Event ID</th>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Lecturer</th>
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<tr>
<td>SS 2020</td>
<td>7900317</td>
<td>Advanced Game Theory</td>
<td>Prüfung (PR)</td>
<td>Reiß</td>
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</tr>
</tbody>
</table>

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

**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Prerequisites**

None

**Recommendation**

Basic knowledge of mathematics and statistics is assumed.

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

**Advanced Game Theory**

2521533, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)
8.4 Course: Advanced Inverse Problems: Nonlinearity and Banach Spaces [T-MATH-105927]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102955 - Advanced Inverse Problems: Nonlinearity and Banach Spaces

<table>
<thead>
<tr>
<th>Type</th>
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<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oral examination</td>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>

**Prerequisites**

none
8 COURSES

Course: Advanced Lab Blockchain Hackathon (Master) [T-WIWI-111126]

8.5 Course: Advanced Lab Blockchain Hackathon (Master) [T-WIWI-111126]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>Examination of another type</td>
<td>4.5</td>
<td>Each term</td>
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Events

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<tr>
<td>WS 20/21</td>
<td>2512403</td>
<td>Practical Course Blockchain Hackathon (Master)</td>
<td>SWS</td>
<td>Practical course (P) / Sunyaev, Kannengießer</td>
</tr>
</tbody>
</table>

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

Competence Certificate
The alternative exam assessment consists of:

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

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

Prerequisites
None
### Course: Advanced Lab Informatics (Master) [T-WIWI-110548]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

<table>
<thead>
<tr>
<th>Events</th>
<th>Type</th>
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<th>Recurrence</th>
<th>Version</th>
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<tr>
<td>SS 2020</td>
<td>Lab Business Information Systems: Realisation of innovative services (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Oberweis, Schiefer, Schüler, Toussaint</td>
</tr>
<tr>
<td>SS 2020</td>
<td>Lab Automation in Everyday Life (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Oberweis, Forell, Frister</td>
</tr>
<tr>
<td>SS 2020</td>
<td>Development of Sociotechnical Information Systems (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Sunyaev, Sturm</td>
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<tr>
<td>SS 2020</td>
<td>Praktikum Blockchain und Distributed Ledger Technology (Master)</td>
<td>SWS</td>
<td>Practical course (P)</td>
<td>Sunyaev, Beyene, Kannengießer, Pandl</td>
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<tr>
<td>SS 2020</td>
<td>Project Lab Machine Learning</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Zöllner</td>
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<tr>
<td>SS 2020</td>
<td>Practical lab Security, Usability and Society (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Volkamer, Strufe, Mayer, Mossano</td>
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<tr>
<td>WS 20/21</td>
<td>Lab Realisation of innovative services (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
<td>Oberweis, Schiefer, Schüler, Toussaint</td>
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<td>WS 20/21</td>
<td>Practical Course Blockchain Hackathon (Master)</td>
<td>SWS</td>
<td>Practical course (P)</td>
<td>Sunyaev, Kannengießer</td>
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<td>WS 20/21</td>
<td>Practical Course Cognitive Automobiles and Robots (Master)</td>
<td>3 SWS</td>
<td>Practical course (P)</td>
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<td>WS 20/21</td>
<td>Project lab Information Service Engineering (Master)</td>
<td>2 SWS</td>
<td>Practical course (P)</td>
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<td>WS 20/21</td>
<td>Seminar Linked Data and the Semantic Web (Bachelor)</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Sure-Vetter, Acosta Deibe, Käfer, Heling</td>
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<td>WS 20/21</td>
<td>Seminar Linked Data and the Semantic Web (Master)</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Sure-Vetter, Acosta Deibe, Käfer, Heling</td>
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**Exams**

| SS 2020      | Lab Automation in Everyday Life (Master) | Prüfung (PR) | Oberweis |
| SS 2020      | Project Lab Machine Learning | Prüfung (PR) | Zöllner |
| SS 2020      | Advanced Lab in Information Systems: Realisation of innovative services (Master) | Prüfung (PR) | Oberweis |
| SS 2020      | Lab Blockchain and Distributed Ledger Technology (Master) | Prüfung (PR) | Sunyaev |
| SS 2020      | Development of Sociotechnical Information Systems (Master) | Prüfung (PR) | Sunyaev |
| SS 2020      | Practical lab Security, Usability and Society (Master) | Prüfung (PR) | Volkamer |

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

**Competence Certificate**

The alternative exam assessment consists of:
- a practical work
- a presentation and
- a written seminar thesis

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

None

**Annotation**

The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at https://portal.wiwi.kit.edu.

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

<table>
<thead>
<tr>
<th>Event Name</th>
<th>Course Code</th>
<th>Semester</th>
<th>SWS</th>
<th>Language</th>
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<tr>
<td>Lab Business Information Systems: Realisation of innovative services (Master)</td>
<td>2512205</td>
<td>SS 2020</td>
<td>3 SWS</td>
<td>German</td>
<td>Open in study portal</td>
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<tr>
<td>Lab Automation in Everyday Life (Master)</td>
<td>2512207</td>
<td>SS 2020</td>
<td>3 SWS</td>
<td>German</td>
<td>Open in study portal</td>
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<td>Development of Sociotechnical Information Systems (Master)</td>
<td>2512401</td>
<td>SS 2020</td>
<td>3 SWS</td>
<td>German/English</td>
<td>Open in study portal</td>
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<td>Project Lab Machine Learning</td>
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<td>SS 2020</td>
<td>3 SWS</td>
<td>German/English</td>
<td>Open in study portal</td>
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</table>

**Content**

As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students). Further information can be found on the ILIAS page of the lab.

**Organizational issues**

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

As part of the lab, various topics on everyday automation are offered. During the lab, the participants will gain an insight into problem-solving oriented project work and work on a project together in small groups. Further information can be found on the ILIAS page of the lab.

**Organizational issues**

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

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.
Content
The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:
The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.
Registration and further information can be found in the WiWi-portal.
Content
The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.

Important dates:
Kick-off: April 24th, 2020, 14: 00-15: 30 Microsoft Teams - please check the WiWi portal
Final submission: 8. September 2020, 23:59
Presentation: 28. September 2020, 14:00

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

Topics:
- NoPhish 2.0
- Notes 2.0
- Sudoku 2.0

Programming Usable Security Intervention
In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO (https://secuso.aifb.kit.edu/english/TORPEDO.php ) or PassSec + (https://secuso.aifb.kit.edu/english/PassSecPlus.php ). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Topics:
- Password Manager Enrollment Add-On
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- PassSec update
- TORPEDO - web service for different checks
- TORPEDO -Enabling to put identified phishing e-mails into the KIT-spam folder
- Privacy friendly and security friendly marketing analysis tool

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

Topics:
- Investigating the Corona outbreak impact on privacy and security users' perception.
- Correlation between misconceptions about password security.
- Comparative analysis of several tutorials for TORPEDO.
- Investigating user reactions to Facebook behavioural data collection.
- Usability and adoption of password managers.

Please, note that registration is not required to participate in the kick-off meeting.
This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php .

As reported on the KIT informational page for the Corona outbreak (https://www.kit.edu/kit/25911.php ), all teaching and in-person contact are forbid until new noticed. If the KIT restrictions are still in effect on the kick-off date, this will still take place at the date and time programmed, albeit in an online form.

In any case, we will inform you promptly as soon a more precise decision is reached.

Lab Realisation of innovative services (Master)
2512205, WS 20/21, 3 SWS, Language: German, Open in study portal

Content
As part of the lab, the participants should work together in small groups to realize innovative services (mainly for students).
Further information can be found on the ILIAS page of the lab.

Organizational issues
Die genauen Termine und Informationen zur Anmeldung werden auf der Veranstaltungsseite bekannt gegeben.
Practical Course Cognitive Automobiles and Robots (Master)
2512501, WS 20/21, 3 SWS, Language: German/English, Open in study portal

Content
The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:
The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.
Registration and further information can be found in the WiWi-portal.

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

The **ISE project course** is based on the summer semester lecture "**Information Service Engineering**". The topics of the ISE project course focus on artificial intelligence based applications. In particular, we are covering the following:

- Natural Language Processing
- Knowledge Graphs
- Deep Learning

Goal of the course is to work on a research problem in small groups (3-4 students) related to the ISE lecture topics, i.e. Natural Language Processing, Knowledge Graphs, and Machine Learning. The solution of the given research problem requires the development of a software implementation.

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

Required coursework includes:

- Mid term presentation (5-10 min)
- Final presentation (10-15 min)
- Course report (c. 20 pages)
- Participation and contribution of the students during the course
- Software development and delivery

Notes:

The ISE project course can also be credited as a seminar.

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

The project course will be restricted to 15 participants.

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

**ISE Tutor Team:**

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

Organizational issues

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

**Seminar Linked Data and the Semantic Web (Bachelor)**

2513312, WS 20/21, 2 SWS, Language: German/English, [Open in study portal](#)
**Content**

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

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

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

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

Topics of interest include, but are not limited to:

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

The exact dates and information for registration will be announced at the event page.
8.7 Course: Advanced Lab Security [T-WIWI-109786]

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

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

**Part of:** M-WIWI-101472 - Informatics

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
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### Events

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<td>Practical Course Security (Master)</td>
<td>4 SWS</td>
<td>Practical course (P) / Baumgart, Volkamer, Mayer</td>
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Legend: 🌐 Online, 🏛 Blend [On-Site/Online], 🏛 On-Site, ✗ Cancelled

### Competence Certificate

The alternative exam assessment consists of:

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

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

### Prerequisites

None

### Recommendation

Knowledge from the lecture "Information Security" is recommended.

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

#### Practical Course Security (Master)

2512557, WS 20/21, 4 SWS, Language: German, [Open in study portal](https://ilias.studium.kit.edu/goto_produktiv_crs_998421.html)

### Content

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

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

More information on [https://ilias.studium.kit.edu/goto.Produktiv_crs_998421.html](https://ilias.studium.kit.edu/goto.Produktiv_crs_998421.html)
8 COURSES

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

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

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

**Part of:** M-WIWI-101472 - Informatics

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**Competence Certificate**

The alternative exam assessment consists of:

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

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

**Prerequisites**

None

**Recommendation**

Knowledge from the lecture "Information Security" is recommended.

**Annotation**

The course is expected to be offered from winter term 2018/2019.

**Contents:**

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

**Learning goals:**

The student

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

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

**Practical lab Security, Usability and Society (Bachelor)**

2512554, SS 2020, 3 SWS, Language: English, Open in study portal

**Practical course (P)**
Content
The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.

Important dates:
- Kick-off: April 24th, 2020, 14: 00-15: 30 Microsoft Teams - Please check the WiWi portal
- Final submission: 8. September 2020, 23:59
- Presentation: 28. September 2020, 14:00

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

Topics:
- NoPhish 2.0
- Notes 2.0
- Sudoku 2.0

Programming Usable Security Intervention
In this subject, students develop a part of coding, an extension, or another programming task dealing with various usable security interventions, eg as an extension. Eg TORPEDO ( https://secuso.aifb.kit.edu/english/TORPEDO.php ) or PassSec + ( https://secuso.aifb.kit.edu/english/PassSecPlus.php ). Just as before, students are provided with a point list of goals, containing both basic features mandatory to pass the course and more advanced ones that heighten the final grade.

Topics:
- Password Manager Enrollment Add-On
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- PassSec update
- TORPEDO - web service for different checks
- TORPEDO - Enabling to put identified phishing e-mails into the KIT-spam folder
- Privacy friendly and security friendly marketing analysis tool

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

Topics:
- Investigating the Corona outbreak impact on privacy and security users' perception.
- Correlation between misconceptions about password security.
- Comparative analysis of several tutorials for TORPEDO.
- Investigating user reactions to Facebook behavioural data collection.
- Usability and adoption of password managers.

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

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php .

As reported on the KIT informational page for the Corona outbreak ( https://www.kit.edu/25911.php ), all teaching and in-person contact are forbidden until new noticed. If the KIT restrictions are still in effect on the kick-off date, this will still take place at the date and time programmed, albeit in an online form.

In any case, we will inform you promptly as soon as a more precise decision is reached.

Practical Course Security, Usability and Society (Bachelor)
2512554, WS 20/21, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Content
The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.

Important dates:

Kick-off: (compulsory attendance) on 18.10.2019 at 11:00 in room 3A-11.2

Final submission:

Presentation:

Subjects:

Privacy-friendly apps

Programming Usable Security Intervention

Conducting Usable Security User studies (online studies only)

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

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website [https://secuso.aifb.kit.edu/Studium_und_Lehre.php](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

As reported on the KIT informational page for the Corona outbreak ([https://www.kit.edu/kit/25911.php](https://www.kit.edu/kit/25911.php)), all teaching and in-person contact are forbid until new noticed. If the KIT restrictions are still in effect on the kick-off date, this will still take place at the date and time programmed, albeit in an online form.

In any case, we will inform you promptly as soon a more precise decision is reached.
### 8.9 Course: Advanced Lab Sociotechnical Information Systems Development (Master) [T-WIWI-111125]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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

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

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

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

**Prerequisites**  
None

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

**Practical Course Sociotechnical Information Systems Development (Master) 2512401, WS 20/21, 3 SWS, Language: German/English, Open in study portal**

**Content**

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

**Learning objectives:**

- Independent and self-organized realization of a software development project  
- Evaluation and selection of suitable development tools and methods  
- Application of modern software development methods  
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance  
- Project documentation  
- Presentation of project results in an comprehensible and structured form
8.10 Course: Advanced Statistics [T-WIWI-103123]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101637 - Analytics and Statistics

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Exams

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

Prerequisites
None

Annotation
New course starting winter term 2015/2016

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

Statistik für Fortgeschrittene
2550552, WS 20/21, 2 SWS, Open in study portal

Literature
Skript zur Vorlesung
8.11 Course: Advanced Stochastic Optimization [T-WIWI-106548]

- **Responsible:** Prof. Dr. Steffen Rebennack
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101473 - Mathematical Programming
  - M-WIWI-103289 - Stochastic Optimization

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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 semester.

### Prerequisites

None.
8 COURSES

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

8.12 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-101500 - Microeconomic Theory  
M-WIWI-101502 - Economic Theory and its Application in Finance |

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Competence Certificate
The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

Prerequisites
None

Recommendation
This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

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

Advanced Topics in Economic Theory
2520527, SS 2020, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Die Veranstaltung wird in englischer Sprache angeboten:
The course is based on the excellent textbook "Microeconomic Theory" (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green.
8.13 Course: Algebra [T-MATH-102253]

**Responsible:** Prof. Dr. Frank Herrlich  
Dr. Stefan Kühnlein  

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-101315 - Algebra

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
### 8.14 Course: Algebraic Geometry [T-MATH-103340]

**Responsible:** Prof. Dr. Frank Herrlich  
Dr. Stefan Kühnlein

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101724 - Algebraic Geometry

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### 8.15 Course: Algebraic Number Theory [T-MATH-103346]

**Responsible:** Dr. Stefan Kühnlein  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101725 - Algebraic Number Theory

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8.16 Course: Algebraic Topology [T-MATH-105915]

**Responsible:** Dr. Holger Kammeyer  
Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102948 - Algebraic Topology

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**Exams**

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**Prerequisites**

none
### 8.17 Course: Algebraic Topology II [T-MATH-105926]

**Responsible:** Prof. Dr Roman Sauer  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102953 - Algebraic Topology II

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

**Prerequisites**

none
8.18 Course: Applied Econometrics [T-WIWI-103125]

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

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

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

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

**Prerequisites**
None

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

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Competence Certificate**  
The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is recommended for the written exam, which is offered at the end of the winter semester and at the end of the summer semester.

By successful processing the exercises a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**  
None

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

Below you will find excerpts from events related to this course:
Content
The lecture Applied Computer Science II provides insights into fundamental concepts and future technologies of distributed systems and Internet computing. Students should be able to select, design and apply the presented concepts and technologies. The course first introduces basic concepts of distributed systems (e.g. design of architectures for distributed systems, internet architectures, web services, middleware).
In the second part of the course, emerging technologies of Internet computing will be examined in depth. These include, among others:

- Cloud Computing
- Edge & Fog Computing
- Internet of Things
- Blockchain
- Artificial Intelligence

Learning objectives:
The student learns about basic concepts and emerging technologies of distributed systems and internet computing. Practical topics will be deepened in lab classes.

Recommendations:
Knowledge of content of the module [WI1INFO].

Workload:
The total workload for this course is approximately 135-150 hours.

Literature
Wird in der Vorlesung bekannt gegeben
8.20 Course: Asset Pricing [T-WIWI-102647]

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

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

**Part of:**  
M-WIWI-101480 - Finance 3  
M-WIWI-101482 - Finance 1  
M-WIWI-101483 - Finance 2  
M-WIWI-101502 - Economic Theory and its Application in Finance

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**Competence Certificate**
The success control takes place in form of a written examination (75 min) during the semester break (according to §4(2), 1 SPO). The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**
None

**Recommendation**
We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

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

**Asset Pricing**
2530555, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Literature**

**Basisliteratur**


**Zur Wiederholung/Vertiefung**

8.21 Course: Asymptotic Stochastics [T-MATH-105866]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Norbert Henze
PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102902 - Asymptotic Stochastics

---

**Type:** Oral examination

**Credits:** 8

**Version:** 1

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Legend: 📥 Online, 🧩 Blended (On-Site/Online), 🗽 On-Site, ✗ Cancelled

**Prerequisites**

none
**Course: Auction Theory [T-WIWI-102613]**

**Responsible:** Prof. Dr. Karl-Martin Ehrhart  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101500 - Microeconomic Theory  
M-WIWI-102970 - Decision and Game Theory

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**Exams**

**Competence Certificate**

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

**Prerequisites**

None

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

**Auktionstheorie**

2520408, WS 20/21, 2 SWS, Open in study portal

**Literature**

- Ehrhart, K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011  
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999
8.23 Course: Bifurcation Theory [T-MATH-106487]

**Responsible:** Dr. Rainer Mandel

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103259 - Bifurcation Theory

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**Prerequisites**
None
8.24 Course: Blockchains & Cryptofinance [T-WIWI-108880]

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

Organisation: KIT Department of Economics and Management

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

Type: Written examination
Credits: 4.5
Recurrence: see Annotations
Version: 1

Exams
SS 2020 7900260 Blockchains & Cryptofinance Prüfung (PR) Uhrig-Homburg

Competence Certificate
The assessment consists of a written exam (75 min) (§4(2), 1 of the examination regulations). 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
None

Annotation
The lecture is currently not offered.
### 8.25 Course: Bond Markets [T-WIWI-110995]

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

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<td>Lecture / Practice (VÜ) / 🖥️</td>
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Legend: 🖥️ Online, Blended [On-Site/Online], 🗽 On-Site, X Cancelled

**Competence Certificate**

The assessment consists of a written exam (75min.) A bonus can be earned through successful participation in the tutorial sessions. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

**Annotation**

This course will be held in English.

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

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

**Content**

The lecture “Bond Markets” deals with the national and international bond markets, which are an important source of financing for companies, as well as for the public sector. After an overview of the most important bond markets, different yield definitions are discussed. Based on this, the concept of the yield curve is presented. In addition, the theoretical and empirical relationships between ratings, default probabilities and spreads are analyzed. The focus will then be on questions regarding the valuation, measurement, management and control of credit risks.

The total workload for this course is approximately 135 hours (4.5 credits).

The assessment consists of a written exam (75min.) (according to §4(2), 1 SPO). A bonus can be earned through successful participation in the tutorial sessions. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Students deepen their knowledge of national and international bond markets. They gain knowledge of the traded instruments and their key figures for describing default risk such as ratings, default probabilities or credit spreads.

**Organizational issues**

Blockveranstaltung: Do 14:00-19:00 Uhr, Fr 9:45-17:15 Uhr  
05./06.11., 19./20.11., 03./04.12.20
8.26 Course: Bond Markets - Models & Derivatives [T-WIWI-110997]

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

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Events

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<td>Lecture / Practice (VÜ) / 🖥</td>
<td>2 SWS</td>
<td>Each winter term</td>
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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗓 On-Site, 🗑 Cancelled

Competence Certificate
The assessment of success consists in equal parts of a written thesis and an oral exam including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.

Recommendation
Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.

Annotation
This course will be held in English.

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

Content

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

Organizational issues
Blockveranstaltung
freitags 9:45-17:15 Uhr, 15.01. und 22.01.21
8.27 Course: Bond Markets - Tools & Applications [T-WIWI-110996]

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

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Legend: 🖤 Online, 🧩 Blended (On-Site/Online), 🗓 On-Site, ❌ Cancelled

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

Recommendation
Knowledge of the “Bond Markets” course is very helpful.

Annotation
This course will be held in English.

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

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

Organizational issues
Blockveranstaltung am 11.12.20, Zeiten nach gesondertem Aushang
Seminarraum 320 Geb. 09.21
8.28 Course: Bott Periodicity [T-MATH-108905]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-104349 - Bott Periodicity

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**Prerequisites**
none
## 8.29 Course: Boundary and Eigenvalue Problems [T-MATH-105833]

**Responsible:**
- Prof. Dr. Dorothee Frey
- Prof. Dr. Dirk Hundertmark
- Prof. Dr. Tobias Lamm
- Prof. Dr. Michael Plum
- Prof. Dr. Wolfgang Reichel
- Prof. Dr. Roland Schnaubelt

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102871 - Boundary and Eigenvalue Problems

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8.30 Course: Boundary Element Methods [T-MATH-109851]

**Responsible:** PD Dr. Tilo Arens

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103540 - Boundary Element Methods

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**Prerequisites**

none
8.31 Course: Brownian Motion [T-MATH-105868]

**Responsible:** Prof. Dr. Nicole Bäuerle
Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102904 - Brownian Motion

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**Prerequisites**
none
8.32 Course: Business Intelligence Systems [T-WIWI-105777]

**Responsible:** Prof. Dr. Alexander Mädche  
Mario Nadj  
Peyman Toreini

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-104068 - Information Systems in Organizations

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**Competence Certificate**  
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

**Prerequisites**  
None

**Recommendation**  
Basic knowledge on database systems is helpful.

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

**Business Intelligence Systems**  
2540422, WS 20/21, 3 SWS, Language: English, [Open in study portal](#)
Content
In most modern enterprises, Business Intelligence & Analytics (BI&A) Systems represent a core enabler of decision-making in that they are supplying up-to-date and accurate information about all relevant aspects of a company's planning and operations: from stock levels to sales volumes, from process cycle times to key indicators of corporate performance. Modern BI&A systems leverage beyond reporting and dashboards also advanced analytical functions. Thus, today they also play a major role in enabling data-driven products and services. The aim of this course is to introduce theoretical foundations, concepts, tools, and current practice of BI&A Systems from a managerial and technical perspective.

The course is complemented with an engineering capstone project, where students work in a team with real-world use cases and data in order to create running Business intelligence & Analytics system prototypes.

Learning objectives
- Understand the theoretical foundations of key Business Intelligence & Analytics concepts supporting decision-making
- Explore key capabilities of state-of-the-art Business Intelligence & Analytics Systems
- Learn how to successfully implement and run Business Intelligence & Analytics Systems from multiple perspectives, e.g. architecture, data management, consumption, analytics
- Get hands-on experience by working with Business Intelligence & Analytics Systems with real-world use cases and data

Prerequisites
This course is limited to a capacity of 50 places. The capacity limitation is due to the attractive format of the accompanying engineering capstone project. Strong analytic abilities and profound skills in SQL as well as Python and/or R are required. Students have to apply with their CV and transcript of records.

Literature
- Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term”

Further literature will be made available in the lecture.
8.33 Course: Business Process Modelling [T-WIWI-102697]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Exams**  
SS 2020  
7900047  
Business Process Modelling (Registration until 13 July 2020)  
Prüfung (PR)  
Oberweis

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

**Prerequisites**  
None

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

**Business Process Modelling**  
2511210, WS 20/21, 2 SWS, Language: German, Open in study portal  
Lecture (V)  
Online

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

**Learning objectives:**  
Students

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

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

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


Weitere Literatur wird in der Vorlesung bekannt gegeben.
8.34 Course: Business Strategies of Banks [T-WIWI-102626]

**Responsible:** Prof. Dr. Wolfgang Müller

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

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

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**Exams**

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

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

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

**Business Strategies of Banks**

2530299, WS 20/21, 2 SWS, Language: German, Open in study portal

**Content**

The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank’s success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

**Learning outcomes:**

Students are are in a position to discuss the principles of commercial banking. They are familiar with fundamental concepts of bank management and are able to apply them.

**Workload:**

The total workload for this course is approximately 90 hours. For further information see the German version.

**Literature**

**Weiterführende Literatur:**

- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer
Course: Case Studies in Sales and Pricing [T-WIWI-102834]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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**Competence Certificate**

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Please note that the workshop "Case Studies in Sales and Pricing" as well as all other 1.5-ECTS courses will not take place in the winter term 20/21 due to a research semester. The course will probably be offered again starting in WS21/22. Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed. For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu). Please note that only one of the 1.5-ECTS courses can be attended in this module.
8.36 Course: Challenges in Supply Chain Management [T-WIWI-102872]

Responsible: Esther Mohr
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

Type: Examination of another type
Credits: 4.5
Recurrence: Each summer term
Version: 2

Events
SS 2020 2550494 Challenges in Supply Chain Management 3 SWS Lecture (V) Mohr

Exams
SS 2020 7900322 Challenges in Supply Chain Management Prüfung (PR) Nickel

Competence Certificate
The assessment consists of a written paper and an oral exam of ca. 30-40 min.

Prerequisites
None

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

Annotation
The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is offered irregularly. The planned lectures and courses for the next three years are announced online.

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

Challenges in Supply Chain Management
2550494, SS 2020, 3 SWS, Language: English, Open in study portal

Content
The course consists of case studies of BASF which cover future challenges of supply chain management. Thus, the course aims at a case-study based presentation, critical evaluation and exemplary discussion of recent questions in supply chain management. The focus lies on future challenges and trends, also with regard to their applicability in practical cases (especially in the chemical industry).

The main part of the course is working on a project together with BASF in Ludwigshafen. The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the project topic.

This course will include working on cutting edge supply chain topics like Industry 4.0 / "Internet of Everything in production", supply chain analytics, risk management, procurement and production in SCM. The team essays / project reports will be linked to industry-related challenges as well as to upcoming theoretical concepts. The topics of the seminar will be announced at the beginning of the term in a preliminary meeting.

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

Literature
Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.
## 8.37 Course: Classical Methods for Partial Differential Equations [T-MATH-105832]

### Responsible:
Prof. Dr. Dorothee Frey  
Prof. Dr. Dirk Hundertmark  
Prof. Dr. Tobias Lamm  
Prof. Dr. Michael Plum  
Prof. Dr. Wolfgang Reichel  
Prof. Dr. Roland Schnaubelt

### Organisation:
KIT Department of Mathematics

### Part of:
M-MATH-102870 - Classical Methods for Partial Differential Equations

### Type
Written examination

### Credits
8

### Version
1

### Events

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### Exams

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**Legend:**  
- Online
- Blended (On-Site/Online)
- On-Site
- Cancelled
## 8.38 Course: Combinatorics [T-MATH-105916]

**Responsible:** Prof. Dr. Maria Aksenovich  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102950 - Combinatorics

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| Exams | SS 2020 | 7700092 | Combinatorics | Prüfung (PR) | Aksenovich |
|-------|---------|---------|----------------|---------------|

### Prerequisites

none
8.39 Course: Commutative Algebra [T-MATH-108398]

Responsible: Prof. Dr. Frank Herrlich
Organisation: KIT Department of Mathematics
Part of: M-MATH-104053 - Commutative Algebra

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Prerequisites
none
8 COURSES

8.40 Course: Comparison Geometry [T-MATH-105917]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102940 - Comparison Geometry

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**Prerequisites**

Keine


8.41 Course: Comparison of Numerical Integrators for Nonlinear Dispersive Equations
[T-MATH-109040]

- **Responsible:** Prof. Dr Katharina Schratz
- **Organisation:** KIT Department of Mathematics
- **Part of:** M-MATH-104426 - Comparison of Numerical Integrators for Nonlinear Dispersive Equations

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**Prerequisites**
none
8.42 Course: Complex Analysis [T-MATH-105849]

**Responsible:**
- PD Dr. Gerd Herzog
- Prof. Dr. Michael Plum
- Prof. Dr. Wolfgang Reichel
- Dr. Christoph Schmoeger
- Prof. Dr. Roland Schnaubelt

**Organisation:**
- KIT Department of Mathematics

**Part of:**
- M-MATH-102878 - Complex Analysis

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8.43 Course: Compressive Sensing [T-MATH-105894]

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

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102935 - Compressive Sensing

**Type**
- Oral examination

**Credits**
- 5

**Recurrence**
- Irregular

**Version**
- 1
### 8.44 Course: Computational Economics [T-WIWI-102680]

**Responsible:** Dr. rer. nat. Pradyumn Kumar Shukla  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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#### Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4). The bonus only applies to the first and second exam of the semester in which it was obtained.

#### Prerequisites

None

#### Annotation

The credits have been changed to 5 starting summer term 2016.

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

### Computational Economics

2590458, WS 20/21, 2 SWS, Language: English, Open in study portal

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#### Content

Examining complex economic problems with classic analytical methods usually requires making numerous simplifying assumptions, for example that agents behave rationally or homogeneously. Recently, widespread availability of computing power gave rise to a new field in economic research that allows the modeling of heterogeneity and forms of bounded rationality: Computational Economics. Within this new discipline, computer based simulation models are used for analyzing complex economic systems. In short, an artificial world is created which captures all relevant aspects of the problem under consideration. Given all exogenous and endogenous factors, the modelled economy evolves over time and different scenarios can be analyzed. Thus, the model can serve as a virtual testbed for hypothesis verification and falsification.

#### Learning objectives:

The student

- understands the methods of Computational Economics and applies them on practical issues,
- evaluates agent models considering bounded rational behaviour and learning algorithms,
- analyses agent models based on mathematical basics,
- knows the benefits and disadvantages of the different models and how to use them,
- examines and argues the results of a simulation with adequate statistical methods,
- is able to support the chosen solutions with arguments and can explain them.
Literature


Weiterführende Literatur:

8.45 Course: Computational Risk and Asset Management [T-WIWI-102878]

Responsible: Prof. Dr. Maxim Ulrich
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-105032 - Data Science for Finance

Type: Examination of another type
Credits: 4,5
Recurrence: Each winter term
Version: 4

Events

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Exams

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

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

Recommendation
Basic knowledge of capital markt theory.

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

Computational Risk and Asset Management
2500015, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
The course covers several topics, among them:

- Pattern detection in price and return data in equity, interest rate, futures and option markets.
- Quantitative Portfolio Strategies
- Modeling Return Densities using tools from financial econometrics, data science and machine learning
- Valuation of equity, fixed-income, futures and options in a coherent framework to possibly exploit arbitrage opportunities
- Neural networks and Natural Language Processing
Course: Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems [T-MATH-105854]

**Responsible:** Prof. Dr. Michael Plum  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102883 - Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems

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### 8.47 Course: Continuous Time Finance [T-MATH-105930]

**Responsible:** Prof. Dr. Nicole Bäuerle  
Prof. Dr. Vicky Fasen-Hartmann  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-102860 - Continuous Time Finance

**Type**  
Oral examination  

**Credits**  
8  

**Version**  
1

#### Events

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#### Exams

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<td><strong>Course: Control Theory [T-MATH-105909]</strong></td>
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**Course: Convex Analysis [T-WIWI-102856]**

**Responsible:** Prof. Dr. Oliver Stein
**Organisation:** KIT Department of Economics and Management
**Part of:** M-WIWI-101473 - Mathematical Programming

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**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. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

**Prerequisites**
None

**Recommendation**
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Annotation**
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).
### 8.50 Course: Convex Geometry [T-MATH-105831]

<table>
<thead>
<tr>
<th>Responsible</th>
<th>Prof. Dr. Daniel Hug</th>
</tr>
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<tbody>
<tr>
<td>Organisation</td>
<td>KIT Department of Mathematics</td>
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<tr>
<td>Part of</td>
<td>M-MATH-102864 - Convex Geometry</td>
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<tr>
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8.51 Course: Corporate Financial Policy [T-WIWI-102622]

**Responsible:** Prof. Dr. Martin Ruckes

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

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2
- M-WIWI-101502 - Economic Theory and its Application in Finance

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**Events**

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<tr>
<td>SS 2020</td>
<td>2530214</td>
<td>Corporate Finance Policy</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Ruckes</td>
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<tr>
<td>SS 2020</td>
<td>2530215</td>
<td>Übungen zu Corporate Finance Policy</td>
<td>1</td>
<td>Practice (Ü)</td>
<td>Ruckes, Hoang</td>
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**Exams**

<table>
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<td>Prüfung (PR)</td>
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<td>WS 20/21</td>
<td>7900058</td>
<td>Corporate Financial Policy</td>
<td>Prüfung (PR)</td>
<td>Ruckes</td>
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</table>

**Competence Certificate**

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

**Prerequisites**

None

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

**Corporate Finance Policy**

2530214, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Literature**

Weiterführende Literatur


**8.52 Course: Corporate Risk Management [T-WIWI-109050]**

**Responsible:** Prof. Dr. Martin Ruckes

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

**Part of:** M-WIWI-101480 - Finance 3  
M-WIWI-101483 - Finance 2  
M-WIWI-101502 - Economic Theory and its Application in Finance

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**Exams**

| SS 2020 | 7900259 | Corporate Risk Management | Prüfung (PR) | Ruckes |
| WS 20/21 | 7900136 | Corporate Risk Management | Prüfung (PR) | Ruckes |

**Competence Certificate**

Please note that the lecture will not be offered in summer semester 2020. The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The course will exceptionally be held in the winter semester 2019/2020. Usually, however, the event takes place as a block course in the summer semester.
8.53 Course: Credit Risk [T-WIWI-102645]

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

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

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

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**Exams**

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<th>7900113</th>
<th>Credit Risk</th>
<th>Prüfung (PR)</th>
<th>Uhrig-Homburg</th>
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**Competence Certificate**
The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The examination is offered every semester and can be repeated at every regular examination date.

A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**
None

**Recommendation**
Knowledge from the course "Derivatives" is very helpful.

**Annotation**
The course will no longer be offered from winter semester 2020/21.
8.54 Course: Critical Information Infrastructures [T-WIWI-109248]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

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<td>WS 20/21</td>
<td>2511400</td>
<td>Critical Information Infrastructures</td>
<td>English</td>
<td>Lecture (V) / Online</td>
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<td>WS 20/21</td>
<td>2511401</td>
<td>Exercises to Critical Information Infrastructures</td>
<td>Language: English</td>
<td>Practice (Ü) / Online</td>
<td>Sunyaev, Dehling, Lins</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

Competence Certificate
The alternative exam assessment consists of

- the preparation of a written elaboration as well as
- an oral examination as part of a presentation of the work.

Details of the grades will be announced at the beginning of the course.
The examination is only offered to first-time students in the winter semester, but can be repeated in the following summer semester.

Prerequisites
None.

Annotation

Below you will find excerpts from events related to this course:
Content
The course critical information infrastructures (CII) introduces students to the world of complex sociotechnical systems that permeate societies on a global scale. Students will learn to handle the complexities involved in the design, development, operation, and evaluation of critical information infrastructures. In the beginning of the course, critical information infrastructures will be introduced on a general level.

The following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Distributed Ledger Technology
- Internet of Things / Edge and Fog Computing
- Cloud Computing
- Health Information Infrastructures
- Information Privacy
- Certification of Critical IT-Services

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:
Students know concepts and technologies relevant for the design and reliable operation of critical information infrastructures and can leverage them to develop solutions for real-world challenges.

Notes:
The number of participants is limited to 24 students. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/3853
The registration will be opened from September 1, 2020 until October 12, 2020.
Please make sure that you are available at the following dates if you want to take the course:

- 11.2020, 11:30 am–01:00 pm: 1. Foundations of Critical Information Infrastructures
- 11.2020, 11:30 am–01:00 pm: 2. Topic Area Presentation
- 11.2020, 11:30 am–01:00 pm: 3. Critical Information Infrastructure Landscape
- 11.2020, 11:30 am–01:00 pm: 4. Research on Information Systems & Group Assignment
- 12.2020, 10:00 am–04:00 pm: Interim Presentation
- 02.2021, 10:00 am–04:00 pm: Final Presentation

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams. We will provide a link to join the team if your registration was approved.

If you have any questions regarding course registration, please contact lins@kit.edu or dehling@kit.edu

Organizational issues
Bitte beachten Sie die geänderte Terminplanung. Die Vorlesung wird als Blockveranstaltung durchgeführt.

Literature
8.55 Course: Current Directions in Consumer Psychology [T-WIWI-111100]

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

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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<td>Once</td>
<td>1 terms</td>
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</table>

**Events**

| WS 20/21 | 2540441 | Current Directions in Consumer Psychology | SWS | Others (sonst.) | Scheibehenne |

**Competence Certificate**

Non exam assessment. Grading will be based on a continuous basis throughout the semester.

**Prerequisites**

Strong Interest in Original Research.
8.56 Course: Data Mining and Applications [T-WIWI-103066]

**Responsible:** Rheza Nakhaeizadeh

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

**Part of:**
- M-WIWI-101638 - Econometrics and Statistics I
- M-WIWI-101639 - Econometrics and Statistics II

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**Events**

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<td>Exams</td>
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<td></td>
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<tr>
<td>SS 2020</td>
<td>Prüfung (PR)</td>
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</table>

**Competence Certificate**

- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation (app. 45 minutes)

**Prerequisites**

None

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

**Data Mining and Applications**

2520375, SS 2020, 2/4 SWS, Language: German, [Open in study portal](#)

**Content**

**Learning objectives:**

Students

- know the definition of Data Mining
- are familiar with the CRISP-DM
- are familiar with the most important Data Mining Algorithms like Decision Tree, K-Means, Artificial Neural Networks, Association Rules, Regression Analysis
- will be able to use a DM-Tool

**Content:**

Part one: Data Mining:

What is Data Mining?; History of Data Mining; Conferences and Journals on Data Mining; Potential Applications; Data Mining Process; Business Understanding; Data Understanding; Data Preparation; Modeling; Evaluation; Deployment; Interdisciplinary aspects of Data Mining; Data Mining tasks; Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks); Fuzzy Mining; OLAP and Data Warehouse; Data Mining Tools; Trends in Data Mining

Part two: Examples of application of Data Mining

Success parameters of Data Mining Projects; Application in industry; Application in Commerce

**Workload:**

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours
Organizational issues
Blockveranstaltung. Termine werden über ILIAS bekannt gegeben

Literature
U. Fayyad, G. Piatetsky-Shapiro, P. Smyth, R. Uthurusamy, editors, Advances in Knowledge Discovery and Data Mining, AAAI/MIT Press, 1996 (order online from Amazon.com or from MIT Press).


David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining, MIT Press, Fall 2000


Course: Database Systems and XML [T-WIWI-102661]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

**Type**
- Written examination

**Credits**
- 4,5

**Recurrence**
- Each winter term

**Version**
- 2

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<td>Practice (Ü)</td>
<td>Oberweis, Frister, Forell, Schreiber, Fritsch</td>
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<td>Prüfung (PR)</td>
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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

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

**Database Systems and XML**
2511202, WS 20/21, 2 SWS, Language: German, [Open in study portal]

**Content**
Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly more important with the emergence of the extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing data base systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

**Learning objectives:**
Students
- know the basics of XML and generate XML documents,
- are able to use XML database systems and to formulate queries to XML documents,
- know to assess the use of XML in operational practice in different application contexts.

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

- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2008

Weitere Literatur wird in der Vorlesung bekannt gegeben.
8.58 Course: Demand-Driven Supply Chain Planning [T-WIWI-110971]

**Responsible:** Josef Packowski  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102805 - Service Operations

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

**Competence Certificate**  
The assessment consists of a written exam.

**Annotation**  
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The course is planned to be held every winter term. The planned lectures and courses for the next three years are announced online.
### Course: Derivatives [T-WIWI-102643]

**Responsible:** Prof. Dr. Marliese Uhrig-Homburg  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101480 - Finance 3  
M-WIWI-101482 - Finance 1  
M-WIWI-101483 - Finance 2

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<td>SS 2020</td>
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<td>Prüfung (PR)</td>
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**Exams**

**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](#)

**Literature**


**Weiterführende Literatur:**

### 8.60 Course: Designing Interactive Systems [T-WIWI-110851]

**Responsible:** Ulrich Gnewuch  
Prof. Dr. Alexander Mädche

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-104068 - Information Systems in Organizations

<table>
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#### Events

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<th>3 SWS</th>
<th>Lecture (V)</th>
<th>Mädche, Gnewuch, Benke</th>
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| SS 2020 | 00010   | Designing Interactive Systems  | Prüfung (PR) | Mädche |

**Competence Certificate**

Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

**Prerequisites**

None

**Annotation**

This course replaces T-WIWI-108461 "Interactive Information Systems" starting summer term 2020.

The course is held in English.

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

<table>
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<th>V Designing Interactive Systems</th>
<th>Lecture (V)</th>
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<tbody>
<tr>
<td>2540558, SS 2020, 3 SWS, Language: English, <a href="#">Open in study portal</a></td>
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Content Description

Computers have evolved from batch processors towards highly interactive systems. This offers new possibilities but also challenges for the successful design of the interaction between human and computer. Interactive systems are socio-technical systems in which users perform tasks by interacting with technology in a specific context in order to achieve specified goals and outcomes.

The aim of this course is to introduce advanced concepts and theories, interaction technologies as well as current practice of contemporary interactive systems.

The course is complemented with a design capstone project, where students in a team select and apply design methods & techniques in order to create an interactive prototype.

Learning objectives

- Get an advanced understanding of conceptual foundations of interactive systems from a human and computer perspective
- Explore the theoretical grounding of Interactive Systems leveraging theories from reference disciplines such as psychology
- Know specific design principles for the design of advanced interactive systems
- Get hands-on experience in conceptualizing and designing advanced Interactive Systems to solve a real-world challenge from an industry partner by applying the lecture contents.

Prerequisites

No specific prerequisites are required for the lecture.

Literature

Die Vorlesung basiert zu einem großen Teil auf


Weiterführende Literatur wird in der Vorlesung bereitgestellt.
8.61 Course: Differential Geometry [T-MATH-102275]

**Responsible:**
- Dr. Sebastian Grensing
- Prof. Dr. Enrico Leuzinger
- Prof. Dr. Wilderich Tuschmann

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-101317 - Differential Geometry

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<td>Lecture (V)</td>
<td>Tuschmann, Frenck</td>
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<td>0100310</td>
<td>Tutorial for 0100300 (Differential Geometry)</td>
<td>2 SWS</td>
<td>Practice (Ü)</td>
<td>Tuschmann, Frenck</td>
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</table>
8.62 Course: Digital Health [T-WIWI-109246]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Events**

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<td>2511402</td>
<td>2 SWS</td>
<td>Sunyaev, Thiebes, Schmidt-Kraepelin</td>
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**Legend:** 🖥 Online, 🧩 Blended [On-Site/Online], 🗣 On-Site, ✗ Cancelled

**Competence Certificate**

Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §4(2),3 of the examination regulation. Details of the grading will be announced at the beginning of the course. The examination is only offered to first-time writers in the winter semester, but can be repeated in the following summer semester.

**Prerequisites**

None.

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

<table>
<thead>
<tr>
<th>Digital Health</th>
<th>2511402, WS 20/21, 2 SWS, Language: German/English, Open in study portal</th>
<th>Lecture (V)</th>
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Content
The master course Digital Health introduces master students to the subject of digitization in health care. Students will learn about the theoretical foundations and practical implications of various topics surrounding the digitization in health care, including health information systems, telematics, big health care data, and patient-centered health care.

After an introduction to the challenge of digitization in health care, the following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 3-4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods are possible.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Mobile Health (mHealth) / Gamification
- Distributed Ledger Technology / Blockchain
- Artificial Intelligence / Machine Learning
- Genomics / Biomedical Data

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:
Students know about the challenges of digitization in health care and can leverage relevant concepts and technologies to address these challenges. Students learn to work in teams and critically discuss digital health topics with fellow students, researchers, and practitioners.

Notes:
The number of participants is limited to 24 students. Please register here: https://portal.wiwi.kit.edu/ys/3897
The registration will be opened from September 11, 2020 until October 12, 2020.
Please make sure that you are available at the following dates if you want to take the course:

- 11.2020, 15:45-17:15 - 1. Introduction to Digital Health
- 11.2020, 15:45-17:15 - 2. Topic Area Presentation #1
- 11.2020, 15:45-17:15 - 3. Topic Area Presentation #2
- 11.2020, 15:45-17:15 - 4. Topic Area Presentation #3
- 02.2021, 10:00-17:00 - Final Presentation

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams. We will provide a link to join the team if your registration was approved.

If you have any questions regarding course registration, please contact scott.thiebes@kit.edu or manuel.schmidt-kraepelin@kit.edu

Workload:
4.5 ECTS = approx. 135 hours.

Organizational issues
Bitte beachten Sie die geänderte Terminplanung und das geänderte Anmeldeverfahren (https://portal.wiwi.kit.edu/ys/3897)
8.63 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

**Responsible:** Anja Konhäuser  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105312 - Marketing and Sales Management

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**Competence Certificate**  
Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

**Prerequisites**  
None.

**Annotation**  
Please note that the workshop "Digital Marketing and Sales in B2B" as well as all other 1.5-ECTS courses will not take place in the winter term 20/21 due to a research semester. The course will probably be offered again starting in WS21/22. Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing and Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed. For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu). Please note that only one of the 1.5-ECTS courses can be attended in this module.
8.64 Course: Discrete Dynamical Systems [T-MATH-110952]

**Responsible:** PD Dr. Gerd Herzog

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105432 - Discrete Dynamical Systems

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

**Prerequisites**
none
8.65 Course: Discrete Time Finance [T-MATH-105839]

**Responsible:** Prof. Dr. Nicole Bäuerle  
Prof. Dr. Vicky Fasen-Hartmann

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102919 - Discrete Time Finance

**Type:** Written examination  
**Credits:** 8  
**Version:** 1

### Events

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**Exams**

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**Prerequisites**

none

Legend: 🌐 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗑 Cancelled
8.66 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

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

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

**Part of:**
- M-WIWI-102805 - Service Operations
- M-WIWI-102832 - Operations Research in Supply Chain Management

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**Events**

| SS 2020 | 2550488 | Ereignisdiskrete Simulation in Produktion und Logistik | 3 SWS | Lecture (V) | Spieckermann |

**Exams**

| SS 2020 | 7900248 | Discrete-Event Simulation in Production and Logistics | Prüfung (PR) | Nickel |

**Competence Certificate**
The assessment consists of a written paper and an oral exam of about 30-40 min (alternative exam assessment).

**Prerequisites**
None

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

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.
The course is planned to be held every summer term.
The planned lectures and courses for the next three years are announced online.

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

**Ereignisdiskrete Simulation in Produktion und Logistik**
2550488, SS 2020, 3 SWS, Language: German, [Open in study portal]

**Content**
Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

**Literature**
### T 8.67 Course: Dispersive Equations [T-MATH-109001]

**Responsible:** Prof. Dr. Wolfgang Reichel  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-104425 - Dispersive Equations

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**Prerequisites**
none

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Economathematics M.Sc.  
Module Handbook as of 01/10/2020  
279
8.68 Course: Dynamic Macroeconomics [T-WIWI-109194]

**Responsible:** Prof. Dr. Johannes Brumm

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

**Part of:**
- M-WIWI-101478 - Innovation and Growth
- M-WIWI-101496 - Growth and Agglomeration

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

**Competence Certificate**
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

**Prerequisites**
None.

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

**Dynamic Macroeconomics**
2560402, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)

**Literature**
Literatur und Skripte werden in der Veranstaltung angegeben.
8.69 Course: Dynamical Systems [T-MATH-106114]

**Responsible:** Prof. Dr. Jens Rottmann-Matthes

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103080 - Dynamical Systems

**Type**
Oral examination

**Credits**
8

**Recurrence**
Irregular

**Version**
1

**Prerequisites**
none
8.70 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

**Responsible:** PD Dr. Patrick Jochem

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

**Part of:** M-WIWI-101452 - Energy Economics and Technology

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<th>Lecture (V)</th>
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**Exams**

| SS 2020 | 7981006 | Efficient Energy Systems and Electric Mobility | Prüfung (PR) | Fichtner |

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

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

**Efficient Energy Systems and Electric Mobility**

2581006, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Lecture (V)**

**Content**

This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.

- Understand the concept of energy efficiency as applied to specific systems
- Obtain an overview of the current trends in energy efficiency
- Be able to determine and evaluate alternative methods of energy efficiency improvement
- Overview of technical and economical stylized facts on electric mobility
- Judging economical, ecological and social impacts through electric mobility

**Literature**

Wird in der Vorlesung bekanntgegeben.
8.71 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]

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

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<td>WS 20/21</td>
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**Exams**

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<td>7900293</td>
<td>eFinance: Information Systems for Securities Trading</td>
<td>Prüfung (PR)</td>
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**Legend:** 📚 Online, 🧩 Blended (On-Site/Online), 📒 On-Site, X Cancelled

**Competence Certificate**

Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

**Prerequisites**

see below

**Annotation**

The course “eFinance: Information Systems for Securities Trading” covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.

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

**eFinance: Information Systems for Securities Trading**  
2540454, WS 20/21, 2 SWS, Language: English, Open in study portal

**Content**

The course “eFinance: Information Systems for Securities Trading” covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.
Literature


Further Literature

# 8.72 Course: Emerging Trends in Digital Health [T-WIWI-110144]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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## Events

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<th>Seminar (S)</th>
<th>Lins, Sunyaev, Thiebes</th>
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<tr>
<td>SS 2020</td>
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<td>Emerging Trends in Digital Health (Master)</td>
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## Exams

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<th>Sunyaev</th>
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## Competence Certificate
The alternative exam assessment consists of a final thesis.

## Prerequisites
None.

## Annotation
The course is usually held as a block course.
**Course: Emerging Trends in Internet Technologies [T-WIWI-110143]**

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Competence Certificate**  
The alternative exam assessment consists of a final thesis.

**Prerequisites**  
None.

**Annotation**  
The course is usually held as a block course.
8.74 Course: Energy and Environment [T-WIWI-102650]

Responsibility: Ute Karl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101452 - Energy Economics and Technology

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Events

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Exams

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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:

Energy and Environment
2581003, SS 2020, 2 SWS, Language: German, Open in study portal

Content
The lecture focuses on the environmental impacts arising from fossil fuels use and on the methods for the evaluation of such impacts. The first part of the lecture describes the environmental impacts of air pollutants and greenhouse gases as well as technical measures for emission control. The second part covers methods of impact assessment and their use in environmental communication as well as methods for the scientific support of emission control strategies.

The topics include:
- Fundamentals of energy conversion
- Formation of air pollutants during combustion
- Technical measures to control emissions from fossil-fuel combustion processes
- External effects of energy supply (life cycle analyses of selected energy systems)
- Environmental communication on energy services (e.g. electricity labelling, carbon footprint)
- Integrated Assessment Modelling to support the European Clean Air Strategy
- Cost-effectiveness analyses and cost-benefit analyses for emission control strategies
- Monetary valuation of external effects (external costs)

Literature
Die Literaturhinweise sind in den Vorlesungsunterlagen enthalten (vgl. ILIAS)
8.75 Course: Energy Market Engineering [T-WIWI-107501]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103720 - eEnergy: Markets, Services and Systems

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<tbody>
<tr>
<td>SS 2020 79852</td>
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</table>

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Recommendation
None

Annotation
Former course title until summer term 2017: T-WIWI-102794 "eEnergy: Markets, Services, Systems".
The lecture has also been added in the IIP Module Basics of Liberalised Energy Markets.

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

Energy Market Engineering
2540464, SS 2020, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature
Course: Energy Networks and Regulation [T-WIWI-107503]

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

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

**Part of:** M-WIWI-103720 - eEnergy: Markets, Services and Systems

---

### Competence Certificate

The assessment consists of a written exam according to Section 4 (2), 1 of the examination regulation. The exam is offered every semester. Re-examinations are offered on every ordinary examination date.

### Prerequisites

None

### Recommendation

None

### Annotation

Former course title until summer term 2017: T-WIWI-103131 "Regulatory Management and Grid Management - Economic Efficiency of Network Operation"

---

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

**Energy Networks and Regulation**

2540494, WS 20/21, 2 SWS, [Open in study portal](#)

Lecture (V) - Online
Content
Learning Goals
The student,

- understands the business model of a network operator and knows its central tasks in the energy supply system,
- has a holistic overview of the interrelationships in the network economy,
- understands the regulatory and business interactions,
- is in particular familiar with the current model of incentive regulation with its essential components and understands its implications for the decisions of a network operator
- is able to analyse and assess controversial issues from the perspective of different stakeholders.

Content of teaching
The lecture “Energy Networks and Regulation” provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator’s abilities to deal with the massive challenges lying ahead (“Energiewende”, redispatch, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO
- Objectives of regulation: Fair price calculation and high standard access conditions
- The functioning of incentive regulation
- First major amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily?) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

Literature


Course: Energy Systems Analysis

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

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

**Part of:** M-WIWI-101452 - Energy Economics and Technology

---

**Events**

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<td>SS 2020</td>
<td>7981002</td>
<td>Written examination</td>
<td>3</td>
<td>Each winter term</td>
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</table>

**Exams**

| SS 2020 | 7981002 | Prüfung (PR) | Fichtner |

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

---

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

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

---

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

---

**Content**

1. Overview and classification of energy systems modelling approaches
2. Usage of scenario techniques for energy systems analysis
3. Unit commitment of power plants
4. Interdependencies in energy economics
5. Scenario-based decision making in the energy sector
6. Visualisation and GIS techniques for decision support in the energy sector

**Learning goals:**
The student

- has the ability to understand and critically reflect the methods of energy system analysis, the possibilities of its application in the energy industry and the limits and weaknesses of this approach
- can use select methods of the energy system analysis by her-/himself

**Literature**

**Weiterführende Literatur:**

**Course: Engineering FinTech Solutions [T-WIWI-106193]**

**Responsible:** Prof. Dr. Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105036 - FinTech Innovations

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<td>Prüfung (PR)</td>
<td>Ulrich</td>
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</table>

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

**Competence Certificate**
The assessment is carried out in form of a written thesis based on the course “Engineering FinTech Solutions”.

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

### Engineering FinTech Solutions

**2530357, SS 2020, 6 SWS, Language: English, Open in study portal**

**Content**
The assessment is carried out in form of a written thesis based on the course “Engineering FinTech Solutions”.

This project invites students to either pursue their own FinTech innovation project or to contribute to the Chair’s ongoing innovation projects.

The course is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.

In order to take the course “Engineering FinTech Solutions”, students must have completed the module “Data Science for Finance” with a grade of 1.3 or better.

The total workload for this course is approximately 270 hours. This consists of regular meetings with members of the research group and time for independent work on the software project.

Students will learn to connect innovative financial research with modern information technology to build a prototype that solves some daunting tasks for professional end-users in the field of modern asset and risk management.

**Organizational issues**
Blücherstr. 17, E009; 14-tägig, tba

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

### Engineering FinTech Solutions

**2500020, WS 20/21, 6 SWS, Language: English, Open in study portal**

**Content**

This project invites students to either pursue their own FinTech innovation project or to contribute to the Chair’s ongoing innovation projects. Students will learn to connect innovative financial research with modern information technology to build a prototype that solves some daunting tasks for professional end-users in the field of modern asset and risk management. The course is targeted to students with strong knowledge in the field of computational risk and asset management and strong programming skills. It offers students the opportunity to develop an algorithmic solution and hence ample their programming experience and their understanding of financial economics or asset and risk management.
Organizational issues
Termine werden bekannt gegeben
8.79 Course: Enterprise Architecture Management [T-WIWI-102668]

**Responsible:** Prof. Dr. Thomas Wolf

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

**Part of:** M-WIWI-101472 - Informatics

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<td>(Registration until 13 July 2020)</td>
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**Prerequisites**

None

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

## Evolution Equations

**0156400, SS 2020, 4 SWS, Language: English, [Open in study portal](#)**

### Content

Evolution equations describe the time evolution of dynamical systems by an ordinary differential equation in a Banach space. We investigate linear and autonomous (time invariant) problems. In this case the solutions are given by a one-parameter semigroup of linear operators. For such operator semigroups there is a quite complete theory, which allows us to study the properties of the underlying dynamical system. This approach essentially relies on functional analytic methods and results.

We treat the basic existence theorems for linear autonomous evolution equations. In this framework, we then investigate qualitative properties of the solutions, such as regularity and the longterm behavior. Perturbation and approximation results are also studied (which have connections to numerical analysis). The developed theory can be applied to the diffusion, the (damped) wave, and the Schrödinger equation.

Knowledge of the lecture Functional Analysis and of the theory of L^p spaces is required. The necessary parts from the lecture Spectral Theory will be recalled (without proofs) and discussed, so that this lecture is not a prerequisite.

### Organizational issues

**Vorlesung und Übungen werden (zunächst) online angeboten. Es ist geplant den Tafelanschrieb und meine Erläuterungen als Video (mp4) Dateien in ILIAS zur Verfügung zu stellen. (Siehe den Link unten) Weiter will ich via Microsoft-Teams Online Fragestunden zu den Vorlesungen anbieten. Die Details finden Sie unter Ilias.**

Die Grundlage der Vorlesung ist mein Manuskript aus dem Wintersemester 2018/19, das man auf meiner Homepage findet und das ich parallel zur laufenden Vorlesung aktualisiere und in Ilias hochlade.

Lectures and exercises will be held online (at first). I will upload the text on board and my oral explanations as a video file (mp4) in ILIAS. (See link below.) In addition I want to offer online discussions via Microsoft Teams. Details can be found in Ilias.

The lectures are based on my manuscript from winter 2018/19, which can be found on my [webpage](#). I will upload a revised in Ilias parallel to the lectures.
Literature
* Engel, Nagel: One-Parameter Semigroups for Linear Evolution Equations
* Pazy: Semigroups of Linear Operators and Applications to Partial Differential Equations
* Arendt, Batty, Hieber, Neubrander: Vector-valued Laplace Transforms and Cauchy Problems
* Davies: One-Parameter Semigroups
* Engel, Nagel: A Short Course of Operator Semigroups
* Fattorini: The Cauchy Problem
* Goldstein: Semigroups of Linear Operators and Applications
* Hille, Phillips: Functional Analysis and Semi-groups
* Lunardi: Analytic Semigroups and Optimal Regularity in Parabolic Problems
* Tanabe: Equations of Evolution
8.81 Course: Experimental Economics [T-WIWI-102614]

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

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

**Part of:**
- M-WIWI-101505 - Experimental Economics
- M-WIWI-102970 - Decision and Game Theory

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<td>4.5</td>
<td>Each winter term</td>
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<td>WS 20/21 2540493 Übung zu Experimentelle Wirtschaftsforschung</td>
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**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each winter term

**Version**
- 1

**Events**
- WS 20/21 2540489, Experimental Economics, 2 SWS, Language: German, Lecture (V) / Online, Peukert, Knierim
- WS 20/21 2540493, Übung zu Experimentelle Wirtschaftsforschung, 1 SWS, Practice (Ü) / Online, Greif-Winzrieth, Knierim, Peukert

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

**Competence Certificate**
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**
None

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

**Experimental Economics**
2540489, WS 20/21, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
Online

**Content**
Experiments have become a valuable tool in Economics and Information Systems research. Nearly all fields of the economic discipline use experiments to verify theoretical predictions and to identify cause-effect relationships. Besides being used for empirical validation, this method is applied in political and strategic consulting. The lecture gives an introduction to experimental methods in Economics and in the Information Systems research domain, and shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

**Literature**
- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2. Aufl. 2006.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.
8.82 Course: Exponential Integrators [T-MATH-107475]

**Responsible:** Prof. Dr. Marlis Hochbruck

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103700 - Exponential Integrators

**Prerequisites**
none

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</table>
8.83 Course: Extremal Graph Theory [T-MATH-105931]

**Responsible:** Prof. Dr. Maria Aksenovich

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102957 - Extremal Graph Theory

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<tbody>
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### Course: Extreme Value Theory [T-MATH-105908]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann  
Prof. Dr. Norbert Henze

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102939 - Extreme Value Theory

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<td>SS 2020 0155610</td>
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<tr>
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<td>Prüfung (PR)</td>
<td>Extreme Value Theory</td>
<td>Fasen-Hartmann</td>
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### Course: Facility Location and Strategic Supply Chain Management [T-WIWI-102704]

**Responsible:** Prof. Dr. Stefan Nickel  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101413 - Applications of Operations Research  
M-WIWI-101414 - Methodical Foundations of OR

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**Events**

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<td>Facility Location and Strategic Supply Chain Management</td>
<td>2 SWS Lecture (V) / Online</td>
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<tr>
<td>WS 20/21</td>
<td>2550487</td>
<td>Übungen zu Standortplanung und strategisches SCM</td>
<td>1 SWS Practice (Ü) / Online</td>
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**Exams**

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<td>Facility Location and Strategic Supply Chain Management</td>
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**Competence Certificate**

The assessment consists of a written exam (60 min) according to Section 4 (2), 1 of the examination regulation. The exam takes place in every semester. Prerequisite for admission to examination is the succesful completion of the online assessments.

**Prerequisites**

Prerequisite for admission to examination is the succesful 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.

---

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

**Facility Location and Strategic Supply Chain Management**  
2550486, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)

**Literature**

*Weiterführende Literatur:*

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
8.86 Course: Financial Analysis [T-WIWI-102900]

**Responsible:** Dr. Torsten Luedecke

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

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

### Type
- Written examination

### Credits
- 4.5

### Recurrence
- Each summer term

### Version
- 1

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</table>

**Exams**

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

Basic knowledge in corporate finance, accounting, and valuation is required.

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

**Financial Analysis**

2530205, SS 2020, 2 SWS, Language: English, Open in study portal

**Literature**

# Financial Econometrics [T-WIWI-103064]

**Responsible:** Prof. Dr. Melanie Schienle  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101638 - Econometrics and Statistics I  
- M-WIWI-101639 - Econometrics and Statistics II

## Type
- Written examination  
- Credits: 4.5
- Recurrence: Irregular  
- Version: 2

### Events

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### Exams

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**Competence Certificate**  
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**  
The course T-MATH-105874 "Time Series Analysis" may not be chosen.

**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)**

**Content**

**Learning objectives:**  
The student
- shows a broad knowledge of financial econometric estimation and testing techniques  
- is able to apply his/her technical knowledge using software in order to critically assess empirical problems

**Content:**  
ARMA, ARIMA, ARFIMA, (non)stationarity, causality, cointegration, ARCH/GARCH, stochastic volatility models, computer based exercises

**Requirements:**  
It is recommended to attend the course Economics III: Introduction to Econometrics [2520016] prior to this course.

**Workload:**
- Total workload for 4.5 CP: approx. 135 hours  
- Attendance: 30 hours  
- Preparation and follow-up: 65 hours  
- Exam preparation: 40 hours
Literature
Additional literature will be discussed in the lecture.
8 COURSES

Course: Financial Econometrics II [T-WIWI-110939]

8.88 Course: Financial Econometrics II [T-WIWI-110939]

- **Responsible:** Prof. Dr. Melanie Schienle
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101638 - Econometrics and Statistics I
  - M-WIWI-101639 - Econometrics and Statistics II

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- **Prerequisites:** None

**Competence Certificate**
The assessment consists of a written exam (90 minutes).

**Recommendation**
Knowledge of the contents covered by the course "Financial Econometrics"

**Annotation**
Course language is English
The course takes place each second winter term starting in WS2020/21
8.89 Course: Financial Intermediation [T-WIWI-102623]

**Responsible:** Prof. Dr. Martin Ruckes

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

**Part of:**
- M-WIWI-101480 - Finance 3
- M-WIWI-101483 - Finance 2
- M-WIWI-101502 - Economic Theory and its Application in Finance

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each winter term

**Version**
- 1

### Events

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### Exams

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

### Competence Certificate

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:*

### Content

The lecture covers the following topics:

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Stability of the financial system
- The macroeconomic role of financial intermediation
- Principles of the prudential regulation of banks

### Learning outcomes: Students

- are in a position to describe the arguments for the existence of financial intermediaries,
- are able of discuss and analyze both static and dynamic aspects of contractual relationships between banks and borrowers,
- are able to discuss the macroeconomic role of the banking system,
- are in a position to explain the fundamental principles of the prudential regulation of banks and are able to recognize and evaluate the implications of specific regulations.

### Workload

The total workload for this course is approximately 135.0 hours. For further information see the German version.
Literature
Weiterführende Literatur:

8.90 Course: Finite Element Methods [T-MATH-105857]

**Responsible:**
- Prof. Dr. Willy Dörfler
- Prof. Dr. Marlis Hochbruck
- Prof. Dr. Tobias Jahnke
- Prof. Dr. Andreas Rieder
- Prof. Dr. Christian Wieners

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-102891 - Finite Element Methods

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<td>Tutorial for 0110300 (Finite Element Methods)</td>
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Legend:
- 🖥 Online
- 🧩 Blended (On-Site/Online)
- 🗣 On-Site
- 🗑 Cancelled
8.91 Course: Finite Group Schemes [T-MATH-106486]

**Responsible:** Dr. Fabian Januszewski

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103258 - Finite Group Schemes

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8.92 Course: Fixed Income Securities [T-WIWI-102644]

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

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

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

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**Legend:** 🖥 Online, 🗻 Blended (On-Site/Online), 📚 On-Site, ❌ Cancelled

**Competence Certificate**

The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the exercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

**Prerequisites**

None

**Recommendation**

Knowledge from the course "Derivatives" is very helpful.

**Annotation**

The course will no longer be offered from winter semester 2020/21.

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

**Bond Markets**

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

**Content**

The lecture "Bond Markets" deals with the national and international bond markets, which are an important source of financing for companies, as well as for the public sector. After an overview of the most important bond markets, different yield definitions are discussed. Based on this, the concept of the yield curve is presented. In addition, the theoretical and empirical relationships between ratings, default probabilities and spreads are analyzed. The focus will then be on questions regarding the valuation, measurement, management and control of credit risks.

The total workload for this course is approximately 135 hours (4.5 credits).

The assessment consists of a written exam (75 min.) (according to §4(2), 1 SPO). A bonus can be earned through successful participation in the tutorial sessions. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date. Students deepen their knowledge of national and international bond markets. They gain knowledge of the traded instruments and their key figures for describing default risk such as ratings, default probabilities or credit spreads.

**Organizational issues**

Blockveranstaltung: Do 14:00-19:00 Uhr, Fr 9:45-17:15 Uhr  
05./06.11., 19./20.11., 03./04.12.20
### 8.93 Course: Forecasting: Theory and Practice [T-MATH-105928]

**Responsible:** Prof. Dr. Tilmann Gneiting  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102956 - Forecasting: Theory and Practice

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Legend: 🖥 Online, ☑️ Blended (On-Site/Online), ☐ On-Site, ✗ Cancelled
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<th>Prof. Dr. Christian Wieners</th>
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<td>M-MATH-103527 - Foundations of Continuum Mechanics</td>
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### Prerequisites
none
8.95 Course: Fourier Analysis [T-MATH-105845]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-102873 - Fourier Analysis

Type: Written examination
Credits: 8
Version: 1
8.96 Course: Fourier Analysis and its Applications to PDEs [T-MATH-109850]

**Responsible:** Jun.-Prof. Dr. Xian Liao

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-104827 - Fourier Analysis and its Applications to PDEs

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**Prerequisites**
none
## 8.97 Course: Functional Analysis [T-MATH-102255]

**Responsible:** Prof. Dr. Dorothee Frey  
PD Dr. Gerd Herzog  
Prof. Dr. Dirk Hundertmark  
Prof. Dr. Tobias Lamm  
Prof. Dr. Michael Plum  
Prof. Dr. Wolfgang Reichel  
Dr. Christoph Schmoeger  
Prof. Dr. Roland Schnaubelt

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101320 - Functional Analysis

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
8.98 Course: Functions of Matrices [T-MATH-105906]

Responsible: PD Dr. Volker Grimm
Organisation: KIT Department of Mathematics
Part of: M-MATH-102937 - Functions of Matrices

Type: Oral examination
Credits: 8
Version: 1

Prerequisites
none
8.99 Course: Functions of Operators [T-MATH-105905]

Organisation: KIT Department of Mathematics
Part of: M-MATH-102936 - Functions of Operators

Type: Oral examination
Credits: 6
Version: 1

Type: Oral examination
Credits: 6
Version: 1
### T 8.100 Course: Generalized Regression Models [T-MATH-105870]

**Responsible:** Prof. Dr. Norbert Henze  
PD Dr. Bernhard Klar  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-102906 - Generalized Regression Models

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8.101 Course: Geometric Group Theory [T-MATH-105842]

**Responsible:**
Prof. Dr. Frank Herrlich  
Prof. Dr. Enrico Leuzinger  
Dr. Gabriele Link  
Prof. Dr Roman Sauer  
Prof. Dr. Wilderich Tuschmann

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-102867 - Geometric Group Theory

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### 8.102 Course: Geometric Numerical Integration [T-MATH-105919]

**Responsible:** Prof. Dr. Marlis Hochbruck  
Prof. Dr. Tobias Jahnke  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-102921 - Geometric Numerical Integration

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#### Prerequisites

none
8.103 Course: Geometry of Schemes [T-MATH-105841]

**Responsible:** Prof. Dr. Frank Herrlich  
Dr. Stefan Kühnlein

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102866 - Geometry of Schemes

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Legend: 🖥 Online, 🗭 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
8 COURSES

Course: Global Differential Geometry [T-MATH-105885]

8.104 Course: Global Differential Geometry [T-MATH-105885]

- **Responsible:** Dr. Sebastian Grensing
  Prof. Dr. Wilderich Tuschmann
- **Organisation:** KIT Department of Mathematics
- **Part of:** M-MATH-102912 - Global Differential Geometry

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**Prerequisites**

none
### 8.105 Course: Global Optimization I [T-WIWI-102726]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101413 - Applications of Operations Research  
- M-WIWI-101414 - Methodical Foundations of OR  
- M-WIWI-101473 - Mathematical Programming

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

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**Competence Certificate**  
Please note: due to the research semester of Prof. Dr. Stein the lecture will not be offered in summer semester 2020.

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.
8.106 Course: Global Optimization I and II [T-WIWI-103638]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101414 - Methodical Foundations of OR
M-WIWI-101473 - Mathematical Programming

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Exams
SS 2020 | 7900300_SS2020_NK | Global Optimization I and II | Prüfung (PR) | Stein

Competence Certificate
Please note: due to the research semester of Prof. Dr. Stein the lectures will not be offered in summer semester 2020.
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.
8.107 Course: Global Optimization II [T-WIWI-102727]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101414 - Methodical Foundations of OR  
M-WIWI-101473 - Mathematical Programming

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**Exams**

| SS 2020 | 7900297_SS2020_NK | Global Optimization II | Prüfung (PR) | Stein |

**Competence Certificate**

Please note: due to the research semester of Prof. Dr. Stein the lecture will not be offered in summer semester 2020.

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.
### 8.108 Course: Graph Theory [T-MATH-102273]

**Responsible:** Prof. Dr. Maria Aksenovich  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101336 - Graph Theory

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**Prerequisites**

None
8.109 Course: Graph Theory and Advanced Location Models [T-WIWI-102723]

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

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

**Part of:**
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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**Exams**

| SS 2020 | 7900334 | Graph Theory and Advanced Location Models | Prüfung (PR) | Nickel |

**Competence Certificate**

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

**Prerequisites**

None

**Recommendation**

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

**Annotation**

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.
8.110 Course: Group Actions in Riemannian Geometry [T-MATH-105925]

**Responsible:** Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102954 - Group Actions in Riemannian Geometry

**Type**
- Oral examination

**Credits**
- 5

**Version**
- 1

**Prerequisites**
none
## T 8.111 Course: Harmonic Analysis [T-MATH-110804]

**Responsible:** Prof. Dr. Dorothee Frey  
apl. Prof. Dr. Peer Kunstmann  
Prof. Dr. Roland Schnaubelt  

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-105324 - Harmonic Analysis  

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8.112 Course: Harmonic Analysis for Dispersive Equations [T-MATH-107071]

**Responsible:** apl. Prof. Dr. Peer Kunstmann
**Organisation:** KIT Department of Mathematics
**Part of:** M-MATH-103545 - Harmonic Analysis for Dispersive Equations

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**Prerequisites**
none
**8.113 Course: Heat Economy [T-WIWI-102695]**

**Responsible:** Prof. Dr. Wolf Fichtner  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101452 - Energy Economics and Technology

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**Exams**

| SS 2020 | 7981001 | Heat Economy | Prüfung (PR) | Fichtner |

**Compentence Certificate**

The lecture will be suspended in summer semester 2019 and 2020 and will probably be offered again in summer semester 2021.

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**

See German version.
8.114 Course: Homotopy Theory [T-MATH-105933]

**Responsible:** Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102959 - Homotopy Theory

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8 COURSES
Course: Human Factors in Security and Privacy [T-WIWI-109270]

8.115 Course: Human Factors in Security and Privacy [T-WIWI-109270]

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

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<td>Human Factors in Security and Privacy</td>
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Exams

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

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation. Only those who have successfully participated in the exercises and the lecture will be admitted to the examination.

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

Prerequisites

1. Successful participation in the exercises. Successful means actively participating in the tasks and its discussions. One task may be missed.
2. Also participation in the lectures is required. One lecture may be missed.

Recommendation

The prior attendance of the lecture "Information Security" is strongly recommended.

Annotation

Some lectures are in English, some in German.

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

Human Factors in Security and Privacy
2511554, WS 20/21, 2 SWS, Language: German, Open in study portal

Content

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website [https://secuso.aifb.kit.edu/Studium_und_Lehre.php](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).
Literature

- Security and Usability: Designing Secure Systems that People Can Use von Lorrie Faith Cranor und Simson Garfinkel. 2005
# 8.116 Course: Incentives in Organizations [T-WIWI-105781]

**Responsible:** Prof. Dr. Petra Nieken  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101500 - Microeconomic Theory  
M-WIWI-101505 - Experimental Economics  

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**Competence Certificate**  
The assessment of this course is a written examination (60 min). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

**Prerequisites**  
None

**Recommendation**  
Knowledge of microeconomics, game theory, and statistics is assumed.

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

- **Incentives in Organizations**  
  2573003, SS 2020, 2 SWS, Language: English, [Open in study portal](#)  
  Lecture (V)
Content
The students acquire profound knowledge about the design and the impact of different incentive and compensation systems. Topics covered are, for instance, performance based compensation, team work, intrinsic motivation, multitasking, and subjective performance evaluations. We will use microeconomic or behavioral models as well as empirical data to analyze incentive systems. We will investigate several widely used compensation schemes and their relationship with corporate strategy. Students will learn to develop practical implications which are based on the acquired knowledge of this course.

Aim
The student
- develops a strategic understanding about incentives systems and how they work.
- analyzes models from personnel economics.
- understands how econometric methods can be used to analyze performance and compensation data.
- knows incentive schemes that are used in companies and is able to evaluate them critically.
- can develop practical implications which are based on theoretical models and empirical data from companies.
- understands the challenges of managing incentive and compensation systems and their relationship with corporate strategy.

Workload
The total workload for this course is: approximately 135 hours.
Lecture: 32 hours
Preparation of lecture: 52 hours
Exam preparation: 51 hours

Literature
Slides, Additional case studies and research papers will be announced in the lecture.
Literature (complementary):
Behavioral Game Theory, Camerer, Russel Sage Foundation, 2003
Introduction to Econometrics, Wooldridge, Andover, 2014
Econometric Analysis of Cross Section and Panel Data, Wooldridge, MIT Press, 2010
8 COURSES

**Course: Information Service Engineering [T-WIWI-106423]**

**Responsible:** Prof. Dr. Harald Sack

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

**Part of:** M-WIWI-101472 - Informatics

---

**Type:** Written examination  
**Credits:** 4,5  
**Recurrence:** Each summer term  
**Version:** 2

---

| Events |  
| SS 2020 | 2511606 | Information Service Engineering | 2 SWS | Lecture (V) | Sack |
| SS 2020 | 2511607 | Exercises to Information Service Engineering | 1 SWS | Practice (Ü) | Sack |

| Exams |  
| SS 2020 | 7900070 | Information Service Engineering (Registration until 13 July 2020) | Prüfung (PR) | Sack |

---

**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

**Prerequisites**

None

---

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

**Information Service Engineering**

2511606, SS 2020, 2 SWS, Language: English, [Open in study portal](#)
Content
- Information, Natural Language and the Web
- Natural Language Processing
  - NLP and Basic Linguistic Knowledge
  - NLP Applications, Techniques & Challenges
  - Evaluation, Precision and Recall
  - Regular Expressions and Automata
  - Tokenization
  - Language Model and N-Grams
  - Part-of-Speech Tagging
- Knowledge Graphs
  - Knowledge Representations and Ontologies
  - Resource Description Framework (RDF) as simple Data Model
  - Creating new Models with RDFS
  - Querying RDF(S) with SPARQL
  - More Expressivity via Web Ontology Language (OWL)
  - From Linked Data to Knowledge Graphs
  - Wikipedia, DBpedia, and Wikidata
  - Knowledge Graph Programming
- Basic Machine Learning
  - Machine Learning Fundamentals
  - Evaluation and Generalization Problems
  - Linear Regression
  - Decision Trees
  - Unsupervised Learning
  - Neural Networks and Deep Learning
- ISE Applications
  - From Data to Knowledge
  - Data Mining, Information Visualization and Knowledge Discovery
  - Semantic Search
  - Exploratory Search
  - Semantic Recommender Systems

Learning objectives:
- The students know the fundamentals and measures of information theory and are able to apply those in the context of Information Service Engineering.
- The students have basic skills of natural language processing and are enabled to apply natural language processing technology to solve and evaluate simple text analysis tasks.
- The students have fundamental skills of knowledge representation with ontologies as well as basic knowledge of Semantic Web and Linked Data technologies. The students are able to apply these skills for simple representation and analysis tasks.
- The students have fundamental skills of information retrieval and are enabled to conduct and to evaluate simple information retrieval tasks.
- The students apply their skills of natural language processing, Linked Data engineering, and Information Retrieval to conduct and evaluate simple knowledge mining tasks.
- The students know the fundamentals of recommender systems as well as of semantic and exploratory search.

Literature


8.118 Course: Innovation Theory and Policy [T-WIWI-102840]

**Responsible:** Prof. Dr. Ingrid Ott  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101478 - Innovation and Growth

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**Exams**

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</table>

**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.

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

**Prerequisites**

None

**Recommendation**

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

---

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

**Innovation theory and policy**

2560236, SS 2020, SWS, Language: German/English, [Open in study portal](#)
Content
Learning objectives:
Students shall be given the ability to

- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- understand the relationships between market structure and the development of innovation
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Course content:
The course covers the following topics:

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

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

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

Exam description:
The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature
Auszug:
### 8.119 Course: Integral Equations [T-MATH-105834]

**Responsible:**
- PD Dr. Tilo Arens
- Prof. Dr. Roland Griesmaier
- PD Dr. Frank Hettlich

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-102874 - Integral Equations

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8.120 Course: International Business Development and Sales [T-WIWI-110985]

**Responsible:** Erice Casenave  
Prof. Dr. Martin Klarmann  
Prof. Dr. Orestis Terzidis

**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105312 - Marketing and Sales Management

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**Events**

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

**Competence Certificate**

Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

**Annotation**

Due to the Corona situation it is currently unclear whether the seminar can be offered in WS20 / 21.

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

- **International Business Development and Sales**  
  2500003, WS 20/21, 4 SWS, Language: English, [Open in study portal](#)

**Content**

This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model.

- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.

Total workload for 6 ECTS: about 180 hours.
8.121 Course: International Finance [T-WIWI-102646]

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

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- **Exams**

  | SS 2020 | 7900097 | International Finance | Prüfung (PR) | Uhrig-Homburg |

**Competence Certificate**
See German version.

**Prerequisites**
None

**Recommendation**
None

**Annotation**
The course will not be offered in the summer semester 2020 as originally planned, but only in the winter semester 2020/2021. The course is offered as a 14-day or block course.

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

### International Finance
- **2530570, SS 2020, 2 SWS, Language: German**, [Open in study portal](#)

**Lecture (V)**

**Organizational issues**
Diese Veranstaltung findet im WS 20/21 statt.

**Literature**
Weiterführende Literatur:

### International Finance
- **2530570, WS 20/21, 2 SWS, Language: German**, [Open in study portal](#)

**Lecture (V) On-Site**

**Organizational issues**
Blockveranstaltung am 11.11.20 15:45-19:00 Uhr
Literature
Weiterführende Literatur:

8.122 Course: Introduction into Particulate Flows [T-MATH-105911]

**Responsible:** Prof. Dr. Willy Dörfler  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102943 - Introduction into Particulate Flows

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**Prerequisites**

none
### 8.123 Course: Introduction to Aperiodic Order [T-MATH-110811]

<table>
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<tr>
<th>Responsible</th>
<th>Prof. Dr. Tobias Hartnick</th>
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<tr>
<td>Organisation</td>
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<td>Part of</td>
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**Prerequisites**
none
### 8.124 Course: Introduction to Data Science [T-WIWI-110863]

**Responsible:** PD Dr. Steffen Herbold  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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#### Events

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#### Competence Certificate

The assessment consists of a written exam (60 min).

Please note that lecture and exam will be offered once in the summer semester 2020. The repeat examination will take place in winter semester 2020/21 (only for repeaters).

#### Prerequisites

None

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

### Introduction to Data Science

**2511608, SS 2020, 2 SWS, Language: English, Open in study portal**

**Lecture (V)**

**Content**

The main topic of this lecture is data science, i.e., methods to extract information from data with a scientific approach. We approach this topic from a practical side in this lecture. This means, that we concern ourselves directly with what algorithms do, and where they should be applied. The details of the algorithms and the theory behind them are not part of this lecture. Methods considered in this lecture include:

- Association rule mining with the APRIORI approach
- Clustering with k-means, EM for gaussian mixtures, DBSCAN, and single linkage clustering
- Classification with k-nearest neighbor, decision trees, random forests, logistic regression, naive Bayes, support vector machines, and neural networks
- Linear regression with ridge and lasso
- Time series analysis with ARMA
- Fundamentals of text mining

Additionally, we will consider the analysis of Big Data. In this context, we will consider the following topics:

- The MapReduce paradigm
- Apache Hadoop and Apache Spark

**Literature**

To be announced.
8.125 Course: Introduction to Geometric Measure Theory [T-MATH-105918]

**Responsible:** PD Dr. Steffen Winter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102949 - Introduction to Geometric Measure Theory

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Prerequisites
none
8.127 Course: Introduction to Kinetic Theory [T-MATH-108013]

**Responsible:** Prof. Dr. Martin Frank

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-103919 - Introduction to Kinetic Theory

**Type**
Oral examination

**Credits**
4

**Recurrence**
Each winter term

**Version**
1

### Events

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### Exam

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**Prerequisites**
none

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

**Introduction to Kinetic Theory**
0155450, WS 20/21, 2 SWS, Language: English, Open in study portal

**Lecture (V)**
Online
8.128 Course: Introduction to Matlab and Numerical Algorithms [T-MATH-105913]

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

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102945 - Introduction to Matlab and Numerical Algorithms

**Type**
Written examination

**Credits**
5

**Version**
1

Prerequisites
none
# 8.129 Course: Introduction to Scientific Computing [T-MATH-105837]

**Responsible:** Prof. Dr. Willy Dörfler  
Prof. Dr. Marlis Hochbruck  
Prof. Dr. Tobias Jahnke  
Prof. Dr. Andreas Rieder  
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102889 - Introduction to Scientific Computing

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

**Responsible:** Prof. Dr. Steffen Rebennack  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
M-WIWI-101414 - Methodical Foundations of OR  
M-WIWI-102832 - Operations Research in Supply Chain Management  
M-WIWI-103289 - Stochastic Optimization

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**Events**  
SS 2020 2550470  **Einführung in die Stochastische Optimierung**  
2 SWS  Lecture (V)  Rebennack

SS 2020 2550471  **Übung zur Einführung in die Stochastische Optimierung**  
1 SWS  Practice (Ü)  Rebennack, Sinske

SS 2020 2550474  **Rechnerübung zur Einführung in die Stochastische Optimierung**  
SWS  Practice (Ü)  Rebennack, Sinske

**Exams**  
SS 2020 7900272  **Introduction to Stochastic Optimization**  
Prüfung (PR)  Rebennack

**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.
### 8.131 Course: Inverse Problems [T-MATH-105835]

**Responsible:**
PD Dr. Tilo Arens  
Prof. Dr. Roland Griesmaier  
PD Dr. Frank Hettlich  
Prof. Dr. Andreas Rieder

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-102890 - Inverse Problems

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Legend: 📚 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
8.132 Course: Judgment and Decision Making [T-WIWI-111099]

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

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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**Competence Certificate**

The grade will be based on the written exam (60 minutes) at the end of the semester.
### 8.133 Course: Key Moments in Geometry [T-MATH-108401]

<table>
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<tr>
<th>Responsible</th>
<th>Prof. Dr. Wilderich Tuschmann</th>
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**Prerequisites**
none
8.134 Course: Knowledge Discovery [T-WIWI-102666]

Responsible: Prof. Dr. York Sure-Vetter
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

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Exams:
- SS 2020: 7900039 Knowledge Discovery (Registration until 13 July 2020) Prüfung (PR) Sure-Vetter

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

Competence Certificate
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation. Students can be awarded a bonus on their final grade if they successfully complete special assignments.

Prerequisites
None

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

Knowledge Discovery
2511302, WS 20/21, 2 SWS, Language: English, Open in study portal

Lecture (V) Online

Content
The lecture gives an overview of approaches of machine learning and data mining for knowledge acquisition from large data sets. These are examined especially with respect to algorithms, applicability to different data representations and the use in real application scenarios.

Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.

The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.

Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:
Students
- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Workload:
- The total workload for this course is approximately 135 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 60 hours
- Exam and exam preparation: 30 hours
Contents
The exercises are based on the lecture Knowledge Discovery. Several exercises are covered, which take up and discuss in detail the topics covered in the lecture Knowledge Discovery. Practical examples are demonstrated to the students to enable a knowledge transfer of the theoretical aspects learned into practical application.

Contents of the lecture cover the entire machine learning and data mining process with topics on monitored and unsupervised learning processes and empirical evaluation. The learning methods covered range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:
Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Literature

- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley
8.135 Course: L2-Invariants [T-MATH-105924]

**Responsible:** Dr. Holger Kammeyer  
Prof. Dr Roman Sauer

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102952 - L2-Invariants

**Type**  
Oral examination

**Credits**  
5

**Version**  
1

**Prerequisites**  
none
8.136 Course: Large-scale Optimization [T-WIWI-106549]

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

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

**Part of:**
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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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.
8.137 Course: Lie Groups and Lie Algebras [T-MATH-108799]

**Responsible:** Prof. Dr. Enrico Leuzinger

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-104261 - Lie Groups and Lie Algebras

- **Type:** Oral examination
- **Credits:** 8
- **Recurrence:** Irregular
- **Version:** 1
Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]

**8.138 Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]**

- **Responsible:** Prof. Dr.-Ing. Johann Marius Zöllner
- **Organisation:** KIT Department of Economics and Management
- **Part of:** M-WIWI-101472 - Informatics

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**Exams**

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(Registration until 13 July 2020)

**Prerequisites**
None.

**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

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

**Machine Learning 1 - Fundamental Methods**

- **2511500, WS 20/21, 2 SWS, Language: German, Open in study portal**

**Content**

The field of knowledge acquisition and machine learning is a rapidly expanding field of knowledge and the subject of numerous research and development projects. The acquisition of knowledge can take place in different ways. Thus a system can benefit from experiences already made, it can be trained, or it draws conclusions from extensive background knowledge.

The lecture covers symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as sub-symbolic techniques such as neural networks, support vector machines and genetic algorithms. The lecture introduces the basic principles and structures of learning systems and examines the algorithms developed so far. The structure and operation of learning systems is presented and explained with some examples, especially from the fields of robotics and image processing.

**Learning objectives:**

- Students acquire knowledge of the fundamental methods in the field of machine learning.
- Students can classify, formally describe and evaluate methods of machine learning.
- Students can use their knowledge to select suitable models and methods for selected problems in the field of machine learning.
Literatur
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.
8.139 Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]

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

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

**Part of:**
- M-WIWI-101472 - Informatics
- M-WIWI-101637 - Analytics and Statistics

**Type:** Written examination

**Credits:** 4.5

**Recurrence:** Each summer term

**Version:** 2

**Events**

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<th>Credits</th>
<th>Recurrence</th>
</tr>
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<tbody>
<tr>
<td>Machine Learning 2 - Advanced methods</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
</tr>
<tr>
<td>Exercises for Machine Learning 2 - Advanced Methods</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
</tr>
</tbody>
</table>

**Exams**

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<thead>
<tr>
<th>Exams</th>
<th>Credits</th>
<th>Recurrence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Machine Learning 2 – Advanced Methods (Registration until 13 July 2020)</td>
<td></td>
<td>Prüfung (PR)</td>
</tr>
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</table>

**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

**Prerequisites**
None.

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

**Machine Learning 2 - Advanced methods**

Lecture (V)

SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Content**
The subject area of machine intelligence and, in particular, machine learning, taking into account real challenges of complex application domains, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The lecture "Machine Learning 2" deals with advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning), pulsed networks, hierarchical approaches, e.g. As well as dynamic, probabilistic relational methods. Another focus is the embedding and application of machine learning methods in real systems.

The lecture introduces the latest basic principles as well as extended basic structures and elucidates previously developed algorithms. The structure and the mode of operation of the methods and methods are presented and explained by means of some application scenarios, especially in the field of technical (sub) autonomous systems (robotics, neurorobotics, image processing, etc.).

**Learning objectives:**
- Students understand extended concepts of machine learning and their possible applications.
- Students can classify, formally describe and evaluate methods of machine learning.
- In detail, methods of machine learning can be embedded and applied in complex decision and inference systems.
- Students can use their knowledge to select suitable models and methods of machine learning for existing problems in the field of machine intelligence.

**Recommendations:**
Attending the lecture *Machine Learning 1* or a comparable lecture is very helpful in understanding this lecture.
Literatur
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.
8.140 Course: Management of IT-Projects [T-WIWI-102667]

**Responsible:** Dr. Roland Schätzle

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

**Part of:** M-WIWI-101472 - Informatics

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

### Events

<table>
<thead>
<tr>
<th>Term</th>
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<th>Description</th>
<th>Semester</th>
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<th>Type</th>
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<tr>
<td>SS 2020</td>
<td>2511214</td>
<td>Management of IT-Projects</td>
<td>SS 2020</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
<td>Schätzle</td>
</tr>
<tr>
<td>SS 2020</td>
<td>2511215</td>
<td>Übungen zu Management von Informatik-Projekten</td>
<td>SS 2020</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Schätzle</td>
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### Exams

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<tr>
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<th>Description</th>
<th>Date</th>
<th>Type</th>
<th>Instructor</th>
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<tr>
<td>SS 2020</td>
<td>7900045</td>
<td>Management of IT-Projects (Registration until 13 July 2020)</td>
<td>Oberweis</td>
<td>Prüfung (PR)</td>
<td>Oberweis</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment takes place in the form of a written examination (exam) in the amount of 60 minutes. The examination is offered every semester and can be repeated at any regular examination date.

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

The exact details will be announced in the lecture.

**Prerequisites**

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

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

### Management of IT-Projects

<table>
<thead>
<tr>
<th>Code</th>
<th>Term</th>
<th>Credits</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>2511214</td>
<td>SS 2020</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
</tr>
</tbody>
</table>

*Language: German, [Open in study portal](#)*
Content
The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
  - plan of the project structure
  - flow chart
  - project schedule
  - plan of resources
- effort estimation
- project infrastructure
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Learning objectives:
Students

- explain the terminology of IT project management and typical used methods for planning, handling and controlling,
- apply methods appropriate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:
Knowledge from the lecture Software Engineering is helpful.

Workload:

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

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004

Content
The general conditions, influencing factors and methods in the planning, execution and control of IT projects are dealt with. In particular, the following topics will be dealt with: Project environment, project organization, project structure plan, effort estimation, project infrastructure, project control, decision-making processes, negotiation, time management. The lecture is accompanied by exercises in the form of tutorials. The date of the exercise will be announced later.
8.141 Course: Market Research [T-WIWI-107720]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

<table>
<thead>
<tr>
<th>Type</th>
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<th>Title</th>
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<th>Type</th>
<th>Instructor</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 2020</td>
<td>2571150</td>
<td>Market Research</td>
<td>2</td>
<td>Lecture (V)</td>
<td>Klarmann</td>
</tr>
<tr>
<td>SS 2020</td>
<td>2571151</td>
<td>Market Research Tutorial</td>
<td>1</td>
<td>Practice (Ü)</td>
<td>Honold</td>
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**Exams**

<table>
<thead>
<tr>
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<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Instructor</th>
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<tbody>
<tr>
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<td>7900015</td>
<td>Market Research</td>
<td>Prüfung (PR)</td>
<td>Klarmann</td>
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<td>SS 2020</td>
<td>7900203</td>
<td>Market Research</td>
<td>Prüfung (PR)</td>
<td>Klarmann</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Recommendation**
None

**Annotation**
Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.

*Below you will find excerpts from events related to this course:*
Content
Within the lecture, essential statistical methods for measuring customer attitudes (e.g. satisfaction measurement), understanding customer behavior and making strategic decisions will be discussed. The practical use as well as the correct handling of different survey methods will be taught, such as experiments and surveys. To analyze the collected data, various analysis methods are presented, including hypothesis tests, factor analyses, cluster analyses, variance and regression analyses. Building on this, the interpretation of the results will be discussed.

Topics addressed in this course are for example:

- Theoretical foundations of market research
- Statistical foundations of market research
- Measuring customer attitudes
- Understanding customer reactions
- Strategical decision making

The aim of this lecture is to give an overview of essential statistical methods. In the lecture students learn the practical use as well as the correct handling of different statistical survey methods and analysis procedures. In addition, emphasis is put on the interpretation of the results after the application of an empirical survey. The derivation of strategic options is an important competence that is required in many companies in order to react optimally to customer needs.

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

The total workload for this course is approximately 135.0 hours.

Presence time: 30 hours
Preparation and wrap-up of the course: 45.0 hours
Exam and exam preparation: 60.0 hours

Please note that this course has to be completed successfully by students interested in master thesis positions at the chair of marketing.

Literature
8.142 Course: Marketing Strategy Business Game [T-WIWI-102835]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

<table>
<thead>
<tr>
<th>Type</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Version</th>
</tr>
</thead>
<tbody>
<tr>
<td>Examination of another type</td>
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<td>Each summer term</td>
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**Events**

<table>
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<tr>
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<th>Title</th>
<th>SWS</th>
<th>Block</th>
<th>Tutors</th>
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<tbody>
<tr>
<td>SS 2020</td>
<td>2571183</td>
<td>Marketing Strategy Business Game</td>
<td>1</td>
<td>(B)</td>
<td>Klarmann, Mitarbeiter</td>
</tr>
<tr>
<td>SS 2020</td>
<td>2571184</td>
<td>Real World Lab: Innovation Communication</td>
<td>1</td>
<td>(B)</td>
<td>Klarmann, Feurer, Honold</td>
</tr>
</tbody>
</table>

**Exams**

<table>
<thead>
<tr>
<th>Term</th>
<th>Code</th>
<th>Title</th>
<th>Type</th>
<th>Tutors</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS 2020</td>
<td>7900022</td>
<td>Marketing Strategy Business Game</td>
<td>Prüfung (PR)</td>
<td>Klarmann</td>
</tr>
</tbody>
</table>

**Competence Certificate**

The assessment (alternative exam assessment) consists of a group presentation and a subsequent round of questions totalling 20 minutes.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Please note that only one of the courses from the election block can be chosen in the module.

Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS points in the respective module to all students. Participation in a specific course cannot be guaranteed.

In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

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

**Marketing Strategy Business Game**

2571183, SS 2020, 1 SWS, Language: German, [Open in study portal](#)
Content
Using Markstrat, a marketing strategy business game, students work in groups representing a company that competes on a simulated market against the other groups’ companies.
Students
- are able to operate the strategic marketing simulation software “Markstrat”
- are able to take strategic marketing decisions in groups
- know how to apply strategic marketing concepts to practical contexts (e.g. for market segmentation, product launches, coordination of the marketing mix, market research, choice of the distribution channel or competitive behavior)
- are capable to collect and to select information usefully with the aim of decision-making
- are able to react appropriately to predetermined market conditions
- know how to present their strategies in a clear and consistent way
- are able to talk about the success, problems, critical incidents, external influences and strategy changes during the experimental game and to reflect and present their learning success
Non exam assessment (following §4(2), 3 of the examination regulation).
The total workload for this course is approximately 45.0 hours. For further information see German version.

- Please note that only one of the courses from the election block can be chosen in the module.
- Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.
- In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

Organizational issues
Termine werden bekannt gegeben

Literature

Real World Lab: Innovation Communication
2571184, SS 2020, 1 SWS, Language: German/English, Open in study portal
Content
In this interactive course, students work in groups to develop and test a suitable communication measure to accompany the market launch of an innovative product by a start-up from Karlsruhe. For this purpose, the course is divided into four phases. (1) First, students work in groups to develop different scientific fundamentals (e.g. company goals, product/market characteristics, target groups, communication of innovations) and share these findings with other groups in the form of a team presentation. (2) Then each group independently develops its own online communication measure, which can be realized with a given budget and makes use of the knowledge gained from (1). (3) The groups implement this measure in the field, evaluate its effectiveness according to given criteria (KPIs) and adapt it if necessary. (4) Finally, the design and success of the measure are critically reflected and discussed and shared with the other groups in the form of a final presentation.
Information about the start-up: It is a medical device for the treatment of insect bites (+ corresponding app) with the smartphone. Launch of the product is spring 2020. Further information at heatit.de

Learning objectives
Students
- have the ability to make strategic marketing decisions independently in groups
- can apply basic marketing strategy concepts (e.g. market segmentation, product launch, coordination of the marketing mix, market research, channel selection or competitive behaviour) to a practical context
- can collect, analyze and meaningfully prepare information and KPIs for decision-making
- can react to given market conditions in a coordinated manner
- are able to present their strategy in a clear and coherent manner
- are able to talk about success, problems, important events, external influences and strategy changes during the practical test and present their learning effects in a reflected manner

Total effort
with 1.5 credit points: approx. 45 hours

Presence time
9 hours (3 compulsory dates: kick-off, 1st presentation, final presentation)
Preparation and follow-up of the course: 28.5 hours
Exam and exam preparation: 7.5 hours

Examination
The control of success is carried out in the form of an examination performance of another kind according to § 4 paragraph 2 no. 3 SPO (two team presentations)

Notes
An application is required for participation in this course. The application phase usually takes place at the beginning of the lecture period in the summer semester. This course is restricted. The research group Marketing and Sales typically allows all students to attend a course at 1.5 credit points in the corresponding module. A guarantee for the attendance of a specific course can not be given, though. Further information can be obtained directly from the research group Marketing and Sales [marketing.iasm.kit.edu]. Please note that only one of the 1.5-ECTS events can be credited for the module.

Organizational issues
einmalige Veranstaltung im Sommer 2020
Termine werden bekannt gegeben
8.143 Course: Markov Decision Processes [T-MATH-105921]

**Responsible:** Prof. Dr. Nicole Bäuerle

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102907 - Markov Decision Processes

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<th>0159900</th>
<th>Markovsche Entscheidungsprozesse</th>
<th>3 SWS</th>
<th>Lecture (V)</th>
<th>Bäuerle</th>
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<tbody>
<tr>
<td></td>
<td>SS 2020</td>
<td>0159910</td>
<td>Übungen zu 0159900 (Markovsche Entscheidungsprozesse)</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Bäuerle</td>
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</table>

| Exams | SS 2020 | 77341 | Markov Decision Processes | Prüfung (PR) | Bäuerle |

**Prerequisites**
none
8.144 Course: Master Thesis [T-MATH-105878]

Réponsible: Dr. Sebastian Grensing  
Organisation: KIT Department of Mathematics  
Part of: M-MATH-102917 - Master Thesis

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<thead>
<tr>
<th>Type</th>
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</thead>
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</table>

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

- **Submission deadline**: 6 months
- **Maximum extension period**: 3 months
- **Correction period**: 8 weeks
8.145 Course: Mathematical Methods in Signal and Image Processing [T-MATH-105862]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102897 - Mathematical Methods in Signal and Image Processing

<table>
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<tr>
<th>Type</th>
<th>Credits</th>
<th>Version</th>
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</thead>
<tbody>
<tr>
<td>Oral examination</td>
<td>8</td>
<td>1</td>
</tr>
</tbody>
</table>

**Prerequisites**
none
8 COURSES

Course: Mathematical Methods of Imaging [T-MATH-106488]

8.146 Course: Mathematical Methods of Imaging [T-MATH-106488]

- **Responsible:** Prof. Dr. Andreas Rieder
- **Organisation:** KIT Department of Mathematics
- **Part of:** M-MATH-103260 - Mathematical Methods of Imaging

<table>
<thead>
<tr>
<th>Type</th>
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<tbody>
<tr>
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**Events**

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<th>Type</th>
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<td>2</td>
<td>Practice (Ü)</td>
<td>Rieder</td>
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**Exams**

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<th>Event Code</th>
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</tr>
</thead>
<tbody>
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<td>Mathematical Methods of Imaging</td>
<td>Prüfung (PR)</td>
<td>Rieder</td>
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**Prerequisites**

None
8.147 Course: Mathematical Modelling and Simulation in Practise [T-MATH-105889]

**Responsible:** PD Dr. Gudrun Thäter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102929 - Mathematical Modelling and Simulation in Practise

<table>
<thead>
<tr>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>Oral examination</td>
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</table>
8.148 Course: Mathematical Statistics [T-MATH-105872]

**Responsible:** Prof. Dr. Norbert Henze  
PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102909 - Mathematical Statistics

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

<table>
<thead>
<tr>
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<th>Course Title</th>
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<th>Type</th>
<th>Instructor</th>
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<tbody>
<tr>
<td>SS 2020</td>
<td>0162300</td>
<td>Mathematische Statistik</td>
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<td>Lecture (V)</td>
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<td>SS 2020</td>
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<td>Practice (Ü)</td>
<td>Klar</td>
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**Exams**

<table>
<thead>
<tr>
<th>Semester</th>
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<tbody>
<tr>
<td>SS 2020</td>
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<td>Mathematical Statistics</td>
<td>Prüfung (PR)</td>
<td>Klar</td>
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</table>

**Prerequisites**

none
### 8.149 Course: Mathematical Topics in Kinetic Theory [T-MATH-108403]

**Responsible:** Prof. Dr. Dirk Hundertmark  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-104059 - Mathematical Topics in Kinetic Theory

<table>
<thead>
<tr>
<th>Type</th>
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<th>Recurrence</th>
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</thead>
<tbody>
<tr>
<td>Oral exam</td>
<td>4</td>
<td>Irregular</td>
<td>1</td>
</tr>
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</table>

**Prerequisites**
none
8.150 Course: Maxwell's Equations [T-MATH-105856]

**Responsible:**
- PD Dr. Tilo Arens
- Prof. Dr. Roland Griesmaier
- PD Dr. Frank Hettlich

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102885 - Maxwell's Equations

**Type**
- Oral examination

**Credits**
- 8

**Version**
- 1

**Exams**

<table>
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<th>7700055</th>
<th>Maxwell's Equations</th>
<th>Prüfung (PR)</th>
<th>Hettlich</th>
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8.151 Course: Medical Imaging [T-MATH-105861]

**Responsible:** Prof. Dr. Andreas Rieder  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102896 - Medical Imaging

<table>
<thead>
<tr>
<th>Type</th>
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</thead>
<tbody>
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### Exams

<table>
<thead>
<tr>
<th>Semester</th>
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<th>Exam Title</th>
<th>Type</th>
<th>Code</th>
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</thead>
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<tr>
<td>WS 20/21</td>
<td>7305261</td>
<td>Medical Imaging Techniques I</td>
<td>Prüfung (PR)</td>
<td>Dössel</td>
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</tbody>
</table>

**Prerequisites**

none
8.152 Course: Mixed Integer Programming I [T-WIWI-102719]

**Responsible:** Prof. Dr. Oliver Stein  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101473 - Mathematical Programming  
- M-WIWI-102832 - Operations Research in Supply Chain Management  
- M-WIWI-103289 - Stochastic Optimization

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**Exams**

| SS 2020 | 7900249_SS2020_NK | Mixed Integer Programming I | 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.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

**Prerequisites**

None

**Recommendation**

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Annotation**

The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).
8.153 Course: Mixed Integer Programming II [T-WIWI-102720]

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:**
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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**Competence Certificate**
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of Mixed Integer Programming I [2550138]. In this case, the duration of the written examination takes 120 minutes.

**Prerequisites**
None

**Recommendation**
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Annotation**
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).
Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

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

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

**Part of:** M-WIWI-102832 - Operations Research in Supply Chain Management

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<td>SS 2020</td>
<td>Modeling and OR-Software: Advanced Topics</td>
<td>Prüfung (PR) / Nickel</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**
Basic knowledge as conveyed in the module Introduction to Operations Research is assumed.

Successful completion of the course Modeling and OR-Software: Introduction.

**Annotation**
Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The lecture is held in every term. The planned lectures and courses for the next three years are announced online.

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

**Modellieren und OR-Software: Fortgeschrittene Themen**
2550490, WS 20/21, 3 SWS, Language: German, [Open in study portal]

**Content**
The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis. We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling programming languages are OPL and ILOG Script.

**Organizational issues**
die genauen Termine werden auf der Homepage bekannt gegeben
8 COURSES

Course: Modeling and OR-Software: Introduction [T-WIWI-106199]

8.155 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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<tr>
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Events

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Exams

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<td>SS 2020</td>
<td>2 SWS</td>
<td>Prüfung (PR)</td>
<td>Nickel</td>
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</table>

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


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:

V Modellieren und OR-Software: Einführung
2550490, SS 2020, 3 SWS, Language: German, Open in study portal

Practical course (P)

Content

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.
### 8.156 Course: Monotonicity Methods in Analysis [T-MATH-105877]

- **Responsible:** PD Dr. Gerd Herzog
- **Organisation:** KIT Department of Mathematics
- **Part of:** M-MATH-102887 - Monotonicity Methods in Analysis

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<th>Herzog</th>
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<tr>
<td>SS 2020</td>
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</table>
**8.157 Course: Multivariate Statistical Methods [T-WIWI-103124]**

**Responsible:** Prof. Dr. Oliver Grothe  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101473 - Mathematical Programming  
- M-WIWI-101637 - Analytics and Statistics  
- M-WIWI-101639 - Econometrics and Statistics II  
- M-WIWI-103289 - Stochastic Optimization

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<td>SS 2020 2550554</td>
<td>4,5</td>
<td>Each summer term</td>
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**Type** 
- Written examination

**Exam** 
- SS 2020 7900326  
  - Multivariate Statistical Methods  
  - Prüfung (PR)  
  - Grothe

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

**Prerequisites**  
None

**Recommendation**  
The course covers highly advanced statistical methods with a quantitative focus. Hence, participants are necessarily expected to have advanced statistical knowledge, e.g. acquired in the course “Advanced Statistics”. Without this, participation in the course is not advised.

Previous attendance of the course Analysis of Multivariate Data is recommended. Alternatively, the script can be provided to interested students.

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

**Multivariate Verfahren**  
- 2550554, SS 2020, 2 SWS, [Open in study portal]

**Literature**  
- Skript zur Vorlesung
8.158 Course: Nature-Inspired Optimization Methods [T-WIWI-102679]

**Responsible:** Dr. rer. nat. Pradyumn Kumar Shukla

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

**Part of:** M-WIWI-101472 - Informatics

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each summer term

**Version**
- 2

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**Events**

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<th>2511106</th>
<th>Nature-Inspired Optimization Methods</th>
<th>2 SWS</th>
<th>Lecture (V)</th>
<th>Shukla</th>
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<tr>
<td>SS 2020</td>
<td>2511107</td>
<td>Übungen zu Nature-Inspired Optimization Methods</td>
<td>1 SWS</td>
<td>Practice (Ü)</td>
<td>Shukla</td>
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</tbody>
</table>

**Exams**

| SS 2020 | 7900026 | Nature-Inspired Optimization Methods (Registration until 13 July 2020) | Prüfung (PR) | Shukla |

**Competence Certificate**

The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called "bonus exam", 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exercises. The bonus exam may be split into several shorter written tests.

The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**

None

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

**Nature-Inspired Optimization Methods**

2511106, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Lecture (V)**

**Content**

Many optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.

**Learning objectives:**

Students learn:

- Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
- Different aspects and limitation of the methods
- Applications of such methods
- Multi-objective optimization methods
- Constraint handling methods
- Different aspects in parallelization and computing platforms

**Literature**

**8.159 Course: Non- and Semiparametrics [T-WIWI-103126]**

- **Responsible:** Prof. Dr. Melanie Schienle
- **Organisation:** KIT Department of Economics and Management
- **Part of:**
  - M-WIWI-101638 - Econometrics and Statistics I
  - M-WIWI-101639 - Econometrics and Statistics II

**Type**  
Written examination

**Credits**  
4,5

**Recurrence**  
Irregular

**Version**  
1

**Competence Certificate**
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**
None

**Recommendation**
Knowledge of the contents covered by the course "Applied Econometrics" [2520020]

**Annotation**
The course takes place every second winter semester: 2018/19 then 2020/21
### 8.160 Course: Nonlinear Analysis [T-MATH-107065]

**Responsibility:** Prof. Dr. Tobias Lamm  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-103539 - Nonlinear Analysis

<table>
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</table>

**Prerequisites**  
none
8.161 Course: Nonlinear Maxwell Equations [T-MATH-110283]

Responsible: Prof. Dr. Roland Schnaubelt
Organisation: KIT Department of Mathematics
Part of: M-MATH-105066 - Nonlinear Maxwell Equations

Type: Oral examination
Credits: 8
Recurrence: Irregular
Version: 1

Prerequisites
none
### 8.162 Course: Nonlinear Maxwell Equations [T-MATH-106484]

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Prerequisites
Keine
8.163 Course: Nonlinear Optimization I [T-WIWI-102724]

**Responsibility:** Prof. Dr. Oliver Stein

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

**Part of:**
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-101473 - Mathematical Programming

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**Events**

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<td>2</td>
<td>Lecture (V) / Online</td>
<td>German</td>
<td>Stein</td>
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<tr>
<td>WS 20/21</td>
<td>2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
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<td>Practice (Ü) / Online</td>
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<td>WS 20/21</td>
<td>2550142</td>
<td>Rechnerübung zu Nichtlineare Optimierung I + II</td>
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<td>7900252_SS2020_NK</td>
<td>Nonlinear Optimization I</td>
<td>Prüfung (PR)</td>
<td>Stein</td>
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</table>

**Examinations**

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

- Course ID: 2550111, WS 20/21, 2 SWS, Language: German
- Open in study portal

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Economathematics M.Sc.
Module Handbook as of 01/10/2020
Content
The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems with constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
8.164 Course: Nonlinear Optimization I and II [T-WIWI-103637]

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:**
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-101473 - Mathematical Programming

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<th>Version</th>
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<td>Each winter term</td>
<td>6</td>
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<th>Recurrence</th>
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<tbody>
<tr>
<td>WS 20/21</td>
<td>2550111</td>
<td>Nonlinear Optimization I</td>
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<td>Lecture (V) / Online</td>
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<tr>
<td>WS 20/21</td>
<td>2550112</td>
<td>Exercises Nonlinear Optimization I + II</td>
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<td>Practice (Ü) / Online</td>
<td>Stein</td>
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<tr>
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<td>SS 2020</td>
<td>7900266</td>
<td>Nonlinear Optimization I and II</td>
<td>2</td>
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<td>Prüfung (PR) / Online</td>
<td>Stein</td>
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</table>

Legend: 📚 Online, 🏈 Blended (On-Site/Online), 🎤 On-Site, ❌ Cancelled

**Competence Certificate**
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation 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 20/21, 2 SWS, Language: German, Open in study portal

**Lecture (V)**
Online
Content
The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems with constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic programming)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:
The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

Learning objectives:
The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.
Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
**Course: Nonlinear Optimization II [T-WIWI-102725]**

**Responsible:** Prof. Dr. Oliver Stein

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

**Part of:**
- M-WIWI-101414 - Methodical Foundations of OR
- M-WIWI-101473 - Mathematical Programming

**Type**
- Written examination

**Credits**
- 4.5

**Recurrence**
- Each winter term

**Version**
- 3

**Events**

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<td>SWS</td>
<td>Practice (Ü) / 📚</td>
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<tr>
<td>WS 20/21</td>
<td>Nonlinear Optimization II</td>
<td>2 SWS</td>
<td>Lecture (V) / 📚</td>
<td>Stein</td>
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</table>

**Exams**

| SS 2020 | 7900258_SS2020_NK | Nonlinear Optimization II | Prüfung (PR) | Stein |

**Competence Certificate**

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of Nonlinear Optimization I [2550111]. In this case, the duration of the written exam takes 120 minutes.

**Prerequisites**

None.

**Annotation**

Part I and II of the lecture are held consecutively in the same semester.

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

**Nonlinear Optimization II**

2550113, WS 20/21, 2 SWS, Language: German, Open in study portal

**Content**

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

**Remark:**

The treatment of optimization problems without constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively in the same semester.

**Learning objectives:**

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.
Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
8.166 Course: Nonlinear Wave Equations [T-MATH-110806]

**Responsible:** Dr. Birgit Schörkhuber  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-105326 - Nonlinear Wave Equations

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**Exams**

| SS 2020 | 7700102 | Nonlinear Wave Equations | Prüfung (PR) | Schörkhuber |

**Prerequisites**

none
8.167 Course: Nonparametric Statistics [T-MATH-105873]

**Responsible:**  Prof. Dr. Norbert Henze  
PD Dr. Bernhard Klar

**Organisation:**  KIT Department of Mathematics

**Part of:**  M-MATH-102910 - Nonparametric Statistics

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</table>
Course: Numerical Continuation Methods [T-MATH-105912]

Responsible: Prof. Dr. Jens Rottmann-Matthes
Organisation: KIT Department of Mathematics
Part of: M-MATH-102944 - Numerical Continuation Methods

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Prerequisites:
none

**Responsible:** Dr. Hartwig Anzt  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-103709 - Numerical Linear Algebra for Scientific High Performance Computing

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**Prerequisites**

none
8.170 Course: Numerical Linear Algebra in Image Processing [T-MATH-108402]

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<th>Responsible:</th>
<th>PD Dr. Volker Grimm</th>
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Prerequisites
none
8 COURSES


**Responsible:** Prof. Dr. Willy Dörfler
Prof. Dr. Marlis Hochbruck
Prof. Dr Tobias Jahnke
Prof. Dr. Andreas Rieder
Prof. Dr. Christian Wieners

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102888 - Numerical Methods for Differential Equations

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**Events**

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Legend: 🖥️ Online, 🧩 Blended (On-Site/Online), 🗣️ On-Site, ✗ Canceled
8.172 Course: Numerical Methods for Hyperbolic Equations [T-MATH-105900]

**Responsible:** Prof. Dr. Willy Dörfler

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102915 - Numerical Methods for Hyperbolic Equations

**Type**
- Oral examination

**Credits**
- 6

**Version**
- 1

**Prerequisites**
- none
Course: Numerical Methods for Integral Equations [T-MATH-105901]

8.173

8.173 Course: Numerical Methods for Integral Equations [T-MATH-105901]

**Responsible:**
PD Dr. Tilo Arens
PD Dr. Frank Hettlich

**Organisation:**
KIT Department of Mathematics

**Part of:**
M-MATH-102930 - Numerical Methods for Integral Equations

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### 8.174 Course: Numerical Methods for Maxwell's Equations [T-MATH-105920]

**Responsible:** Prof. Dr. Marlis Hochbruck  
Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102931 - Numerical Methods for Maxwell's Equations

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8.175 Course: Numerical Methods for Time-Dependent Partial Differential Equations  
[T-MATH-105899]

**Responsible:** Prof. Dr. Marlis Hochbruck  
Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102928 - Numerical Methods for Time-Dependent Partial Differential Equations

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**Responsible:**  Prof. Dr. Willy Dörfler  
Prof. Dr. Marlis Hochbruck  
Prof. Dr Tobias Jahnke  
Prof. Dr. Andreas Rieder  
Prof. Dr. Christian Wieners  

**Organisation:**  KIT Department of Mathematics  
**Part of:**  M-MATH-102894 - Numerical Methods in Computational Electrodynamics  

**Prerequisites:**  none
8.177 Course: Numerical Methods in Fluid Mechanics [T-MATH-105902]

Responsible: Prof. Dr. Willy Dörfler  
PD Dr. Gudrun Thäter

Organisation: KIT Department of Mathematics

Part of: M-MATH-102932 - Numerical Methods in Fluid Mechanics

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<td>Numerische Methoden in der Strömungsmechanik</td>
<td>2 SWS</td>
<td>Lecture (V)</td>
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<td>SS 2020 0164210</td>
<td>Übungen zu 0164210 (numerische Methoden in der Strömungsmechanik)</td>
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<td>Practice (Ü)</td>
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Exams

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<td>Numerical Methods in Fluid Mechanics</td>
<td>Prüfung (PR)</td>
<td>Thäter</td>
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8.178 Course: Numerical Methods in Mathematical Finance [T-MATH-105865]

**Responsible:** Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102901 - Numerical Methods in Mathematical Finance

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<td>Jahnke</td>
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</table>

**Prerequisites**

none
8.179 Course: Numerical Methods in Mathematical Finance II [T-MATH-105880]

**Responsible:** Prof. Dr. Tobias Jahnke  
**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102914 - Numerical Methods in Mathematical Finance II

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**Competence Certificate**  
Mündliche Prüfung im Umfang von ca. 30 Minuten

**Prerequisites**  
none
### 8.180 Course: Numerical Optimisation Methods [T-MATH-105858]

**Responsible:**  
Prof. Dr. Willy Dörfler  
Prof. Dr. Marlis Hochbruck  
Prof. Dr. Tobias Jahnke  
Prof. Dr. Andreas Rieder  
Prof. Dr. Christian Wieners

**Organisation:**  
KIT Department of Mathematics

**Part of:**  
M-MATH-102892 - Numerical Optimisation Methods

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Legend: 🖥 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled
T 8.181 Course: Numerical Simulation in Molecular Dynamics [T-MATH-110807]

**Responsible:** PD Dr. Volker Grimm

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105327 - Numerical Simulation in Molecular Dynamics

**Type**
Oral examination

**Credits**
8

**Recurrence**
Irregular

**Version**
1

**Prerequisites**
none
8.182 Course: Operations Research in Health Care Management [T-WIWI-102884]

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

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

**Part of:** M-WIWI-102805 - Service Operations

### Events

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| SS 2020 | 2550495 | Operations Research in Health Care Management | 2 SWS | Lecture (V) | Nickel |
| SS 2020 | 2550496 | Übungen zu OR im Health Care Management | 1 SWS | Practice (Ü) | Bakker |

### Exams

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| SS 2020 | 7900229 | Operations Research in Health Care Management | | Nickel |

### Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

### Prerequisites

None

### Recommendation

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

### Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

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

**Operations Research in Health Care Management**

2550495, SS 2020, 2 SWS, Language: English, Open in study portal

**Literature**

**Weiterführende Literatur:**

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
8.183 Course: Operations Research in Supply Chain Management [T-WIWI-102715]

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

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

**Part of:** M-WIWI-101473 - Mathematical Programming  
M-WIWI-102805 - Service Operations  
M-WIWI-102832 - Operations Research in Supply Chain Management  
M-WIWI-103289 - Stochastic Optimization

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<td>WS 20/21 2550481 Übungen zu OR in Supply Chain Management</td>
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**Competence Certificate**

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation). The examination is held in the term of the lecture and the following lecture.

**Prerequisites**

None

**Recommendation**

Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM, Tactical and operational SCMIs assumed.

**Annotation**

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

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

**Operations Research in Supply Chain Management**

2550480, WS 20/21, 2 SWS, Language: English, Open in study portal

**Content**

Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.

In form and content, the lecture addresses all levels of Supply Chain Management: After a short introduction, the tactical and operational level will be discussed with regard to inventory models, scheduling as well as cutting and packing. The strategic level will be discussed in terms of layout planning. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.
Literature

- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
Course: Optimisation and Optimal Control for Differential Equations [T-MATH-105864]

Organisation: KIT Department of Mathematics
Part of: M-MATH-102899 - Optimisation and Optimal Control for Differential Equations

Type: Oral examination
Credits: 4
Version: 1

Prerequisites
none
8.185 Course: Optimization in Banach Spaces [T-MATH-105893]

Responsible: Prof. Dr. Roland Griesmaier
PD Dr. Frank Hettlich

Organisation: KIT Department of Mathematics
Part of: M-MATH-102924 - Optimization in Banach Spaces

Prerequisites
none
8.186 Course: Optimization Models and Applications [T-WIWI-110162]

**Responsible:** Dr. Nathan Sudermann-Merx

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

**Part of:**
- M-WIWI-101473 - Mathematical Programming
- M-WIWI-102832 - Operations Research in Supply Chain Management
- M-WIWI-103289 - Stochastic Optimization

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**Events**

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<td>Optimization Models and Application</td>
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**Type:** Written examination

**Credits:** 4,5

**Recurrence:** see Annotations

**Version:** 1

**Competence Certificate**

The examination will take place for the last time in the winter semester 2020/2021.

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

The prerequisite for participation in the exam is the achievement of a minimum number of points in delivery sheets. Details will be announced at the beginning of the course.

**Prerequisites**

None.

**Annotation**

The course will take place for the last time in the winter semester 20/21.
8.187 Course: Optimization under Uncertainty [T-WIWI-106545]

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101413 - Applications of Operations Research
M-WIWI-103289 - Stochastic Optimization

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Events

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

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester.

Prerequisites
None.
8.188 Course: Panel Data [T-WIWI-103127]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

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Prerequisites
None

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

Panel Data
2520320, SS 2020, 2 SWS, Language: German, Open in study portal

Content

Content:
Fixed-Effects-Models, Random-Effects-Models, Time-Demeaning

Workload:
Total workload for 4.5 CP: approx. 135 hours
Attendance: 30 hours
Preparation and follow-up: 65 hours
Exam preparation: 40 hours
Exam preparation: 40 hours

Literature
## 8.189 Course: Parallel Computing [T-MATH-102271]

| Responsible:     | Dr. rer. nat. Mathias Krause  
|                 | Prof. Dr. Christian Wieners  
| Organisation:    | KIT Department of Mathematics  
| Part of:         | M-MATH-101338 - Parallel Computing  

| Type          | Oral examination  
| Credits       | 5  
| Version       | 1  

---

Economathematics M.Sc.
Module Handbook as of 01/10/2020

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### Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The examination is held in the semester of the lecture and in the following semester. Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

### Prerequisites

None

### Recommendation

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

### Annotation

The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

---

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

### Content

Parametric optimization deals with the influence of parameters on the solution of optimization problems. In optimization practice, such investigations play a fundamental role in order to be able to assess the quality of a numerically obtained solution or to make quantitative statements about its parameter dependence. Furthermore, a number of parametric optimization methods exist, and parametric problems occur in applications such as game theory, geometric optimization problems, and robust optimization. The lecture gives a mathematically sound introduction to these topics and is structured as follows:

- Introductory examples and terminology
- Sensitivity
- Stability and regularity conditions
- Applications: semi-infinite optimization and Nash games

### Remark:

Prior to the attendance of this lecture, it is strongly recommend to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

### Learning objectives:

The student

- knows and understands the fundamentals of parametric optimization,
- is able to choose, design and apply modern techniques of parametric optimization in practice.
Literature

8.191 Course: Percolation [T-MATH-105869]

**Responsible:** Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102905 - Percolation

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

**Prerequisites:** none
8.192 Course: Poisson Processes [T-MATH-105922]

**Responsible:** Prof. Dr. Vicky Fasen-Hartmann
Prof. Dr. Daniel Hug
Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102922 - Poisson Processes

**Type**
Oral examination

**Credits**
5

**Version**
1

**Prerequisites**
none
8.193 Course: Portfolio and Asset Liability Management [T-WIWI-103128]

**Responsible:** Dr. Mher Safarian  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101639 - Econometrics and Statistics II

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**Competence Certificate**

The assessment of this course consists of a written examination (following §4(2), 1 SPOs, 180 min.).

**Prerequisites**

None

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

**Portfolio and Asset Liability Management**  
2520357, SS 2020, 2 SWS, Language: English, [Open in study portal](#)

**Lecture (V)**

**Content**

**Learning objectives:**

Knowledge of various portfolio management techniques in the financial industry.

**Content:**

Portfolio theory: principles of investment, Markowitz-portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorial CAPM, arbitrage pricing theory (APT), arbitrage and hedging, multi factorial models, equity-portfolio management, passive strategies, active investment

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management

**Workload:**

Total workload for 4.5 CP: approx. 135 hours  
Attendance: 30 hours  
Preparation and follow-up: 65 hours  
Exam preparation: 40 hours  
Exam preparation: 40 hours

**Organizational issues**

Blockveranstaltung

**Literature**

To be announced in the lecture
8.194 Course: Potential Theory [T-MATH-105850]

Responsible: PD Dr. Tilo Arens  
PD Dr. Frank Hettlich  
Prof. Dr. Andreas Kirsch  
Prof. Dr. Wolfgang Reichel

Organisation: KIT Department of Mathematics
Part of: M-MATH-102879 - Potential Theory

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8.195 Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

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

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

**Part of:** M-WIWI-102805 - Service Operations

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**Competence Certificate**

Due to a research semester of Professor Nickel in WS 19/20, the courses *Location Planning and Strategic SCM* and *Practice Seminar: Health Care Management* do NOT take place in WS 19/20. Please also refer to the information at [https://dol.ior.kit.edu/Lehrveranstaltungen.php](https://dol.ior.kit.edu/Lehrveranstaltungen.php) for further details.

The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

**Prerequisites**

None.

**Recommendation**

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

**Annotation**

The credits have been reduced to 4.5 starting summer term 2016.

The lecture is offered every term.

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

Course: Practical Seminar: Information Systems and Service Design [T-WIWI-108437]


Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104068 - Information Systems in Organizations

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Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

Prerequisites

None.

Recommendation

Attending the course „Digital Service Design“ is recommended, but not mandatory.

Annotation

The course is held in English.

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

Practical Seminar: Information Systems & Service Design (Master)
2540554, SS 2020, 3 SWS, Open in study portal

Content

In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.
8.197 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

**Responsible:** Prof. Dr. Johannes Philipp Reiß  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101505 - Experimental Economics

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**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**

None

**Annotation**

The course is given every second fall term, e.g., WS2017/18, WS2019/20, ...

The retake exam is given in the summer term subsequent to the fall term where the course (lecture and final exam) is given.
8.198 Course: Predictive Modeling [T-WIWI-110868]

**Responsible:** Jun.-Prof. Dr. Fabian Krüger

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

**Part of:**
- M-WIWI-101638 - Econometrics and Statistics I
- M-WIWI-101639 - Econometrics and Statistics II

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**Exams**

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**Competence Certificate**

Written assignment ("Take-Home Assignment") and oral examination (approx. 20 minutes, possibly via video conference) on the content of the assignment. Details will be announced in the lecture.

**Prerequisites**

None

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

**Predictive Modeling**

- 2521311, SS 2020, 2 SWS, Language: English, [Open in study portal](#)

**Literature**

- Weitere Literatur wird in der Vorlesung bekanntgegeben.

**Predictive Modeling (Tutorial)**

- 2521312, SS 2020, 2 SWS, Language: English, [Open in study portal](#)
8.199 Course: Price Negotiation and Sales Presentations [T-WIWI-102891]

**Responsible:** Prof. Dr. Martin Klarmann  
Mark Schröder

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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**Competence Certificate**

This alternative exam assessment consists of a presentation with a subsequent discussion totalling 25 minutes. Moreover learning contents are checked by realistic 30-minute price negotiations.

**Prerequisites**

None

**Recommendation**

None

**Annotation**

Please note that the workshop “Price Negotiation and Sales Presentations” as well as all other 1.5-ECTS courses will not take place in the winter term 20/21 due to a research semester. The course will probably be offered again starting in WS21/22. Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing & Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed. For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu). Please note that only one of the courses from the election block can be attended in the module.
Course: Pricing [T-WIWI-102883]

**Responsible:** Dr. Sven Feurer

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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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

**Recommendation**
None

**Annotation**
Examination offer is discontinued. Last examination date 09.05.2020 for candidates with open retake exams and for first-time writers. For the latter, a repeat examination may be offered in case of a failed attempt (and only then) in SoSe 2020.
8.201 Course: Probability Theory and Combinatorial Optimization [T-MATH-105923]

Responsible: Prof. Dr. Daniel Hug
Prof. Dr. Günter Last

Organisation: KIT Department of Mathematics
Part of: M-MATH-102947 - Probability Theory and Combinatorial Optimization

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Prerequisites

none

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

Probability Theory and Combinatorial Optimization
0160000, SS 2020, 4 SWS, Language: English, Open in study portal

Lecture (V)

Content

This course is devoted to the analysis of algorithms and combinatorial optimization problems in a probabilistic framework. A natural setting for the investigation of such problems is often provided by a (geometric) graph. For a given system (graph), the average or most likely behavior of an objective function of the system will be studied. In addition to asymptotic results, which describe a system as its size increases, quantitative laws for systems of fixed size will be described. Among the specific problems to be explored are:

- the long-common-subsequence problem,
- packing problems,
- the Euclidean traveling salesman problem,
- minimal Euclidean matching,
- minimal Euclidean spanning tree.

For the analysis of problems of this type, several techniques and concepts have been developed and will be introduced and applied in this course. Some of these are:

- concentration inequalities and concentration of measure,
- subadditivity and superadditivity,
- martingale methods,
- isoperimetry,
- entropy.
Literature

8.202 Course: Process Mining [T-WIWI-109799]

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

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

**Part of:** M-WIWI-101472 - Informatics

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<td>2511204</td>
<td>Process Mining</td>
<td>2</td>
<td>Lecture (V)</td>
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<td>SS 2020</td>
<td>2511205</td>
<td>Exercise Process Mining</td>
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<td>Practice (Ü)</td>
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**Exams**

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<td>SS 2020</td>
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<td>Process Mining (Registration until 13 July 2020)</td>
<td>Prüfung (PR)</td>
<td>Oberweis</td>
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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

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

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

**V Process Mining**

2511204, SS 2020, 2 SWS, Language: German, Open in study portal

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

Learning objectives:

Students

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

Recommendations:

Knowledge of course Applied Informatics - Modelling is expected.

Workload:

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

Literature


Weitere Literatur wird in der Vorlesung bekannt gegeben.
8.203 Course: Product and Innovation Management [T-WIWI-109864]

**Responsible:** Prof. Dr. Martin Klarmann

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

**Part of:** M-WIWI-105312 - Marketing and Sales Management

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<tr>
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<td>Product and Innovation Management</td>
<td>2 SWS</td>
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**Exams**

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<tr>
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<td>Product and Innovation Management</td>
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**Competence Certificate**

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

**Prerequisites**

None

**Annotation**

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

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

**Product and Innovation Management**

2571154, SS 2020, 2 SWS, Language: English, Open in study portal

**Lecture (V)**

**Content**

This course addresses topics around the management of new as well as existing products. After the foundations of product management, especially the product choice behavior of customers, students get to know in detail different steps of the innovation process. Another section regards the management of the existing product portfolio.

Students
- know the most important terms of the product and innovation concept
- understand the models of product choice behavior (e.g., the Markov model, the Luce model)
- are familiar with the basics of network theory (e.g. the Triadic Closure concept)
- know the central strategic concepts of innovation management (especially the market driving approach, pioneer and successor, Miles/Snow typology, blockbuster strategy)
- master the most important methods and sources of idea generation (e.g. open innovation, lead user method, crowdsourcing, creativity techniques, voice of the customer, innovation games, conjoint analysis, quality function deployment, online toolkits)
- are capable of defining and evaluating new product concepts and know the associated instruments like focus groups, product testing, speculative sales, test market simulation Assessor, electronic micro test market
- have advanced knowledge about market introduction (e.g. adoption and diffusion models Bass, Fourt/Woodlock, Mansfield)
- understand important connections of the innovation process (cluster formation, innovation culture, teams, stage-gate process)

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Total effort for 3 credit points: approx. 90 hours

Presence time: 30 hours

Preparation and wrap-up of LV: 45.0 hours

Exam and exam preparation: 15.0 hours

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
Literature
8.204 Course: Project Centered Software-Lab [T-MATH-105907]

**Responsible:** PD Dr. Gudrun Thäter

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102938 - Project Centered Software-Lab

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**Prerequisites**

none
8.205 Course: Project Lab Cognitive Automobiles and Robots [T-WIWI-109985]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101472 - Informatics

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Events

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<td>2513500</td>
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<td>2512501</td>
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<td>3</td>
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Legend: 🌐 Online, 🧩 Blended (On-Site/Online), 🗣 On-Site, 🗿 Cancelled

Competence Certificate
The alternative exam assessment consists of:

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

Details of the grade formation will be announced at the beginning of the course.

Prerequisites
None

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

Cognitive Automobiles and Robots
2513500, SS 2020, 2 SWS, Language: German/English, Open in study portal

Content
The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning

Workload:
The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.
Registration and further information can be found in the WiWi-portal.
Content
The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

Workload:
The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.
8.206 Course: Project Lab Machine Learning [T-WIWI-109983]

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

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

**Part of:** M-WIWI-101472 - Informatics

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**Events**

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**Exams**

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**Competence Certificate**

The alternative exam assessment consists of:

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

Details of the grade formation will be announced at the beginning of the course.

**Prerequisites**

None

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

**Project Lab Machine Learning**

2512500, SS 2020, 3 SWS, Language: German/English, [Open in study portal]

**Practical course (P)**

**Content**

The lab is intended as a practical supplement to lectures such as "Machine Learning". The theoretical basics are applied in the lab course. The aim of the lab course is that the participants work together to design, develop and evaluate a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

In addition to the scientific objectives involved in the investigation and application of the methods, aspects of project-specific teamwork in research (from specification to presentation of the results) are also developed in this practical course.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and implementation and evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

**Learning objectives:**

- Students can practically apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles.
- Students master the analysis and solution of corresponding problems in a team.
- Students can evaluate, document and present their concepts and results.

**Recommendations:**

Attendance of the lecture machine learning, C/C++ knowledge, Python knowledge

**Workload:**

The workload of 4.5 credit points consists of the time spent in the lab for practical implementation of the selected solution, as well as the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

**Organizational issues**

Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.
8.207 Course: Public Management [T-WIWI-102740]

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

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

**Part of:** M-WIWI-101504 - Collective Decision Making

**Type**
- Written examination

**Credits**
- 4,5

**Recurrence**
- Each winter term

**Version**
- 1

**Events**

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<td>2561127</td>
<td>Public Management</td>
<td>3 SWS</td>
<td>Lecture / Practice (VÜ) / 🕹️</td>
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<td>790puma</td>
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Legend: 🕹️ Online, 🧩 Blended (On-Site/Online), 🗞️ On-Site, ❌ Cancelled

**Competence Certificate**
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

**Prerequisites**
None

**Recommendation**
Basic knowledge of Public Finance is required.

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

**Public Management**
- Code: 2561127, WS 20/21, 3 SWS, Language: German, Open in study portal
- Lecture / Practice (VÜ) Online

**Organizational issues**
Dienstag 14:00-15:30 Uhr per Zoom-Livestream

**Literature**
Weiterführende Literatur:
8.208 Course: Python for Computational Risk and Asset Management [T-WIWI-110213]

**Responsible:** Prof. Dr. Maxim Ulrich  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-105032 - Data Science for Finance

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**Events**

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<td>WS 20/21</td>
<td>2 SWS</td>
<td>Lecture (V) / Online</td>
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**Competence Certificate**

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

**Prerequisites**

None.

**Recommendation**

Good knowledge of statistics and basic programming skills

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

**Python for Computational Risk and Asset Management**

2500016, WS 20/21, 2 SWS, Language: English, [Open in study portal]

**Content**

The course covers several Python topics, among them:

- Automatic finance data extraction from the web
- Analyzing finance data
- Pattern recognition across asset markets
- Quant portfolio strategies to exploit patterns
- Modeling return densities using time-series and option methods
- Comparing strength and weakness of machine learning tools such as neural networks to financial econometric- and option-implied methods
8.209 Course: Random Graphs [T-MATH-105929]

**Responsible:** Dr. Matthias Schulte  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102951 - Random Graphs

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**Prerequisites**
none
### Course: Ruin Theory [T-MATH-108400]

<table>
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<th>Prof. Dr. Vicky Fasen-Hartmann</th>
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**Prerequisites**

none
8.211 Course: Scattering Theory [T-MATH-105855]

**Responsible:**
- PD Dr. Tilo Arens
- Prof. Dr. Roland Griesmaier
- PD Dr. Frank Hettlich

**Organisation:**
- KIT Department of Mathematics

**Part of:**
- M-MATH-102884 - Scattering Theory

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Economathematics M.Sc.
Module Handbook as of 01/10/2020
8.212 Course: Selected Issues in Critical Information Infrastructures [T-WIWI-109251]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

<table>
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**Events**

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<td>Praktikum Blockchain und Distributed Ledger Technology (Master)</td>
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<td>WS 20/21</td>
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Exams

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

**Competence Certificate**  
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

**Prerequisites**  
None.

**Annotation**  
T-WIWI-109251 “Selected Issues in Critical Information Infrastructures” serves to credit an extracurricular course in the module “Critical Digital Infrastructures”.
### 8.213 Course: Selected Topics in Harmonic Analysis [T-MATH-109065]

<table>
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<tr>
<th>Responsible</th>
<th>Prof. Dr. Dirk Hundertmark</th>
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<tbody>
<tr>
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<tr>
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**Prerequisites**

none
### 8.214 Course: Semantic Web Technologies [T-WIWI-110848]

**Responsible:** Prof. Dr. York Sure-Vetter  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Exams**

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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**

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*Open in study portal*
Content
The aim of the Semantic Web is to make the meaning (semantics) of data on the web usable in intelligent systems, e.g. in e-commerce and internet portals.

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

The following topics are covered:

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

Learning objectives:
The student

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

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

Workload:

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

Literature


Weitere Literatur


Exercises to Semantic Web Technologies
2511311, SS 2020, 1 SWS, Language: English, Open in study portal
Content
The exercises are related to the lecture Semantic Web Technologies.
Multiple exercises are held that capture the topics, held in the lecture Semantic Web Technologies, and discuss them in detail. Thereby, practical examples are given to the students in order to transfer theoretical aspects into practical implementation.

The following topics are covered:
- Resource Description Framework (RDF) and RDF Schema (RDFS)
- Web Architecture and Linked Data
- Web Ontology Language (OWL)
- Query language SPARQL
- Rule languages
- Applications

Learning objectives:
The student
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- masters advanced knowledge representation scenarios involving ontologies

Recommendations:
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Literature

Weitere Literatur
### 8.215 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]

**Responsible:** Professorenschaft des Fachbereichs Betriebswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102971 - Seminar

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**Econometrics M.Sc.**  
**Module Handbook as of 01/10/2020**
### 8 COURSES

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<td>WS 20/21</td>
<td>7981978</td>
<td>Seminar in Production and Operations Management III</td>
<td>Prüfung (PR)</td>
<td>Schultmann</td>
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**Legend:** 🖥 Online, 🧩 Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

### Competence Certificate

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

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

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

### Prerequisites

None.

### Recommendation

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

### Annotation

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

The available places are listed on the internet: https://portal.wiwi.kit.edu.
Below you will find excerpts from events related to this course:

### Interactive Analytics Seminar

**Course:** Seminar in Business Administration A (Master)  
**Code:** T-WIWI-103474  
**Language:** English

**Content**
Providing new and innovative ways for interacting with data is becoming increasingly important. In this seminar, an interdisciplinary team of students engineers a running software prototype of an advanced interactive system leveraging state-of-the-art hardware and software focusing on an analytical use case. The seminar is carried out in cooperation between Tecco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). This seminar follows an interdisciplinary approach. Students the fields of computer science, information systems and industrial engineering work together in teams.

**Learning Objectives**
- Explore and specify a data-driven interaction challenge
- Suggest and evaluate different design solutions for addressing the identified problem
- Build interactive analytics prototypes using advanced interaction concepts and pervasive computing technologies

**Prerequisites**
Strong analytic abilities and profound skills in SQL as well as Python and/or R are required.

**Literature**
Further literature will be made available in the seminar.

**Organizational issues**

### Seminar Human Resource Management (Master)

**Course:** Seminar in Business Administration A (Master)  
**Code:** T-WIWI-103474  
**Language:** German

**Content**
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

**Aim**
The student
- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

**Workload**
The total workload for this course is: approximately 90 hours.

- Lecture: 30h
- Preparation of lecture: 45h
- Exam preparation: 15h

**Literature**
Selected journal articles and books.

**Organizational issues**
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben
Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

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V Advances in Financial Machine Learning
2530372, SS 2020, 2 SWS, Language: English, Open in study portal

Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues
Blücherstr. 17, E009; 14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

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V Seminar in Finance
2530580, SS 2020, 2 SWS, Language: German, Open in study portal

Organizational issues
Termine
1. Termin laut Ankündigung des Lehrstuhls
02.07. von 8 bis 19 Uhr
03.07. von 8 bis 19 Uhr
Alle Termine finden in Geb. 09.21 statt.

Literature
Wird jeweils am Ende des vorherigen Semesters bekanntgegeben.
Data Science for the Industrial Internet of Things
2540493, SS 2020, SWS, Language: English, Open in study portal
Seminar (S)

Content
Learning Objectives
1. Gain practical experience in translating a business problem into a data modeling problem
2. Apply solid theoretical foundations from lectures to real-world data
3. Acquire hands-on experience with industrial data science tools
4. Learn how to communicate data science findings to business stakeholders

Course Credits
The practical seminar can be credited as Seminar Betriebswirtschaftslehre A [WIWI-103474] (3 ECTS). Other courses can be credited upon request.

Seminar Description
The Internet of Things is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, internet access, and economical sensors – physical products turn into cyber-physical smart products that create vast amounts of data.

Current airplanes for example have around 6,000 sensors, creating around 1 TB of data per flight. This data is about the size of all tweets in 3 months worldwide. And this number is growing tremendously. But only 3% of potentially useful data is tagged today, and even less is analyzed. Although Internet of Things use cases such as predictive maintenance are projected to help companies save $630 billion by 2025 (McKinsey, 2015), companies struggle to turn sensor data into actionable insights. To solve this challenge, substantive expertise needs to be combined with skills from software engineering and statistics and machine learning to generate valuable insights from machine data.

The practical seminar is held in cooperation with industry partners of the KSRI, which provide some real-word datasets. Students will then work in teams of three in a close and agile collaboration with the industry subject matter experts from around the world, making use of to the CRISP DM methodology (Chapman et al. 2000).

There will be four different topics and datasets, each assigned to a team of three students. The assignment will be done in the kickoff in calendar week 18. The exact date of the kickoff event will be determined when the participating students have been selected. Attendance at the kickoff event in calendar week 18 is mandatory and a prerequisite for participation.

Expertise in Python and Data Science / Machine Learning is strongly recommended.

Contact
Dominik Martin – dominik.martin@kit.edu
Dr. Niklas Kühl – niklas.kuehl@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.

Masterseminar in Data Science and Machine Learning
2540510, SS 2020, 2 SWS, Language: German/English, Open in study portal
Seminar (S)

Digital Service Design Seminar
2540559, SS 2020, 3 SWS, Language: English, Open in study portal
Seminar (S)
Content Description
In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype.

Learning objectives
The students
- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites
No specific prerequisites are required for the seminar.

Literature
Further literature will be made available in the seminar.

Organizational issues
Termine werden bekannt gegeben

Entrepreneurship Research
2545002, SS 2020, 2 SWS, Language: German, Open in study portal
Seminar (S)

Organizational issues
1. Termin: Do, 23.04.2020, 09:00 - 13:00 Uhr
2. Termin: Mi, 15.07.2020, 09:00 - 16:00 Uhr
Beide Termine finden in Geb. 01.85, Raum 511 statt

Literature
Wird im Seminar bekannt gegeben.

Hospital Management
2550493, SS 2020, 2 SWS, Language: German, Open in study portal
Block (B)

Content
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries. Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions. The assessment consists of attendance and a presentation or a case study.

Open Science and Reproducibility Journal Club (Reproducibilitea)
2572177, SS 2020, SWS, Language: English, Open in study portal
Seminar (S)
Content  
Goal  
The goal of the class is to discuss the topics of Open Science and Reproducibility in the Social Sciences. Students will develop an understanding of the challenges that the field has been facing since the start of the Reproducibility Crisis and possible solutions to the problem will be evaluated and discussed in class.

Description  
Starting in around 2011, the Social Sciences have entered a so-called Reproducibility Crisis as many findings made in previous studies showed to be difficult or impossible to replicate, a problem casting doubt on the validity of research findings in the field. In class, we will discuss the proposed causes of the crisis – ranging from bad incentive structures in the publication process over statistical malpractice to upright fraud – and their possible solutions. The class will help students to develop an understanding of current debates and challenges from a meta-science perspective.

The class will be held in English.

Grading  
There will be weekly homework assignment based on the articles discussed. Additionally, students are required to hold a short presentation, in which they summarize the key message of an article. The scientific literature will be provided to the students.

The homework and presentation will be given in English.

Workload  
The total workload for this course is estimated to be 90 hours (30 hours per ECTS / 2 SWS). The class will meet once peer week (Thursday morning 10-12) over the semester to discuss an article on the topic. The homework (including the reading and course preparation) is estimated to take 3h-5h each week.

Comment  
This course is based on the Reproducibilita initiative at the University of Oxford. See here for more information: https://reproducibilita.org

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Seminar Management Accounting  
2579909, SS 2020, 2 SWS, Language: English, Open in study portal

Content  
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Learning objectives:  
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:  
- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:  
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:  
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:  
- Maximum of 16 students.

Organizational issues  
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature  
Will be announced in the course.
Seminar in Management Accounting - Special Topics
2579919, SS 2020, 2 SWS, Language: English, Open in study portal

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting.
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.
Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.
Content
Digital Citizen Science is an innovative approach to conduct field research - interactively and in the real world. Especially in times of social distancing measures essential questions about how private lives are changing are investigated. Who is experiencing more stress during HomeOffice hours? Who is flourishing while learning at home because flow is experienced more often? Which formats of digital cooperation are fostering social contacts and bonding? These and other questions that target the main topic: Well-being @Home are focused in these seminar projects.

The seminar theses are supervised by academics from multiple institutes that are working together on the topic of Digital Citizen Science arbeiten. Involved are the research groups of Prof. Mädche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

**Advances in Financial Machine Learning**
2530372, WS 20/21, 2 SWS, Language: English, [Open in study portal]

**Content**
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

**Organizational issues**
14-täg, tba

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

**Data Science in Service Management**
2540473, WS 20/21, 2 SWS, Language: German/English, [Open in study portal]

**Content**
wird auf deutsch und englisch gehalten

**Organizational issues**
Blockveranstaltung, siehe WWW

**Master Seminar in Data Science and Machine Learning**
2540510, WS 20/21, 2 SWS, Language: German, [Open in study portal]

**Digital Service Design Seminar**
2540559, WS 20/21, 3 SWS, [Open in study portal]

**Methoden im Innovationsmanagement**
2545107, WS 20/21, 2 SWS, Language: German, [Open in study portal]

**Content**
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

**Literature**
Werden in der ersten Veranstaltung bekannt gegeben.
Content
The seminar teaches students to gain a systematic overview of a field of literature in Marketing - an important prerequisite for a successful master thesis. Central aspects are identification of relevant literature sources, systematization of the field, working out central insights, writing comprehensively, and identification of research gaps.

Students
- can exploit a literature field systematically
- are able to write an academic paper in a formally correct way
- can assess the relevance and quality of sources
- are able to get an overview of sources very quickly
- know how to find relevant sources for a literature field
- are capable to write a convincing outline
- know how to categorize a subject under a research field
- understand how to systematize literature fields theoretically and empirically with the help of literature tables
- can identify the most important findings in a huge number of sources
- are able to present a research field
- can discuss the theoretical and practical implications of a topic
- are capable to identify interesting research gaps

The total workload for this course is approximately 90 hours. For further information see German version.

Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Organizational issues
Blockveranstaltung. Termine werden noch bekannt gegeben

Literature
werden im Seminar bekannt gegeben./will be announced in the seminar.

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.
Literature
Will be announced in the course.
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<tr>
<td>WS 20/21</td>
<td>2540473</td>
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<td>Haubner, Dann, Badewitz, Stoeckel</td>
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<td>WS 20/21</td>
<td>2540475</td>
<td>Electronic Markets &amp; User behavior</td>
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<td>2540477</td>
<td>Digital Experience and Participation</td>
<td>Seminar (S)</td>
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<td>Straub, Peukert, Hoffmann, Pusmaz, Willrich, Kloepper, Fegert, Greif-Winzrieth</td>
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<td>WS 20/21</td>
<td>2540478</td>
<td>Smart Grids and Energy Markets</td>
<td>Seminar (S)</td>
<td>2 SWS</td>
<td>Staudt, Richter, Huber, vom Scheidt, Golla, Schmidt, Henni, Meinke</td>
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<td>WS 20/21</td>
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<td>Master Seminar in Data Science and Machine Learning</td>
<td>Seminar (S)</td>
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<td>Geyer-Schulz, Schweigert, Schweizer, Nazemi</td>
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<td>WS 20/21</td>
<td>2540557</td>
<td>Information Systems and Service Design Seminar</td>
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<td>Mädche</td>
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<td>WS 20/21</td>
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<td>Digital Service Design Seminar</td>
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<td>WS 20/21</td>
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<td>Methoden im Innovationsmanagement</td>
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<td>WS 20/21</td>
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<td>Methoden entlang des Innovationsprozesses</td>
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<td>WS 20/21</td>
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<td>Seminar Management Accounting - Special Topics</td>
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<td>Volk, Schultmann</td>
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**Exams**

<table>
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<tr>
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<th>Course Code</th>
<th>Course Title</th>
<th>Type of Exam</th>
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<td>SS 2020</td>
<td>7900017</td>
<td>Die Aushandlung von Open Innovation</td>
<td>Prüfung (PR)</td>
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<tr>
<td>SS 2020</td>
<td>7900019</td>
<td>Masterseminar in Data Science and Machine Learning</td>
<td>Prüfung (PR)</td>
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<td>SS 2020</td>
<td>7900052</td>
<td>Entrepreneurship Research</td>
<td>Prüfung (PR)</td>
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<td>SS 2020</td>
<td>7900093</td>
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<td>Prüfung (PR)</td>
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<td>SS 2020</td>
<td>7900101</td>
<td>Seminar Human Resource Management (Master)</td>
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<td>Seminar in Business Administration A (Master)</td>
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<td>SS 2020</td>
<td>7900231</td>
<td>Seminar Human Resources and Organizations (Master)</td>
<td>Prüfung (PR)</td>
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<td>SS 2020</td>
<td>7900233</td>
<td>Seminar in Marketing and Sales</td>
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<td>SS 2020</td>
<td>7900238</td>
<td>Technology Assessment</td>
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<td>SS 2020</td>
<td>7900242</td>
<td>Applied Risk and Asset Management</td>
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<td>SS 2020</td>
<td>7900249</td>
<td>Open Science and Reproducibility Journal Club (Reproducibilität)</td>
<td>Prüfung (PR)</td>
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<td>SS 2020</td>
<td>7900256</td>
<td>Seminar Electronic Markets &amp; User Behavior</td>
<td>Prüfung (PR)</td>
</tr>
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</table>
### Competence Certificate

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

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

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

### Prerequisites

None.

### Recommendation

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

### Annotation

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

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

Below you will find excerpts from events related to this course:
Seminar Human Resource Management (Master)

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

Seminar Human Resources and Organizations (Master)

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

Advances in Financial Machine Learning

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of financial machine learning.
- 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.
Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues
Blücherstr. 17, E009; 14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

Seminar in Finance
Seminar (S)
2530580, SS 2020, 2 SWS, Language: German, Open in study portal

Organizational issues
Termine
1. Termin laut Ankündigung des Lehrstuhls
02.07. von 8 bis 19 Uhr
03.07. von 8 bis 19 Uhr
Alle Termine finden in Geb. 09.21 statt.

Literature
Wird jeweils am Ende des vorherigen Semesters bekanntgegeben.

Data Science for the Industrial Internet of Things
Seminar (S)
2540493, SS 2020, SWS, Language: English, Open in study portal
Content

Learning Objectives

1. Gain practical experience in translating a business problem into a data modeling problem
2. Apply solid theoretical foundations from lectures to real-world data
3. Acquire hands-on experience with industrial data science tools
4. Learn how to communicate data science findings to business stakeholders

Course Credits

The practical seminar can be credited as Seminar Betriebswirtschaftslehre A [WIWI-103474] (3 ECTS). Other courses can be credited upon request.

Seminar Description

The Internet of Things is significantly transforming industries such as automotive, healthcare, and energy. With the rise of ubiquitous computing power, internet access, and economical sensors – physical products turn into cyber-physical smart products that create vast amounts of data.

Current airplanes for example have around 6,000 sensors, creating around 1 TB of data per flight. This data is about the size of all tweets in 3 months worldwide. And this number is growing tremendously. But only 3% of potentially useful data is tagged today, and even less is analyzed. Although Internet of Things use cases such as predictive maintenance are projected to help companies save $630 billion by 2025 (McKinsey, 2015), companies struggle to turn sensor data into actionable insights. To solve this challenge, substantive expertise needs to be combined with skills from software engineering and statistics and machine learning to generate valuable insights from machine data.

The practical seminar is held in cooperation with industry partners of the KSRI, which provide some real-word datasets. Students will then work in teams of three in a close and agile collaboration with the industry subject matter experts from around the world, making use of to the CRISP DM methodology (Chapman et al. 2000)

There will be four different topics and datasets, each assigned to a team of three students. The assignment will be done in the kickoff in calendar week 18. The exact date of the kickoff event will be determined when the participating students have been selected. Attendance at the kickoff event in calendar week 18 is mandatory and a prerequisite for participation.

Expertise in Python and Data Science / Machine Learning is strongly recommended.

Contact

Dominik Martin – dominik.martin@kit.edu
Dr. Niklas Kühl – niklas.kuehl@kit.edu

The practical seminar will be held in English. Application documents can be handed in in English or German.

Masterseminar in Data Science and Machine Learning

2540510, SS 2020, 2 SWS, Language: German/English, Open in study portal

Digital Service Design Seminar

2540559, SS 2020, 3 SWS, Language: English, Open in study portal

Content

Description

In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype.

Learning objectives

The students

- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites

No specific prerequisites are required for the seminar

Literature

Further literature will be made available in the seminar.
### Entrepreneurship Research

2545002, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Organizational issues**
Termine werden bekannt gegeben

**Literature**
Wird im Seminar bekannt gegeben.

### Hospital Management

2550493, SS 2020, 2 SWS, Language: German, [Open in study portal](#)

**Content**
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals and relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

The assessment consists of attendance and a presentation or a case study.

### Open Science and Reproducibility Journal Club (Reproducibilitea)

2572177, SS 2020, SWS, Language: English, [Open in study portal](#)

**Content**

**Goal**
The goal of the class is to discuss the topics of Open Science and Reproducibility in the Social Sciences. Students will develop an understanding of the challenges that the field has been facing since the start of the Reproducibility Crisis and possible solutions to the problem will be evaluated and discussed in class.

**Description**
Starting in around 2011, the Social Sciences have entered a so-called Reproducibility Crisis as many findings made in previous studies showed to be difficult or impossible to replicate, a problem casting doubt on the validity of research findings in the field. In class, we will discuss the proposed causes of the crisis – ranging from bad incentive structures in the publication process over statistical malpractice to upright fraud – and their possible solutions. The class will help students to develop an understanding of current debates and challenges from a meta-science perspective.

The class will be held in English.

**Grading**
There will be weekly homework assignment based on the articles discussed. Additionally, students are required to hold a short presentation, in which they summarize the key message of an article. The scientific literature will be provided to the students.

The homework and presentation will be given in English.

**Workload**
The total workload for this course is estimated to be 90 hours (30 hours per ECTS / 2 SWS). The class will meet once peer week (Thursday morning 10-12) over the semester to discuss an article on the topic. The homework (including the reading and course preparation) is estimated to take 3h-5h each week.

**Comment**
This course is based on the Reproducibilitea initiative at the University of Oxford. See here for more information: [https://reproducibilitea.org](https://reproducibilitea.org)
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:
- Maximum of 16 students.

Organizational issues
Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature
Will be announced in the course.
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Workload:

- The total workload for this course is approximately 90 hours. For further information see German version.

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
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- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Note:

- Maximum of 16 students.

Organizational issues

Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature

Will be announced in the course.

Seminar Human Resource Management (Master)

2500006, WS 20/21, 2 SWS, Language: German, Open in study portal

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.
Seminar Human Resources and Organizations (Master)

Content
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim
The student
- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload
The total workload for this course is: approximately 90 hours.
Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature
Selected journal articles and books.

Organizational issues
Blockveranstaltung siehe Homepage

Digital Citizen Science

Content
Digital Citizen Science is an innovative approach to conduct field research - interactively and in the real world. Especially in times of social distancing measures essential questions about how private lives are changing are investigated. Who is experiencing more stress during HomeOffice hours? Who is flourishing while learning at home because flow is experienced more often? Which formats of digital cooperation are fostering social contacts and bonding? These and other questions that target the main topic: Well-being@Home are focused in these seminar projects.

The seminar theses are supervised by academics from multiple institutes that are working together on the topic of Digital Citizen Science arbeiten. Involved are the research groups of Prof. Mädche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

Advances in Financial Machine Learning

Content
Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues
14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.
Data Science in Service Management  
2540473, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Content  
wird auf deutsch und englisch gehalten

Organizational issues  
Blockveranstaltung, siehe WWW

Master Seminar in Data Science and Machine Learning  
2540510, WS 20/21, 2 SWS, Language: German, Open in study portal

Content  
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature  
Werden in der ersten Veranstaltung bekannt gegeben.

Digital Service Design Seminar  
2540559, WS 20/21, 3 SWS, Open in study portal

Methoden im Innovationsmanagement  
2545107, WS 20/21, 2 SWS, Language: German, Open in study portal

Content  
The seminar teaches students to gain a systematic overview of a field of literature in Marketing - an important prerequisite for a successful master thesis. Central aspects are identification of relevant literature sources, systematization of the field, working out central insights, writing comprehensively, and identification of research gaps.

Students  
- can exploit a literature field systematically  
- are able to write an academic paper in a formally correct way  
- can assess the relevance and quality of sources  
- are able to get an overview of sources very quickly  
- know how to find relevant sources for a literature field  
- are capable to write a convincing outline  
- know how to categorize a subject under a research field  
- understand how to systematize literature fields theoretically and empirically with the help of literature tables  
- can identify the most important findings in a huge number of sources  
- are able to present a research field  
- can discuss the theoretical and practical implications of a topic  
- are capable to identify interesting research gaps

The total workload for this course is approximately 90 hours. For further information see German version.

Students interested in master thesis positions at the chair of marketing should participate in the marketing seminar. For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu)

Organizational issues  
Blockveranstaltung, Termine werden noch bekannt gegeben
Literature werden im Seminar bekannt gegeben./will be announced in the seminar.

Seminar Management Accounting - Special Topics
2579919, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:
- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Examination:
- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:
- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:
- The total workload for this course is approximately 90 hours. For further information see German version.

Note:
- Maximum of 16 students.

Literature
Will be announced in the course.
8.217 Course: Seminar in Economics A (Master) [T-WIWI-103478]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102971 - Seminar

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### Events

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<tr>
<th>Session</th>
<th>Code</th>
<th>Title</th>
<th>WS</th>
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<th>Lecturers</th>
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| SS 2020 | 2521310| Advanced Topics in Econometrics                                       | 2  | SWS  | Seminar (S)  
Schiene, Krüger, Buse, Görgen |
| SS 2020 | 2560282| Wirtschaftspolitisches Seminar                                         | 2  | SWS  | Seminar (S)  
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| SS 2020 | 2560555| Fighting Climate Change, Seminar on Morals and Social Behavior (Master)| 2  | SWS  | Seminar (S)  
Szech, Zhao                     |
| SS 2020 | 2560557| Designing the Digital Economy, Topics on Political Economy (Master)   | 2  | SWS  | Seminar (S)  
Szech, Huber                   |
| WL 20/21 | 2560140| Topics in Political Economy (Bachelor)                                 | 2  | SWS  | Seminar (S)  
Szech, Huber                   |
| WL 20/21 | 2560142| Topics in Political Economy (Master)                                   | 2  | SWS  | Seminar (S)  
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| WL 20/21 | 2560143| Morals & Social Behavior (Master)                                      | 2  | SWS  | Seminar (S)  
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| WL 20/21 | 2561208| Ausgewählte Aspekte der europäischen Verkehrsplanung und -modellierung | 1  | SWS  | Seminar (S)  
Szimba                         |

### Exams

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<td>Seminar Strategic Decisions</td>
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**Legend:**  
- Online  
- Blended (On-Site/Online)  
- On-Site  
- Cancelled

### Competence Certificate

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

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

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

### Prerequisites

None.

### Recommendation

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

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

### Advanced Topics in Econometrics
- **Course Code:** 2521310, SS 2020, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)

### Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

### Fighting Climate Change, Seminar on Morals and Social Behavior (Master)
- **Course Code:** 2560555, SS 2020, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)

### Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

### Organizational issues
Blockveranstaltung

### Designing the Digital Economy, Topics on Political Economy (Master)
- **Course Code:** 2560557, SS 2020, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)

### Topics in Political Economy (Bachelor)
- **Course Code:** 2560140, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)

### Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)

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.

### Topics in Political Economy (Master)
- **Course Code:** 2560142, WS 20/21, 2 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu/)
Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu 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.
### Course: Seminar in Economics B (Master) [T-WIWI-103477]

**Responsible:** Professorenschaft des Fachbereichs Volkswirtschaftslehre  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102972 - Seminar

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<td><strong>Wirtschaftspolitisches Seminar</strong></td>
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<td><strong>Fighting Climate Change, Seminar on Morals and Social Behavior (Master)</strong></td>
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<td><strong>Morals &amp; Social Behavior (Master)</strong></td>
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**Exams**

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<td><strong>Seminar Strategic Decisions</strong></td>
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Legend: 🖥 Online, ☐ Blended (On-Site/Online), ⬅️ On-Site, ❌ Cancelled

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

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

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

**Prerequisites**  
None.

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

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

**Advanced Topics in Econometrics**
2521310, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Organizational issues**
Blockveranstaltung, Termine werden bekannt gegeben

**Fighting Climate Change, Seminar on Morals and Social Behavior (Master)**
2560555, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Content**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.
Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](http://polit.econ.kit.edu) or [https://portal.wiwi.kit.edu/Seminare](https://portal.wiwi.kit.edu/Seminare)
The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.
Seminar Papers of 8–10 pages are to be handed in.
Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

**Organizational issues**
Blockveranstaltung

**Designing the Digital Economy, Topics on Political Economy (Master)**
2560557, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Topics in Political Economy (Bachelor)**
2560140, WS 20/21, 2 SWS, Language: English, [Open in study portal]

**Content**
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.
Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see [http://polit.econ.kit.edu](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.

**Topics in Political Economy (Master)**
2560142, WS 20/21, 2 SWS, Language: English, [Open in study portal]
Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

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.
### 8.219 Course: Seminar in Informatics A (Master) [T-WIWI-103479]

**Responsible:** Professorenschaft des Fachbereichs Informatik  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-102973 - Seminar

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<td>SS 2020 2513211</td>
<td>Seminar Business Information Systems (Master)</td>
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<td>Oberweis, Fritsch, Frister, Schreiber, Schüler, Ullrich</td>
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<td>SS 2020 2513309</td>
<td>Seminar Knowledge Discovery and Data Mining (Master)</td>
<td>3 SWS</td>
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<td>Sure-Vetter, Herbold, Färber, Nguyen, Noullet, Saier</td>
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<td>SS 2020 2513311</td>
<td>Seminar Data Science &amp; Real-time Big Data Analytics (Master)</td>
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<td>SS 2020 2513403</td>
<td>Emerging Trends in Internet Technologies (Master)</td>
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<td>SS 2020 2513500</td>
<td>Cognitive Automobiles and Robots</td>
<td>2 SWS</td>
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<td>Seminar E-Voting (Master)</td>
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<td>SS 2020 2513555</td>
<td>Seminar Security, Usability and Society (Master)</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Volkamer, Aldag, Berens, Mayer, Mossano, Düzgün</td>
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<tr>
<td>SS 2020 2595470</td>
<td>Seminar Service Science, Management &amp; Engineering</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Weinhardt, Nickel, Fichtner, Satzger, Sure-Vetter, Fromm</td>
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<td>Security and Privacy Awareness</td>
<td>2 SWS</td>
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<tr>
<td>WS 20/21 2513311</td>
<td>Seminar Data Science &amp; Real-time Big Data Analytics (Master)</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Sure-Vetter, Kulbach, Riemer, Zehnder</td>
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<td>WS 20/21 2513312</td>
<td>Seminar Linked Data and the Semantic Web (Bachelor)</td>
<td>2 SWS</td>
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<tr>
<td>WS 20/21 2513313</td>
<td>Seminar Linked Data and the Semantic Web (Master)</td>
<td>2 SWS</td>
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<tr>
<td>WS 20/21 2513500</td>
<td>Seminar Cognitive Automobiles and Robots (Master)</td>
<td>2 SWS</td>
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<tr>
<td>WS 20/21 2513601</td>
<td>Seminar Representation Learning for Knowledge Graphs (Master)</td>
<td>2 SWS</td>
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<td>Sack, Alam, Dessi, Biswas</td>
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### Exams

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<td>SS 2020 7900092</td>
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<td>SS 2020 7900128</td>
<td>Emerging Trends in Internet Technologies (Master)</td>
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<td>SS 2020 7900146</td>
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### Seminar Knowledge Discovery and Data Mining (Master)

2513309, SS 2020, 3 SWS, Language: English, [Open in study portal](https://portal.wiwi.kit.edu)

#### Content

In this seminar different machine learning and data mining methods are implemented. The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

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

#### Organizational issues

Die Anmeldung erfolgt über das WiWi Portal [https://portal.wiwi.kit.edu/](https://portal.wiwi.kit.edu/).

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.
**Seminar Data Science & Real-time Big Data Analytics (Master)**

2513311, SS 2020, 2 SWS, Language: English, [Open in study portal](http://cep.fzi.de)

**Content**

In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link: http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

**Organizational issues**

Further information as well as the registration form can be found under the following link: http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

**Cognitive Automobiles and Robots**

2513500, SS 2020, 2 SWS, Language: German/English, [Open in study portal](http://cep.fzi.de)

**Content**

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

**Learning objectives:**

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

**Recommendations:**

Attendance of the lecture machine learning

**Workload:**

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

**Organizational issues**

Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.
Content
This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php.

Seminar Security, Usability and Society (Master)
2513555, SS 2020, 2 SWS, Language: German, Open in study portal

Content
Seminar:
The main topic of this seminar is security, usability, and society. The goal is to analyze these topics from different perspectives. Always important is the human, as we are interested in how humans interact with certain problems and how it might be possible to tackle it. For instance, phishing detection, how is it possible to ensure a higher detection. To tackle this problem, you can either focus on the technical side, awareness training, regulations by organizations.

Further important information:
Because of the current situation, every meeting will be held online. This might change during the semester, depending on the course of the corona situation.

Important dates:
- Kick-Off 22.04
- Final submission 01.07
- Presentation 14.07

Topics:
- Do the SECUSO password awareness and education materials reflect the new “BSI Grundschutz”
- Systematic literature on security interventions in the context of phishing
- Key factors in “good” phishing emails
- Systematic literature review categorization of phishing paper

Further descriptions of the topics will be announced asap.

V Seminar Service Science, Management & Engineering
2595470, SS 2020, 2 SWS, Language: German, Open in study portal

Content
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.

Organizational issues
siehe Ankündigung des Instituts
Literature
Die Basisliteratur wird entsprechend der zu bearbeitenden Themen bereitgestellt.

Security and Privacy Awareness
2400125, WS 20/21, 2 SWS, Open in study portal

Content
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Dates:
- Kick-Off: TBA
- Final version: TBA
- Presentation: TBA

Topics will be assigned after the Kick-Off.

Topics:
- TBA

ATTENTION: The seminar is only for MASTER students!

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website [https://secuso.aifb.kit.edu/Studium_und_Lehre.php](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Seminar Data Science & Real-time Big Data Analytics (Master)
2513311, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Content
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term “Big Data”. The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the seminar is given under the following Link:
[http://seminar-cep.fzi.de](http://seminar-cep.fzi.de)

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Further information as well as the registration form can be found under the following link:
[http://seminar-cep.fzi.de](http://seminar-cep.fzi.de)

Questions are answered via the e-mail address sem-ep@fzi.de.

Seminar Linked Data and the Semantic Web (Bachelor)
2513312, WS 20/21, 2 SWS, Language: German/English, Open in study portal
Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

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

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

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

Topics of interest include, but are not limited to:

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

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

Seminar Linked Data and the Semantic Web (Master)
2513313, WS 20/21, 2 SWS, Language: German/English, Open in study portal

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

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

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

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

Topics of interest include, but are not limited to:

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

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

Seminar Cognitive Automobiles and Robots (Master)
2513500, WS 20/21, 2 SWS, Language: German/English, Open in study portal
Content
The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML. The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning

Workload:
The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.
Registration and further information can be found in the WiWi-portal.

Seminar Representation Learning for Knowledge Graphs (Master)
2513601, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
Participation is restricted to 10 students max.

Contributions of the students:
Each student will be assigned at max 2 papers on the topic. Out of which the student will have to give a seminar presentation and write a seminar report paper of 15 pages explaining the methods from at least one of the two assigned papers, in their own words.

Implementation (if applicable):
If code is available from the authors, then re-implementation of it for small scale experiments using Google Colab with python.

Teaching Team:
- Dr. Mehwish Alam
- Dr. Danilo Dessi
- M. Sc. Russa Biswas

Data representation or feature representation plays a key role in the performance of machine learning algorithms. In recent years, rapid growth has been observed in Representation Learning (RL) of words and Knowledge Graphs (KG) into low dimensional vector spaces and its applications to many real-world scenarios. Word embeddings are a low dimensional vector representation of words that are capable of capturing the context of a word in a document, semantic similarity as well as its relation with other words. Similarly, KG embeddings are a low dimensional vector representation of entities and relations from a KG preserving its inherent structure and capturing the semantic similarity between the entities. Each embedding space exhibits different semantic characteristics based on the source of information, e.g. text or KGs as well as the learning of the embedding algorithms. The same algorithm, when applied to different representations of the same training data, leads to different results due to the variation in the features encoded in the respective representations. The distributed representation of text in the form of the word and document vectors as well as of the entities and relations of the KG in form of entity and relation vectors have evolved as the key elements of various natural language processing tasks such as Entity Linking. Named Entity Recognition and disambiguation, etc. Different embedding spaces are generated for textual documents of different languages, hence aligning the embedding spaces has become a stepping stone for machine translation. On the other hand, in addition to multilingualism and domain-specific information, different KGs of the same domain have structural differences, making the alignment of the KG embeddings more challenging. In order to generate coherent embedding spaces for knowledge-driven applications such as question answering, named entity disambiguation, knowledge graph completion, etc., it is necessary to align the embedding spaces generated from different sources.

In this seminar, we would like to study the different state of the art algorithms for aligning embedding space. We would focus on two types of alignment algorithms: (1) Entity - Entity alignment, and (2) Entity - Word alignment.

Organizational issues
Registration and further information can be found in the WiWi-portal.
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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.

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

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

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

#### Seminar Knowledge Discovery and Data Mining (Master)
2513309, SS 2020, 3 SWS, Language: English, Open in study portal

**Content**
In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

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

**Organizational issues**
Die Anmeldung erfolgt über das WiWi Portal https://portal.wiwi.kit.edu/.

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.
**Course: Seminar in Informatics B (Master) [T-WIWI-103480]**

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### Literature
Detaillierte Referenzen werden zusammen mit den jeweiligen Themen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B. aus den folgenden Lehrbüchern:

- Mitchell, T.: Machine Learning

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#### Seminar Data Science & Real-time Big Data Analytics (Master)
2513311, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Content**
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

#### Organizational issues
Further information as well as the registration form can be found under the following link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

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#### Cognitive Automobiles and Robots
2513500, SS 2020, 2 SWS, Language: German/English, [Open in study portal]

**Content**
The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

**Learning objectives:**
- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

**Recommendations:**
Attendance of the lecture machine learning

**Workload:**
The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

**Organizational issues**
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

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#### Seminar E-Voting (Master)
2513553, SS 2020, 2 SWS, Language: German/English, [Open in study portal]
Content
This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Seminar Security, Usability and Society (Master)
2513555, SS 2020, 2 SWS, Language: German, Open in study portal

Content
Seminar:
The main topic of this seminar is security, usability, and society. The goal is to analyze these topics from different perspectives. Always important is the human, as we are interested in how humans interact with certain problems and how it might be possible to tackle it. For instance, phishing detection, how is it possible to ensure a higher detection. To tackle this problem, you can either focus on the technical side, awareness training, regulations by organizations.

Further important information:
Because of the current situation, every meeting will be held online. This might change during the semester, depending on the course of the corona situation.

Important dates:
- Kick-Off 22.04
- Final submission 01.07
- Presentation 14.07

Topics:
- Do the SECUSO password awareness and education materials reflect the new “BSI Grundschutz”
- Systematic literature on security interventions in the context of phishing
- Key factors in "good" phishing emails
- Systematic literature review categorization of phishing paper

Further descriptions of the topics will be announced asap.

This course can also be credited for the KASTEL certificate. Further information about obtaining the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Seminar Service Science, Management & Engineering
2595470, SS 2020, 2 SWS, Language: German, Open in study portal

Content
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.

Organizational issues
siehe Ankündigung des Instituts
Security and Privacy Awareness
2400125, WS 20/21, 2 SWS, Open in study portal

Content
Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Dates:
- Kick-Off: TBA
- Final version: TBA
- Presentation: TBA

Topics will be assigned after the Kick-Off.

Topics:
TBA

ATTENTION: The seminar is only for MASTER students!

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website [https://secuso.aifb.kit.edu/Studium_und_Lehre.php](https://secuso.aifb.kit.edu/Studium_und_Lehre.php).

Seminar Data Science & Real-time Big Data Analytics (Master)
2513311, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Content
In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the seminar is given under the following Link:
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Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues
Further information as well as the registration form can be found under the following link:
http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Seminar Linked Data and the Semantic Web (Bachelor)
2513312, WS 20/21, 2 SWS, Language: German/English, Open in study portal
Content
Linked Data is a way of publishing data on the web in a machine-understandable fashion. The aim of this seminar is to build applications and devise algorithms that consume, provide, or analyse Linked Data.

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

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

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

Topics of interest include, but are not limited to:

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

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

Seminar Linked Data and the Semantic Web (Master)
2513313, WS 20/21, 2 SWS, Language: German/English, Open in study portal

Seminar Cognitive Automobiles and Robots (Master)
2513500, WS 20/21, 2 SWS, Language: German/English, Open in study portal
Content
The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

The individual projects require the analysis of the task at hand, selection of suitable procedures, specification and theoretical evaluation of the approach taken. Finally, the chosen solution has to be documented and presented in a short presentation.

Learning objectives:
- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:
Attendance of the lecture machine learning

Workload:
The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues
Anmeldung und weitere Informationen sind im WiWi-Portal zu finden.
Registration and further information can be found in the WiWi-portal.

Seminar Representation Learning for Knowledge Graphs (Master)
2513601, WS 20/21, 2 SWS, Language: English, Open in study portal

Content
Participation is restricted to 10 students max.

Contributions of the students:
Each student will be assigned at max 2 papers on the topic. Out of which the student will have to give a seminar presentation and write a seminar report paper of 15 pages explaining the methods from at least one of the two assigned papers, in their own words.

Implementation (if applicable):
If code is available from the authors, then re-implementation of it for small scale experiments using Google Colab with python.

Teaching Team:
- Dr. Mehwish Alam
- Dr. Danilo Dossi
- M. Sc. Russa Biswas

Data representation or feature representation plays a key role in the performance of machine learning algorithms. In recent years, rapid growth has been observed in Representation Learning (RL) of words and Knowledge Graphs (KG) into low dimensional vector spaces and its applications to many real-world scenarios. Word embeddings are a low dimensional vector representation of words that are capable of capturing the context of a word in a document, semantic similarity as well as its relation with other words. Similarly, KG embeddings are a low dimensional vector representation of entities and relations from a KG preserving its inherent structure and capturing the semantic similarity between the entities. Each embedding space exhibits different semantic characteristics based on the source of information, e.g. text or KGs as well as the learning of the embedding algorithms. The same algorithm, when applied to different representations of the same training data, leads to different results due to the variation in the features encoded in the respective representations. The distributed representation of text in the form of the word and document vectors as well as of the entities and relations of the KG in form of entity and relation vectors have evolved as the key elements of various natural language processing tasks such as Entity Linking, Named Entity Recognition and disambiguation, etc. Different embedding spaces are generated for textual documents of different languages, hence aligning the embedding spaces has become a stepping stone for machine translation. On the other hand, in addition to multilingualism and domain-specific information, different KGs of the same domain have structural differences, making the alignment of the KG embeddings more challenging. In order to generate coherent embedding spaces for knowledge-driven applications such as question answering, named entity disambiguation, knowledge graph completion, etc., it is necessary to align the embedding spaces generated from different sources.

In this seminar, we would like to study the different state of the art algorithms for aligning embedding space. We would focus on two types of alignment algorithms: (1) Entity - Entity alignment, and (2) Entity - Word alignment.

Organizational issues
Registration and further information can be found in the WiWi-portal.
8.221 Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

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

Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102973 - Seminar

Type
Examination of another type

Credits
3

Recurrence
Each term

Version
1

Events

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

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO 2015). The following aspects are included:
- Regular participation in the seminar dates
- Preparation of a seminar paper on a partial aspect of the seminar topic according to scientific methods
- Lecture on the topic of the seminar paper.

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

Prerequisites
None.

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

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

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

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

Seminar: Modern OR and Innovative Logistics
2550491, SS 2020, 2 SWS, Language: German, Open in study portal
Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:
If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:
The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

---

Seminar: Modern OR and Innovative Logistics
2550491, WS 20/21, 2 SWS, Language: German, Open in study portal

Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues
wird auf der Homepage bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.
8 COURSES

Course: Seminar in Operations Research B (Master) [T-WIWI-103482]

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

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102974 - Seminar

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Exams

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

Competence Certificate

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

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

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

Prerequisites

None.

Recommendation

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

Annotation

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

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

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

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

Economathematics M.Sc.
Module Handbook as of 01/10/2020
Content
The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:
If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:
The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues
wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature
Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

Seminar: Modern OR and Innovative Logistics
2550491, WS 20/21, 2 SWS, Language: German, Open in study portal
8.223 Course: Seminar in Statistics A (Master) [T-WIWI-103483]

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

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

**Part of:** M-WIWI-102971 - Seminar

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**Events**

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<td>SS 2020</td>
<td>7900250</td>
<td>Data Mining and Applications (Projectseminar)</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:*

**Advanced Topics in Econometrics**  
2521310, SS 2020, 2 SWS, Language: English, Open in study portal

**Organizational issues**  
Blockveranstaltung. Termine werden bekannt gegeben.
**8.224 Course: Seminar in Statistics B (Master) [T-WIWI-103484]**

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

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

**Part of:** M-WIWI-102972 - Seminar

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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:

**Advanced Topics in Econometrics**

2521310, SS 2020, 2 SWS, Language: English, [Open in study portal]

**Organizational issues**

Blockveranstaltung, Termine werden bekannt gegeben
### 8.225 Course: Seminar Mathematics [T-MATH-105686]

**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102730 - Seminar

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8.226 Course: Smart Energy Infrastructure [T-WIWI-107464]

**Responsible:** Dr. Armin Ardone
Dr. Dr. Andrej Marko Pustisek

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

**Part of:** M-WIWI-101452 - Energy Economics and Technology

### Events

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### Lectures

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<td>Each winter term</td>
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Legend: Online, Blended (On-Site/Online), On-Site, Cancelled

### Competence Certificate

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

### Prerequisites

None.

### Annotation


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

### (Smart) Energy Infrastructure

2581023, WS 20/21, 2 SWS, Language: German, Open in study portal

### Content

- Basic terms and concepts
- Meaning of infrastructure
- Excursus: regulation of infrastructure
- Natural gas transportation
- Natural gas storage
- Electricity transmission
- (Overview) Crude oil and oil product transportation
8.227 Course: Smart Grid Applications [T-WIWI-107504]

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

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

**Part of:** M-WIWI-103720 - eEnergy: Markets, Services and Systems

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

**Competence Certificate**

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

**Prerequisites**

None

**Recommendation**

None

**Annotation**

The lecture will be read for the first time in winter term 2018/19.
8.228 Course: Sobolev Spaces [T-MATH-105896]

**Responsible:** Prof. Dr. Andreas Kirsch

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102926 - Sobolev Spaces

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8.229 Course: Social Choice Theory [T-WIWI-102859]

Responsible: Prof. Dr. Clemens Puppe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101500 - Microeconomic Theory
M-WIWI-101504 - Collective Decision Making

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Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester.

Prerequisites
None

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

Social Choice Theory
2520537, SS 2020, 2 SWS, Language: English, Open in study portal

Content
How should (political) candidates be elected? What are good ways of merging individual judgments into collective judgments? Social Choice Theory is the systematic study and comparison of how groups and societies can come to collective decisions. The course offers a rigorous and comprehensive treatment of judgment and preference aggregation as well as voting theory. It is divided into two parts. The first part deals with (general binary) aggregation theory and builds towards a general impossibility result that has the famous Arrow theorem as a corollary. The second part treats voting theory. Among other things, it includes proving the Gibbard-Satterthwaite theorem.

Literature
Main texts:

Secondary texts:
8.230 Course: Sociotechnical Information Systems Development [T-WIWI-109249]

**Responsible:** Prof. Dr. Ali Sunyaev  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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**Events**

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**Exams**

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**Legend:** Online, Blended [On-Site/Online], On-Site, Cancelled

**Competence Certificate**

The alternative exam assessment consists of an implementation and a final thesis documenting the development and use of the application.

**Prerequisites**

None.

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

**Development of Sociotechnical Information Systems (Bachelor)**

2512400, SS 2020, 3 SWS, Language: German/English, Open in study portal  
Practical course (P)

**Content**

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

Registration information will be announced on the course page.

**Development of Sociotechnical Information Systems (Master)**

2512401, SS 2020, 3 SWS, Language: German/English, Open in study portal  
Practical course (P)

**Content**

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

Registration information will be announced on the course page.
## Practical Course Sociotechnical Information Systems Development (Bachelor)

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

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

## Practical Course Sociotechnical Information Systems Development (Master)

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

### Learning objectives:
- Independent and self-organized realization of a software development project
- Evaluation and selection of suitable development tools and methods
- Application of modern software development methods
- Planning and execution of different development tasks: requirements assessment, system design, implementation, and quality assurance
- Project documentation
- Presentation of project results in an comprehensible and structured form
8.231 Course: Software Quality Management [T-WIWI-102895]

**Responsibe:** Prof. Dr. Andreas Oberweis

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

**Part of:** M-WIWI-101472 - Informatics

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<td>SS 2020</td>
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**Competence Certificate**
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation in the first week after lecture period.

**Prerequisites**
None

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

### Software Quality Management

**2511208, SS 2020, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**Content**
This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

**Learning objectives:**
Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the mail models of software certification, compare and evaluate these models,
- write scientific theses in the area of software quality management and find own solutions for given problems.

**Recommendations:**
Programming knowledge in Java and basic knowledge of computer science are expected.

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

- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002
- Mauro Pezzè, Michal Young: Software testen und analysieren. Oldenbourg Verlag 2009

Weitere Literatur wird in der Vorlesung bekanntgegeben.
8 COURSES

8.232 Course: Spatial Economics [T-WIWI-103107]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101496 - Growth and Agglomeration

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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

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses "Economics I" [2600012], and "Economics II" [2600014]. In addition, an interest in quantitative-mathematical modeling is required. The attendance of the course "Introduction to economic policy" [2560280] is recommended.

Annotation
Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

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

Spatial Economics
2561260, WS 20/21, 2 SWS, Language: English, Open in study portal

Lecture (V)
Content
The course covers the following topics:

- Geography, trade and development
- Geography and economic theory
- Core models of economic geography and empirical evidence
- Agglomeration, home market effect, and spatial wages
- Applications and extensions

Learning objectives:
The student

- analyses how spatial distribution of economic activity is determined.
- uses quantitative methods within the context of economic models.
- has basic knowledge of formal-analytic methods.
- understands the link between economic theory and its empirical applications.
- understands to what extent concentration processes result from agglomeration and dispersion forces.
- is able to determine theory based policy recommendations.

Recommendations:
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. An interest in mathematical modeling is advantageous.

Workload:
The total workload for this course is approximately 135 hours.

- Classes: ca. 30 h
- Self-study: ca. 45 h
- Exam and exam preparation: ca. 60 h

Assessment:
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Literature

Weitere Literatur wird in der Vorlesung bekanntgegeben.
(Further literature will be announced in the lecture.)
8.233 Course: Spatial Stochastics [T-MATH-105867]

**Responsible:** Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102903 - Spatial Stochastics

**Type**  
Oral examination

**Credits**  
8

**Version**  
1

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Legend: 🌐 Online, 🎬 Blended (On-Site/Online), 🗂 On-Site, ✗ Cancelled

**Prerequisites**
none
8.234 Course: Special Functions and Applications in Potential Theory [T-MATH-102274]

**Responsible:** Prof. Dr. Andreas Kirsch  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-101335 - Special Functions and Applications in Potential Theory

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**Prerequisites**  
None
T 8.235 Course: Special Topics of Numerical Linear Algebra [T-MATH-105891]

Responsible: Prof. Dr. Marlis Hochbruck
Organisation: KIT Department of Mathematics
Part of: M-MATH-102920 - Special Topics of Numerical Linear Algebra

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Exams

| SS 2020 | 7700072 | Special Topics of Numerical Linear Algebra | Prüfung (PR) | Neher |

Prerequisites
none
8.236 Course: Spectral Theory - Exam [T-MATH-103414]

**Responsible:**
- Prof. Dr. Dorothee Frey
- PD Dr. Gerd Herzog
- apl. Prof. Dr. Peer Kunstmann
- Dr. Christoph Schmoeger
- Prof. Dr. Roland Schnaubelt

**Organisation:**
- KIT Department of Mathematics
- Part of: M-MATH-101768 - Spectral Theory

**Type**
- Oral examination

**Credits**
- 8

**Version**
- 1

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**Exams**
- SS 2020 0100035 Spectral Theory - Exam
  - Prüfung (PR)
  - Lamm, Kunstmann, Frey

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

**Spektraltheorie**
- 0163700, SS 2020, 4 SWS, Language: German, Open in study portal

**Organizational issues**
- Die Vorlesung wird online abgehalten. Nähere Informationen dazu finden Sie im Ilias.

**Literature**
- J.B. Conway: A Course in Functional Analysis.
- D. Werner: Funktionalanalysis.
8.237 Course: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature [T-MATH-105932]

**Responsible:** Stephan Klaus
Prof. Dr. Wilderich Tuschmann

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102958 - Spin Manifolds, Alpha Invariant and Positive Scalar Curvature

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8.238 Course: Splitting Methods for Evolution Equations [T-MATH-110805]

**Responsible:** Prof. Dr Tobias Jahnke

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105325 - Splitting Methods for Evolution Equations

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**Prerequisites**
none
8.239 Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

**Responsible:** apl. Prof. Dr. Wolf-Dieter Heller
**Organisation:** KIT Department of Economics and Management
**Part of:**
- M-WIWI-101638 - Econometrics and Statistics I
- M-WIWI-101639 - Econometrics and Statistics II

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

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

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

**Content**

**Learning objectives:**

The student has profound knowledge of generalized regression models.

**Requirements:**

Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016].

**Workload:**

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours
8.240 Course: Stein's Method [T-MATH-105914]

**Responsible:** Dr. Matthias Schulte  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102946 - Stein's Method

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

**Prerequisites**

none
**8.241 Course: Stochastic Calculus and Finance [T-WIWI-103129]**

**Responsible:** Dr. Mher Safarian  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101639 - Econometrics and Statistics II

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**Competence Certificate**
The assessment of this course consists of a written examination (§4(2), 1 SPOs, 180 min.).

**Prerequisites**
None

**Annotation**
For more information see http://statistik.econ.kit.edu/

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

**V Stochastic Calculus and Finance**  
2521331, WS 20/21, 2 SWS, Language: English, [Open in study portal]

**Lecture (V)**  
Blended (On-Site/Online)

**Content**
**Learning objectives:**
After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis we be put on both finance and the theory behind it.

**Content:**
The course will provide rigorous yet focused training in stochastic calculus and mathematical finance. Topics to be covered:


**Workload:**
Total workload for 4.5 CP: approx. 135 hours  
Attendance: 30 hours  
Preparation and follow-up: 65 hours

**Organizational issues**
Blockveranstaltung, Termine werden über Ilias bekannt gegeben

Economathematics M.Sc.  
Module Handbook as of 01/10/2020
Literature

- Stochastic Finance: An Introduction in Discrete Time by H. Föllmer, A. Schied, de Gruyter, 2011
- Introduction to Stochastic Calculus Applied to Finance by D. Lamberton, B. Lapeyre, Chapman&Hall, 1996
8.242 Course: Stochastic Control [T-MATH-105871]

**Responsible:** Prof. Dr. Nicole Bäuerle

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102908 - Stochastic Control

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**Prerequisites**

none
8.243 Course: Stochastic Differential Equations [T-MATH-105852]

**Responsible:** Prof. Dr. Dorothee Frey  
Prof. Dr. Roland Schnaubelt

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102881 - Stochastic Differential Equations

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Legend: 📚 Online, 🟢 Blended (On-Site/Online), 🟦 On-Site, ⚪ Cancelled
8.244 Course: Stochastic Evolution Equations [T-MATH-105910]

**Responsible:** Prof. Dr. Lutz Weis  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102942 - Stochastic Evolution Equations

**Type**: Oral examination  
**Credits**: 8  
**Version**: 1

**Prerequisites**
none
## T 8.245 Course: Stochastic Geometry [T-MATH-105840]

**Responsible:** Prof. Dr. Daniel Hug  
Prof. Dr. Günter Last  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102865 - Stochastic Geometry

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### Events

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<td>0152600</td>
<td>Stochastic Geometry</td>
<td>4</td>
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<td>SS 2020</td>
<td>0152610</td>
<td>Tutorial for 0152600 (Stochastic Geometry)</td>
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### Exams

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<td>7700034</td>
<td>Stochastic Geometry</td>
<td>Prüfung (PR)</td>
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</table>
**8.246 Course: Strategic Finance and Technology Change [T-WIWI-110511]**

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

<table>
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**Exams**

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<td>Strategic Finance and Technology Change</td>
<td>Prüfung (PR)</td>
<td>Ruckes</td>
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<td>WS 20/21</td>
<td>7900219</td>
<td>Strategic Finance and Technology Change</td>
<td>Prüfung (PR)</td>
<td>Ruckes</td>
</tr>
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</table>

**Competence Certificate**

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. 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.
### 8.247 Course: Strategic Management of Information Technology [T-WIWI-102669]

**Responsible:** Prof. Dr. Thomas Wolf  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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<tr>
<td>SS 2020 7900034</td>
<td>(PR)</td>
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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 according (30 min.) to §4(2) of the examination regulation.

**Prerequisites**

None
8.248 Course: Strategy and Management Theory: Developments and “Classics” [T-WIWI-106190]

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

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

**Part of:** M-WIWI-103119 - Advanced Topics in Strategy and Management

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**Events**

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<td>Strategy and Management Theory: Developments and &quot;Classics&quot; (Master)</td>
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<td>Seminar (S)</td>
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<td><strong>WS 20/21</strong></td>
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**Exams**

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<td>Strategy and Management Theory: Developments and &quot;Classics&quot;</td>
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<td></td>
<td></td>
<td>Lindstädt</td>
<td></td>
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</tbody>
</table>

Legend: 🖥 Online, 📦 Blended [On-Site/Online], 🗣 On-Site, X Cancelled

**Competence Certificate**
The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a conclusion meeting. Details on the design of the performance review will be announced during the lecture.

**Prerequisites**
None

**Recommendation**
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

**Annotation**
This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

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

**Strategy and Management Theory: Developments and "Classics" (Master)**

2577921, SS 2020, 2 SWS, Language: German, Open in study portal

Seminar (S)
Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a final meeting. Details on the design of the success control will be announced during the lecture.

Note:
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.
The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
siehe Homepage

Workshop aktuelle Themen Strategie und Management (Master)
2577921, WS 20/21, 2 SWS, Language: German, Open in study portal

Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a final meeting. Details on the design of the success control will be announced during the lecture.

Note:
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.
The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.
Organizational issues
siehe Homepage
4 Blöcke mittwochs nachmittags
8.249 Course: Structural Graph Theory [T-MATH-111004]

**Responsible:** Prof. Dr. Maria Aksenovich

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-105463 - Structural Graph Theory

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**Prerequisites**
none
8.250 Course: Supplement Enterprise Information Systems [T-WIWI-110346]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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<td>Each term</td>
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**Competence Certificate**  
The assessment of this course is a written examination (60 min.) or (if necessary) oral examination (30 min.) according to §4(2) of the examination regulation.

**Prerequisites**  
None
### 8.251 Course: Supplement Software- and Systemsengineering [T-WIWI-110372]

**Responsible:** Prof. Dr. Andreas Oberweis  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

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<tbody>
<tr>
<td>Written exam</td>
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<td>Each term</td>
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**Competence Certificate**
The assessment consists of an 1h written exam in the first week after lecture period.

**Prerequisites**
None

**Annotation**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot be assigned to another course of this topic.
**Taktisches und operatives SCM**

**2550486, SS 2020, 2 SWS, Language: German, Open in study portal**

**Lecture (V)**

**Content**

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.
Literature
Weiterführende Literatur

- 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
8.253 Course: The Riemann Zeta Function [T-MATH-105934]

**Responsible:** Dr. Fabian Januszewski  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102960 - The Riemann Zeta Function

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<tbody>
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</table>
8.254 Course: Theory of Endogenous Growth [T-WIWI-102785]

**Responsible:** Prof. Dr. Ingrid Ott

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

**Part of:**
- M-WIWI-101478 - Innovation and Growth
- M-WIWI-101496 - Growth and Agglomeration

### Type and Credits
- **Written examination**
- **Credits:** 4.5

### Recurrence
- **Each winter term**

### Version
- **1**

#### Events

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#### Exams

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### Competence Certificate

The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but it is very likely to (not every additional point improves the total number of points, since a grade cannot become better than 1). The voluntary elaboration of such a paper cannot countervail a fail in the exam.

### Prerequisites
None

### Recommendation

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

### Annotation

Due to the research semester of Prof. Dr. Ingrid Ott, the course is not offered in the winter term 2018/19.

---

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

**Theory of endogenous growth**
2561503, WS 20/21, 2 SWS, Language: German/English, Open in study portal
Content
This course is intended as an introduction to the field of advanced macroeconomics with a special focus on economic growth. Lectures aim to deal with the theoretical foundations of exogenous and endogenous growth models. The importance of growth for nations and discussion of some (well-known) growth theories together with the role of innovation, human capital and environment will therefore be primary focuses of this course.

Learning objective:
Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

Course content:
- Intertemporal consumption decision
- Growth models with exogenous saving rates: Solow
- Growth models with endogenous saving rates: Ramsey
- Growth and environmental resources
- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

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

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

Exam description:
The assessment consists of a written exam (60 min) according to Section 4(2), 1 of the examination regulation. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature
Auszug:
8.255 Course: Time Series Analysis [T-MATH-105874]

**Responsible:** Prof. Dr. Norbert Henze  
PD Dr. Bernhard Klar

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102911 - Time Series Analysis

**Type**  
Oral examination  
**Credits** 4  
**Version** 2

**Events**

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**Exams**

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<td>Time Series Analysis</td>
<td>Prüfung (PR)</td>
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</table>
8.256 Course: Topics in Experimental Economics [T-WIWI-102863]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101505 - Experimental Economics

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Events

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Exams

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<td>Topics in Experimental Economics</td>
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Competence Certificate
The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Annotation
The course is offered in summer 2020 for the next time, not in summer 2018.
8.257 Course: Topological Data Analysis [T-MATH-11031]

Responsible: Prof. Dr. Tobias Hartnick
Prof. Dr Roman Sauer

Organisation: KIT Department of Mathematics

Part of: M-MATH-105487 - Topological Data Analysis

<table>
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Prerequisites:
none
### 8.258 Course: Topological Groups [T-MATH-110802]

**Responsible:** Dr. rer. nat. Rafael Dahmen  
Prof. Dr. Wilderich Tuschmann  

**Organisation:** KIT Department of Mathematics  

**Part of:** M-MATH-105323 - Topological Groups  

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**Exams**

| SS 2020 | 7700094 | Topological Groups | Prüfung (PR) | Dahmen |

**Prerequisites**  
none
### 8.259 Course: Traveling Waves [T-MATH-105897]

**Responsible:** Prof. Dr. Jens Rottmann-Matthes  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-102927 - Traveling Waves

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### Course: Uncertainty Quantification [T-MATH-108399]

**Responsible:** Prof. Dr. Martin Frank  
**Organisation:** KIT Department of Mathematics  
**Part of:** M-MATH-104054 - Uncertainty Quantification

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<td>Uncertainty Quantification</td>
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</table>

**Prerequisites**
none

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

#### Lecture (V)

**Uncertainty Quantification**  
0164400, SS 2020, 2 SWS, Language: English, [Open in study portal](#)  

**Literature**

8.261 Course: Valuation [T-WIWI-102621]

**Responsible:** Prof. Dr. Martin Ruckes

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

**Part of:** M-WIWI-101480 - Finance 3
M-WIWI-101482 - Finance 1
M-WIWI-101483 - Finance 2

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<tr>
<td>Written exam.</td>
<td>4.5</td>
<td>Each winter term</td>
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**Events**

<table>
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<tr>
<th>Term</th>
<th>Code</th>
<th>Title</th>
<th>SWS</th>
<th>Type</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>WS 20/21</td>
<td>2530212</td>
<td>Valuation</td>
<td>2</td>
<td>Lecture (V) / Online</td>
<td>Ruckes</td>
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<tr>
<td>WS 20/21</td>
<td>2530213</td>
<td>Übungen zu Valuation</td>
<td>1</td>
<td>Practice (Ü) / Online</td>
<td>Ruckes, Luedecke</td>
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<tr>
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<th>Code</th>
<th>Title</th>
<th>SWS</th>
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<tr>
<td>SS 2020</td>
<td>7900072</td>
<td>Valuation</td>
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<td>Prüfung (PR)</td>
<td>Ruckes</td>
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<td>WS 20/21</td>
<td>7900057</td>
<td>Valuation</td>
<td></td>
<td>Prüfung (PR)</td>
<td>Ruckes</td>
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</tbody>
</table>

**Exams**

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

**Competence Certificate**

See German version.

**Prerequisites**

None

**Recommendation**

None

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

**Valuation**

2530212, WS 20/21, 2 SWS, Language: English, [Open in study portal](#)

**Content**

Firms prosper when they create value for their shareholders and stakeholders. This is achieved by investing in projects that yield higher returns than their according cost of capital. Students are told the basic tools for firm and project valuation as well as ways to implement these tools in order to enhance a firm’s value and improve its investment decisions. Among other things, the course will deal with the valuation of firms and individual projects using discounted cash flow and relative valuation approaches and the valuation of flexibility deploying real options.

**Topics:**

- Projections of cash flows
- Estimation of the cost of capital
- Valuation of the firm
- Mergers and acquisitions
- Real options

**Learning outcomes:** Students are able to

- evaluate complex investment projects by taking a financial view,
- value firms,
- assess the advantageousness of potential merger and acquisitions.

**Literature**

*Weiterführende Literatur*

### 8.262 Course: Variational Methods [T-MATH-110302]

<table>
<thead>
<tr>
<th><strong>Responsible:</strong></th>
<th>Prof. Dr. Wolfgang Reichel</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Organisation:</strong></td>
<td>KIT Department of Mathematics</td>
</tr>
<tr>
<td><strong>Part of:</strong></td>
<td>M-MATH-105093 - Variational Methods</td>
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<table>
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<th><strong>Type</strong></th>
<th><strong>Credits</strong></th>
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<tbody>
<tr>
<td>Oral examination</td>
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</table>
### 8.263 Course: Wave Propagation in Periodic Waveguides [T-MATH-111002]

<table>
<thead>
<tr>
<th>Responsible:</th>
<th>Prof. Dr. Roland Griesmaier</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organisation:</td>
<td>KIT Department of Mathematics</td>
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<tr>
<td>Part of:</td>
<td>M-MATH-105462 - Wave Propagation in Periodic Waveguides</td>
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<th>Recurrence</th>
<th>Version</th>
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<tbody>
<tr>
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<td>Irregular</td>
<td>1</td>
</tr>
</tbody>
</table>

**Prerequisites**

none
8.264 Course: Wavelets [T-MATH-105838]

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

**Organisation:** KIT Department of Mathematics

**Part of:** M-MATH-102895 - Wavelets

**Type**
- Oral examination

**Credits** 8

**Recurrence** Irregular

**Version** 1

**Competence Certificate**
Mündliche Prüfung im Umfang von ca. 30 Minuten.

**Prerequisites**
none
8.265 Course: Web App Programming for Finance [T-WIWI-110933]

**Responsible:** Jun.-Prof. Dr. Julian Thimme  
**Organisation:** KIT Department of Economics and Management  
**Part of:**  
- M-WIWI-101480 - Finance 3  
- M-WIWI-101483 - Finance 2

<table>
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<tr>
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</thead>
<tbody>
<tr>
<td>Written examination</td>
<td>4.5</td>
<td>Once</td>
<td>1</td>
</tr>
</tbody>
</table>

**Competence Certificate**  
Non exam assessment according to § 4 paragraph 3 of the examination regulation. (Anmerkung: gilt nur für SPO 2015). The grade is made up as follows: 50% result of the project (R-code), 50% presentation of the project.

**Prerequisites**  
None

**Recommendation**  
The content of the bachelor course Investments is assumed to be known and necessary to follow the course.
### 8.266 Course: Web Science [T-WIWI-103112]

**Responsible:** Prof. Dr. York Sure-Vetter  
**Organisation:** KIT Department of Economics and Management  
**Part of:** M-WIWI-101472 - Informatics

<table>
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<th>Version</th>
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#### Exams

<table>
<thead>
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<th>Exams</th>
<th>Code</th>
<th>Description</th>
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<tr>
<td>SS 2020</td>
<td>7900032</td>
<td>Web Science (Registration until 13 July 2020)</td>
<td>Prüfung (PR)</td>
<td>Sure-Vetter</td>
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</table>

**Competence Certificate**

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation. The exam takes place every semester and can be repeated at every regular examination date.

**Prerequisites**

None

**Annotation**

The lecture will not be offered in the winter semester 2020/2021, but the examination will take place regularly.
8.267 Course: Workshop Business Wargaming – Analyzing Strategic Interactions [T-WIWI-106189]

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

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

**Part of:** M-WIWI-103119 - Advanced Topics in Strategy and Management

<table>
<thead>
<tr>
<th>Type</th>
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</thead>
<tbody>
<tr>
<td>Examination of another type</td>
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### Events

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<th>Credits</th>
<th>Recurrence</th>
<th>Lecturer</th>
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<tbody>
<tr>
<td>WS 20/21</td>
<td>2577922</td>
<td>Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)</td>
<td>2 SWS</td>
<td>Seminar (S) / 🖥</td>
<td>Lindstädt</td>
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### Exams

<table>
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<tr>
<th>Event</th>
<th>Code</th>
<th>Type</th>
<th>Credits</th>
<th>Lecturer</th>
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</thead>
<tbody>
<tr>
<td>WS 20/21</td>
<td>7900172</td>
<td>Workshop Business Wargaming – Analyzing Strategic Interactions</td>
<td>Prüfung (PR)</td>
<td>Lindstädt</td>
</tr>
</tbody>
</table>

**Legend:** 🖥 Online, 📚 Blended (On-Site/Online), 📖 On-Site, ✗ Cancelled

### Competence Certificate

In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

### Prerequisites

None

### Recommendation

Basic knowledge as conveyed in the bachelor module „Strategy and Organization” is recommended.

### Annotation

This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the summer term 2018.

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

**Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)**

- Code: 2577922, WS 20/21, 2 SWS, Language: German, [Open in study portal](#)
Content
In this lecture, current economic trends will be discussed from a perspective of competition analysis and corporate strategies. Using appropriate frameworks, the students will be able to analyze collectively selected case studies and derive business strategies.

Learning Objectives:
Students
- are able to analyze business strategies and derive recommendations for the management
- learn to express their position through compelling reasoning in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the success control will be announced during the lecture.

Note:
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.
The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
4 Blöcke mittwochs nachmittags
siehe Institutshomepage
8.268 Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]

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

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

**Part of:** M-WIWI-103119 - Advanced Topics in Strategy and Management

**Type**
Examination of another type

**Credits**
3

**Recurrence**
Irregular

**Version**
1

<table>
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<th>Events</th>
<th>Credits</th>
<th>Recurrence</th>
<th>Type</th>
<th>Organiser</th>
</tr>
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<tbody>
<tr>
<td>SS 2020 2577923</td>
<td>2 SWS</td>
<td>Seminar (S)</td>
<td>Workshop aktuelle Themen Strategie und Management (Master)</td>
<td>Lindstädt</td>
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<tr>
<td>WS 20/21 2577923</td>
<td>2 SWS</td>
<td>Seminar (S) / 🖥</td>
<td>Workshop aktuelle Themen Strategie und Management (Master)</td>
<td>Lindstädt</td>
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<th>Organiser</th>
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<tbody>
<tr>
<td>SS 2020 7900122</td>
<td>Lindstädt</td>
</tr>
<tr>
<td>WS 20/21 7900171</td>
<td>Lindstädt</td>
</tr>
</tbody>
</table>

**Competence Certificate**
The evaluation of the performance takes place through the active participation in the discussion rounds; an appropriate preparation is expressed here and a clear understanding of the topic and framework becomes recognizable. Further details on the design of the performance review will be announced during the lecture.

**Prerequisites**
None

**Recommendation**
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

**Annotation**
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

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

**Workshop aktuelle Themen Strategie und Management (Master)**
2577923, SS 2020, 2 SWS, Language: German, Open in study portal

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Economathematics M.Sc.
Module Handbook as of 01/10/2020
Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module “Strategy and Organization” is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The assessment of performance is made through active participation in the discussion rounds; adequate preparation is expressed here and a clear understanding of the topic and framework becomes evident. Further details on the design of the success control will be announced during the lecture.

Note:
This course is admission restricted. If you were already admitted to another course in the module “Advanced Topics in Strategy and Management” the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.
The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
Geb 05.20, R 2A-12.1 IBU, mittwochs tba
Content
In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:
Students
- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:
Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a

Assessment:
The assessment of performance is made through active participation in the discussion rounds; adequate preparation is expressed here and a clear understanding of the topic and framework becomes evident. Further details on the design of the success control will be announced during the lecture.

Note:
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
mittwochs tba