Module Handbook
Economathematics (M.Sc.)
SPO 2009/2016
Winter term 17/18
Date: 11/17/2017
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Module Handbook, Date 11/17/2017, Winter term 17/18
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Part I

About this handbook

1 New Wiwi-modules

M-WIWI-103119 Advanced Topics in Strategy and Management

Responsible: Hagen Lindstädt
Credits: 9

Part of:

- Industrial Engineering and Management Master: Business Administration, Compulsory Elective Modules/Compulsory Modules 1+2/Business Administration
- Economics Engineering Master: Business Administration, Compulsory Elective Modules 1+2/Compulsory Module/Business Administration
- Economathematics Master: Finance - Risk Management - Managerial Economics, Elective Field

Courses:

- New: T-WIWI-106188 Workshop Current Topics in Strategy and Management (3 ECTS)
- New: T-WIWI-106189 Workshop Business Wargaming – Analyzing Strategic Interactions (3 ECTS)
- New: T-WIWI-106190 Strategy and Management Theory: Developments and “Classics” (3 ECTS)

Prerequisites: None

M-WIWI-103720 eEnergy: Markets, Services and Systems

Responsible: Christof Weinhardt
Credits: 9

Part of:

- Industrial Engineering and Management Master: Business Administration, Compulsory Elective Modules/Compulsory Modules 1+2/Business Administration
- Economics Engineering Master: Business Administration, Compulsory Elective Modules 1+2/Compulsory Module/Business Administration
- Economathematics Master: Finance - Risk Management - Managerial Economics, Elective Field

Courses:

- New: T-WIWI-107501 - Energy Market Engineering (4.5 ECTS)
- New: T-WIWI-107503 - Energy Networks and Regulation (4.5 ECTS)
- New in WS18/19: T-WIWI-107504 - Smart Grid Applications (4.5 ECTS)

Prerequisites: None
2 Notes and rules

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

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

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

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.

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.

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/exams/index.php:

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

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

Following SPO 2015 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. According to SPO 2007/2009 exams are split into written exams, oral exams and non exam assessments. Non exam assessments are graded or not.

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.

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.

Further information

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

3 Online Version

A new webbased version of the module handbook is now available. This online handbook offers more comfort in browsing modules and courses and allows a smart switching between the english and german version. Try it out!

- Industrial Engineering and Management (B.Sc.): http://www.wiwi.kit.edu/english/mhbWiingBsc_en.php
- Industrial Engineering and Management (M.Sc.): http://www.wiwi.kit.edu/english/mhbWiingMsc_en.php
- Economics Engineering (B.Sc.): http://www.wiwi.kit.edu/english/mhbTVWLbSc_eng.php
- Economics Engineering (M.Sc.): http://www.wiwi.kit.edu/english/mhbTVWMSc_en.php
- Information Engineering and Management (B.Sc.): http://www.wiwi.kit.edu/english/mhbInwiBsc_en.php
- Information Engineering and Management (M.Sc.): http://www.wiwi.kit.edu/english/mhbInwiMsc_en.php
- Economathematics (M.Sc.): http://www.wiwi.kit.edu/english/mhbWimaMsc_en.php

4 Contact

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

  Ralf Hilser
  Anabela Relvas
  Phone +49 721 608-43768
  E-Mail: pruefungssekretariat@wiwi.kit.edu

If you have any questions about modules or exams with MATH-ID, please contact at the KIT Department of Mathematics:

  Dr. Bernhard Klar
  Telefon +49 721 608-42047
  E-Mail: Bernhard.Klar@kit.edu
Figure 1: Screenshot of the webbased module handbook

Editorial responsibility:

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

The Master’s degree program in Economathematics

1 Study plan according to SPO 2016

Preface

This study plan is intended to supplement and explain the study and examination regulations of the Master’s degree program in Economathematics, and to provide students with concrete examples of the organization of their studies.

1. 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.

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.

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.

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.

2. 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.
1. **Subject: Mathematical Methods**

There are the following four mathematical fields:

1. Stochastics
2. Applied and Numerical Mathematics / Optimization
3. Analysis
4. 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.

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. **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.

**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.

**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.

**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.

3. **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:
Basic skills (soft skills)
1. Teamwork, social communication and creativity techniques (for example, working in small groups, working together on the homework and reworking the course material)
2. Presentation creation and techniques
3. Logical and systematic argumentation and writing (for example, in exercises, seminars, courses and writing homework)
4. Structured problem solving and communication

Practice orientation (enabling skills)
1. Empowerment in a professional context
2. Competences in project management
3. Business basic knowledge
4. English as a technical language

Orientation knowledge
1. Mediation of interdisciplinary knowledge
2. Institutional knowledge about economic and legal systems
3. Knowledge about international organizations
4. 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.

4. Exemplary study courses

The following versions are just a few of the many options of available study courses.

Version 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)

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

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

Semester 4: 30 CP
Master Thesis
Version 2

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)

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

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

Semester 4: 30 CP
Master Thesis

Version 3

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

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)

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)

Semester 4: 30 CP
Master Thesis

Version 4: Start in summer term (with specific possible choices)

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

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
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

Semester 4: 30 CP
Master Thesis

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

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

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)

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

Semester 4: 30 CP
Master Thesis

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

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

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
semester 3: 26 CP, 5 examination credits, 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: Informatics: Algorithms for Internet Applications 5 CP
Subject 3: Operations Research in Supply Chain Management and Healthcare Management: Location Planning and Strategic Supply Chain Management 4.5 CP + Supply Chain Management in the Process Industry 4.5 CP = 9 CP
Subject 5: Seminar Math 3 CP

Semester 4: 30 CP

Master Thesis

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

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

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

Semester 3: 26.5 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: Informatics: Algorithms for Internet Applications 5 CP
Subject 3: Operations Research in Supply Chain Management and Healthcare Management: Location Planning and Strategic Supply Chain Management 4.5 CP + Supply Chain Management in the Process Industry 4.5 CP = 9 CP
Subject 5: Seminar Math 3 CP

Semester 4: 30 CP

Master Thesis

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

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

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
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

Semester 4: 30 CP
Master Thesis

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

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

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

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

Semester 4: 30 CP
Master Thesis

2 Study plan according to SPO 2009

Preface

This study plan is intended to supplement and explain the study and examination regulations of the Master’s degree program in Economathematics, and to provide students with concrete examples of the organization of their studies.

1. 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 fields of industry, banking, insurance, logistics, software development and research. Through the research-oriented training, the graduates are prepared especially for lifelong learning.
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.

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.

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 topics. They will gain an in-depth understanding of mathematical methods in the fields of analysis / numerics / optimization and stochastics.

In the profile Financial Engineering, graduates have a broad knowledge of financial mathematical models and methods as well as financial concepts and concepts. This enables them to analyze complex and innovative tasks in this field and to assess the results.

In the Profile Operations Research, graduates acquire a broad knowledge of mathematical and economic models and methods of corporate management. This enables them to analyze complex and innovative tasks in this field and to assess the results.

2. 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 gained 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. Modules from both disciplines must be selected as follows.

Subject Mathematics

There are the following four mathematical fields:

1. Stochastics
2. Applied and Numerical Mathematics / Optimization
3. Analysis
4. Algebra and Geometry

A minimum of 36 credits must be gained, with 8 credits from the field of Stochastics and 8 credits from one of the fields of Analysis or Applied and Numerical Mathematics / Optimization. In the Financial Engineering study profile, there must be a minimum of 8 additional points in the field of Stochastics. The remaining 20 credits (or 12 credits in the study profile of Financial Engineering) must be obtained by any examination from the four mathematical fields.
Subject Business economics
18 CP from each of the two fields must be acquired:
   1. Finance - Risk Management - Managerial Economics
   2. Operations Management - Data Analysis - Informatics

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.

Elective subject and key qualifications
A further 12 CP are flexible. In particular, this gives the possibility of professional deepening in preparation for the master thesis. At least 8 of the 12 credits have to come from the above-mentioned mathematical or economics modules or from a vocational internship. At least 3 credits must be provided by key qualifications.

Master Thesis
The master’s thesis is usually written in the fourth semester and has 30 credits. It can be supervised in both participating departments and should, as far as possible, deal with a topic relevant to content and methodology for economathematics. A prerequisite is an appropriate deepening in the subject field of the work.

3. Definition of the study profile
One of the three possible study profiles Financial Engineering or Operations Research or Classical Economic Mathematics is chosen in the Master’s degree in Economathematics. While the last profile offers maximum flexibility in assembling the modules, the two other study profiles are focused on the choice of modules from specific fields. The scope and content for the individual study profiles are specified below. In the field of Mathematics, the module names correspond to the course names, while in Economics and Management usually different courses can be combined into one module. The combinations are described in the module handbook.

Study Profile Financial Engineering
In the study profile Financial Engineering, courses from modern Stochastics and Analysis of the Department of Mathematics are combined with method-oriented courses from the financial services offered by the Department of Economics and Management. The special role of stochastics in this course is emphasized by the binding choice of 16 credits from this field from the list below. The compulsory 8 credits in Applied and Numerical Mathematics / Optimization or Analysis should also be taken from the list below. The following lists are also available for the 18 credits from the fields of Finance-Risk Management-Managerial Economics and Operations Management-Data Analysis-Informatics. Additional modules may be approved upon request to the "Prüfungsausschuss". For the remaining 12 credits from Mathematics, modules can be selected from the entire mathematical offer of the module handbook.

Stochastics (16 CP)
Applied and Numerical Mathematics / Optimization or Analysis (8 CP)
Finance - Risk Management - Managerial Economics (18 CP)

Operations Management - Data Analysis - Informatics (18 CP)

Study Profile Operations Research
In the profile Operations Research, courses of modern optimization and high-performance calculations from the Department of Mathematics are combined with method-oriented courses in Operations Research and Data Analysis from the Department of Economics and Management. The following modules are intended for compulsory 8 credits in Stochastics and / or Applied and Numerical Mathematics / Optimization or Analysis. The following lists are also available for the 18 credits from the fields of Finance-Risk Management-Managerial Economics and Operations Management-Data Analysis-Informatics.

Stochastics (16 CP)
Applied and Numerical Mathematics / Optimization or Analysis (8 CP)
Finance - Risk Management - Managerial Economics (18 CP)

Operations Management - Data Analysis - Informatics (18 CP)
<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Mathematics in Discrete Time</td>
<td>8 CP</td>
</tr>
<tr>
<td>Financial Mathematics in Continuous Time (Stochastics)</td>
<td>8 CP</td>
</tr>
<tr>
<td>Statistics</td>
<td>8 CP</td>
</tr>
<tr>
<td>Mathematical Statistics</td>
<td>4 CP</td>
</tr>
<tr>
<td>Asymptotic Stochastic</td>
<td>8 CP</td>
</tr>
<tr>
<td>Nonparametric Statistics</td>
<td>8 CP</td>
</tr>
<tr>
<td>Brownian Movement</td>
<td>4 CP</td>
</tr>
<tr>
<td>Generalized Regression Models</td>
<td>4 CP</td>
</tr>
<tr>
<td>Control of stochastic processes</td>
<td>4 CP</td>
</tr>
<tr>
<td>Time series analysis</td>
<td>4 CP</td>
</tr>
<tr>
<td>Financial Statistics</td>
<td>4 CP</td>
</tr>
<tr>
<td>Lévy Processes</td>
<td>4 CP</td>
</tr>
<tr>
<td>Optimization and optimal control for differential equations</td>
<td>4 CP</td>
</tr>
<tr>
<td>Numerical Methods for Differential Equations</td>
<td>8 CP</td>
</tr>
<tr>
<td>Control of stochastic processes</td>
<td>4 CP</td>
</tr>
<tr>
<td>Numerical Methods in Financial Mathematics</td>
<td>8 CP</td>
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<tr>
<td>Numerical Methods in Financial Mathematics II</td>
<td>8 CP</td>
</tr>
<tr>
<td>Functional analysis</td>
<td>8 CP</td>
</tr>
<tr>
<td>Stochastic differential equations</td>
<td>8 CP</td>
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<tr>
<td>Classical Methods for Partial Differential Equations</td>
<td>8 CP</td>
</tr>
<tr>
<td>Control theory</td>
<td>4 CP</td>
</tr>
<tr>
<td>Finance 1</td>
<td>9 CP</td>
</tr>
<tr>
<td>Finance 2</td>
<td>9 CP</td>
</tr>
<tr>
<td>Finance 3</td>
<td>9 CP</td>
</tr>
<tr>
<td>Insurance Management I</td>
<td>9 CP</td>
</tr>
<tr>
<td>Mathematical and Empirical Finance</td>
<td>9 CP</td>
</tr>
<tr>
<td>Economic theory and its application in Finance</td>
<td>9 CP</td>
</tr>
<tr>
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<tr>
<td>Stochastic modeling and optimization</td>
<td>9 CP</td>
</tr>
<tr>
<td>Energy industry and technology</td>
<td>9 CP</td>
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</table>
Additional modules may be approved upon request to the "Prüfungsausschuss". For the remaining 20 credits from Mathematics, modules can be chosen from the entire mathematical offer of the module handbook.

**Stochastics (8 CP)**

**Applied and Numerical Mathematics / Optimization or Analysis (8 CP)**

**Finance - Risk Management - Managerial Economics (18 CP)**

**Operations Management - Data Analysis - Informatics (18 CP)**

**Study profile Classical Economathematics**

In the study profile Classical Economathematics, the greatest flexibility exists in the choice of modules. Details of the offer can be found in the module handbook.

### 4. Module Overlaps and Duties

For certain modules, the content overlap is very large. Therefore, the following exclusion rules apply:

- If the module *Markov-Chains* is integrated from the bachelor's mathematics, none of the courses *Stochastic decision models I and II* in the modules *Stochastic Methods and Simulation* and *Stochastic Modeling and Optimization* can be selected.

- If the module *Numerical Optimization Methods* is integrated, none of the courses *Nonlinear Optimization I and II* can be selected in the modules *Methodical Principles of OR* and *Mathematical Optimization*.

- If the module *Game Theory* is integrated into the subject Mathematics, the course *Introduction to the game theory* within the modules *Decision and Game Theory*, *Mathematical Optimization*, *OR in Supply Chain Management* and *Stochastic Modeling and Optimization* may not be selected.

For the module *Energy Economy and Technology*, the assignment of the course *Energy System Analysis* is mandatory for the study program of Economathematics. For the module *Marketing Management*, the assignment of the courses *Product and Innovation Management* and *Market Research* is obligatory for the degree program in Economathematics.

### 5. 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:

**Basic skills (soft skills)**

1. Teamwork, social communication and creativity techniques (for example, working in small groups, working together on the homework and reworking the course material)

2. Presentation creation and techniques

3. Logical and systematic argumentation and writing (for example, in exercises, seminars, courses and writing homework)

4. Structured problem solving and communication
Statistics 8 CP
Mathematical Statistics 4 CP
Asymptotic Stochastic 8 CP
Nonparametric Statistics 8 CP
Brownian Movement 4 CP
Generalized Regression Models 4 CP
Percolation 4 CP
Control of stochastic processes 4 CP
Time series analysis 4 CP

Optimization and optimal control for differential equations 4 CP
Parallel Calculation 5 CP
Numerical optimization methods 8 CP
Control of stochastic processes 4 CP
Functional analysis 8 CP
Variations calculation 8 CP
Classical Methods for Partial Differential Equations 8 CP
Control theory 4 CP
Optimization in Banach spaces 8 CP
Game Theory 4 CP
Graph theory 8 CP
Modeling and numerical simulation in practice 4 CP

Finance 1 9 CP
Finance 2 9 CP
Finance 3 9 CP
Insurance Management I 9 CP
Mathematical and Empirical Finance 9 CP
Decision-making and game theory 9 CP
Innovation and Growth 9 CP
Growth and agglomeration 9 CP
Strategic Management and Organization 9 CP
Microeconomic Theory 9 CP

Informatics 9 CP
Methodical foundations of the OR 9 CP
Mathematical Optimization 9 CP
Applications of the OR 9 CP
OR in Supply Chain Management and Health Care Management 9 CP
Stochastic Methods Simulation 9 CP
Stochastic modeling and optimization 9 CP
Energy industry and technology 9 CP
Marketing Management 9 CP
Practice orientation (enabling skills)

1. Empowerment in a professional context
2. Competences in project management
3. Business basic knowledge
4. English as a technical language

Orientation knowledge

1. Mediation of interdisciplinary knowledge
2. Institutional knowledge about economic and legal systems
3. Knowledge about international organizations
4. Media, technology and innovation

In addition to the integrative placement of key qualifications, the additional acquisition of key qualifications with a minimum of 3 credit points is envisaged. 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.
Part III

Field structure

1 Master Thesis

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2 Mathematical Methods

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2.2 Analysis or Applied and Numerical Mathematics, Optimization

2.2.1 Analysis

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### 2.2.2 Applied and Numerical Mathematics, Optimization

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## 2.3 Elective Field Mathematical Methods

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M-MATH-102878 Complex Analysis (S. 55) 8 Christoph Schmoeger
M-MATH-102883 Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems (S. 57) 8 Michael Plum
M-MATH-102941 Control Theory (S. 59) 6 Roland Schnaubelt
M-MATH-103080 Dynamical Systems (S. 63) 8 Jens Rottmann-Matthes
M-MATH-102872 Evolution Equations (S. 64) 8 Roland Schnaubelt
M-MATH-102873 Fourier Analysis (S. 70) 8 Lutz Weis
M-MATH-101320 Functional Analysis (S. 71) 8 Roland Schnaubelt
M-MATH-102874 Integral Equations (S. 82) 8 Frank Hettlich
M-MATH-102890 Inverse Problems (S. 87) 8 Andreas Kirsch
M-MATH-102952 L2-Invariants (S. 88) 5 Holger Kammeyer
M-MATH-102881 Maxwell’s Equations (S. 95) 8 Andreas Kirsch
M-MATH-102924 Optimization in Banach Spaces (S. 111) 8 Andreas Kirsch
M-MATH-102879 Potential Theory (S. 114) 8 Andreas Kirsch
M-MATH-102926 Sobolev Spaces (S. 120) 5 Andreas Kirsch
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M-MATH-102942 Stochastic Evolution Equations (S. 129) 8 Lutz Weis
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### ADDITIONAL EXAMINATIONS

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<td>Stochastic Modelling and Optimization (S. 185)</td>
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Part IV

Modules

Module: The Riemann Zeta Function  [M-MATH-102960]

Responsibility: Fabian Januszewski
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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<td>The Riemann Zeta Function (S. 468)</td>
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**Module: Adaptive Finite Element Methods  [M-MATH-102900]**

**Responsibility:** Willy Dörfler  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization  
- Elective Field  
- Additional Examinations

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**Conditions**  
none
### Module: Advanced Inverse Problems: Nonlinearity and Banach Spaces

**[M-MATH-102955]**

**Responsibility:** Andreas Rieder  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
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**Conditions**

none
Module: Algebra  [M-MATH-101315]

Responsibility: Frank Herrlich
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
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Additional Examinations

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Conditions
None
Module: Algebraic Geometry  [M-MATH-101724]

Responsibility: Frank Herrlich  
Organisation: KIT-Fakultät für Mathematik  
Curricular Anchorage: Compulsory Elective  
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry  
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Additional Examinations

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

Responsibility: Claus-Günther Schmidt
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
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Additional Examinations

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

**Responsibility:** Roman Sauer  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry  
- Elective Field  
- Additional Examinations

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

Responsibility: Roman Sauer

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry

Elective Field

Additional Examinations

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Conditions

none
Module: Asymptotic Stochastics  [M-MATH-102902]

Responsibility: Norbert Henze

Organisation: KIT-Fakultät für Mathematik  Compulsory Elective

Curricular Anchorage:

- Compulsory Elective

Contained in:
- Mathematical Methods / Stochastics
- Mathematical Methods / Elective Field
- Mathematical Methods / Stochastics
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Conditions

none
# Module: Bifurcation Theory [M-MATH-103259]

**Responsibility:** Rainer Mandel  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis  
- Mathematical Methods / Elective Field Mathematical Methods / Analysis  
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- Additional Examinations

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**Conditions**  
None

**Remarks**  
Course is held in English
Module: Boundary and Eigenvalue Problems  [M-MATH-102871]

Responsibility: Wolfgang Reichel

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
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Module: Brownian Motion  [M-MATH-102904]

Responsibility: Nicole Bäuerle
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Stochastics
Mathematical Methods / Elective Field Mathematical Methods / Stochastics
Elective Field
Additional Examinations

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Conditions
none
Module: Calculus of Variations  [M-MATH-102882]

Responsibility: Wolfgang Reichel

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Analysis
Elective Field
Additional Examinations

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Compulsory

Andreas Kirsch, Tobias Lamm, Michael Plum, Wolfgang Reichel
Module: Classical Methods for Partial Differential Equations  [M-MATH-102870]

Responsibility: Michael Plum

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Elective Field Mathematical Methods / Analysis
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- Additional Examinations

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Module: Combinatorics  [M-MATH-102950]

Responsibility: Maria Aksenovich
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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Learning Control / Examinations
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).

Conditions
none

Qualification Objectives
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.

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.

Remarks
- Regular cycle: every 2nd year, summer semester
- Course is held in English

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
Module: Comparison Geometry  [M-MATH-102940]

Responsibility:  Wilderich Tuschmann

Organisation:  KIT-Fakultät für Mathematik

Curricular Anchorage:  Compulsory Elective

Contained in:  Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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Conditions

none
Module: Complex Analysis  [M-MATH-102878]

Responsibility: Christoph Schmoeger

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis Mathematical Methods / Elective Field Mathematical Methods / Analysis Elective Field Additional Examinations

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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

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<td>Gerd Herzog, Michael Plum, Wolfgang Reichel, Christoph Schmoeger, Roland Schnaubelt, Lutz Weis</td>
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Module: Compressive Sensing  [M-MATH-102935]

Responsibility: Andreas Rieder

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
Elective Field
Additional Examinations

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<td>T-MATH-105894</td>
<td>Compressive Sensing (S. 225)</td>
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Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18

Responsibility: Michael Plum
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis Mathematical Methods / Elective Field Mathematical Methods / Analysis Elective Field Additional Examinations

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<td>Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems (S. 231)</td>
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<td>Michael Plum</td>
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Module: Continuous Time Finance  [M-MATH-102860]

Responsibility: Nicole Bäuerle
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Stochastics
Mathematical Methods / Elective Field Mathematical Methods / Stochastics
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<td>Continuous Time Finance (S. 233)</td>
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## Module: Control Theory  [M-MATH-102941]

- **Responsibility:** Roland Schnaubelt
- **Organisation:** KIT-Fakultät für Mathematik
- **Curricular Anchorage:** Compulsory Elective
- **Contained in:**
  - Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
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### Conditions

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

Responsibility: Daniel Hug
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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<td>T-MATH-105831</td>
<td>Convex Geometry (S. 237)</td>
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Qualification Objectives
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: Differential Geometry  [M-MATH-101317]

Responsibility: Wilderich Tuschmann

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry

Elective Field

Additional Examinations

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<td>Differential Geometry (S. 247)</td>
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<td>Sebastian Grensing, Enrico Leuzinger, Wilderich Tuschmann</td>
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Conditions
None
Module: Discrete Time Finance  [M-MATH-102919]

Responsibility:  Nicole Bäuerle

Organisation:  KIT-Fakultät für Mathematik

Curricular Anchorage:  Compulsory Elective

Contained in:
- Mathematical Methods / Stochastics
- Mathematical Methods / Elective Field
- Mathematical Methods / Stochastics
- Elective Field
- Additional Examinations

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Compulsory

Identifier  Course  ECTS  Responsibility
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T-MATH-105839  Discrete Time Finance (S. 248)  8  Nicole Bäuerle, Vicky Fasen-Hartmann

Conditions
none
Module: Dynamical Systems [M-MATH-103080]

Responsibility: Jens Rottmann-Matthes

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Elective Field Mathematical Methods / Analysis
- Elective Field
- Additional Examinations

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<td>T-MATH-106114</td>
<td>Dynamical Systems (S. 252)</td>
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Conditions
none
Module: Evolution Equations  [M-MATH-102872]

Responsibility: Roland Schnaubelt
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Analysis
Elective Field
Additional Examinations

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<td>Evolution Equations (S. 263)</td>
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Module: Extremal Graph Theory [M-MATH-102957]

Responsibility: Maria Aksenovich

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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Compulsory

Identifier Course ECTS Responsibility
T-MATH-105931 Extremal Graph Theory (S. 266) 8 Maria Aksenovich

Learning Control / Examinations

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

Qualification Objectives

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, Erdös-Stone theorem, Szemerédi’s lemma, graph colorings and probabilistic techniques.

Recommendations

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

Remarks

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

**Responsibility:** Vicky Fasen-Hartmann  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Stochastics  
- Mathematical Methods / Elective Field  
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- Additional Examinations

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### Conditions

none
### Module: Finite Element Methods  [M-MATH-102891]

**Responsibility:** Willy Dörfler, Christian Wieners

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
- Elective Field
- Additional Examinations

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Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
Module: Finite group schemes  [M-MATH-103258]

**Responsibility:** Frank Herrlich, Fabian Januszewski

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
- Elective Field
- Additional Examinations

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<td>Finite group schemes (S. 274)</td>
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Module: Forecasting: Theory and Practice [M-MATH-102956]

Responsibility: Tilmann Gneiting
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Stochastics
Mathematical Methods / Elective Field Mathematical Methods / Stochastics
Elective Field
Additional Examinations

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Conditions
none

Remarks
- Regular cycle: every 2nd year, starting winter semester 16/17
- Course is held in English
Module: Fourier Analysis  [M-MATH-102873]

Responsibility: Lutz Weis

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis Mathematical Methods / Elective Field Mathematical Methods / Analysis Elective Field Additional Examinations

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<td>Fourier Analysis (S. 277)</td>
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<td>Roland Schnaubelt, Lutz Weis</td>
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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 R^n
- the Hilbert transform
- the interpolation theorem of Marcinkiewicz
- Singular integral operators
- the Fourier multiplier theorem of Mihlin
Module: Functional Analysis  [M-MATH-101320]

Responsibility: Roland Schnaubelt

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Analysis
Elective Field
Additional Examinations

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<td>Functional Analysis (S. 278)</td>
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<td>Gerd Herzog, Dirk Hundertmark, Tobias Lamm, Michael Plum, Wolfgang Reichel, Christoph Schmoeger, Roland Schnaubelt, Lutz Weis</td>
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Conditions

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

Responsibility: Volker Grimm

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
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<td>T-MATH-105906</td>
<td>Functions of Matrices (S. 279)</td>
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Conditions
- none
# Module: Functions of Operators  [M-MATH-102936]

**Responsibility:** Volker Grimm  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization  
- Elective Field  
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Module: Generalized Regression Models [M-MATH-102906]

Responsibility: Bernhard Klar

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Stochastics
 Mathematical Methods / Elective Field
 Mathematical Methods / Stochastics
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<td>T-MATH-105870</td>
<td>Generalized Regression Models (S. 281)</td>
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<td>Norbert Henze, Bernhard Klar</td>
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Conditions
none
Module: Geometric Group Theory  [M-MATH-102867]

Responsibility: Roman Sauer

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry

Elective Field

Additional Examinations

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<td>T-MATH-105842</td>
<td>Geometric Group Theory (S. 282)</td>
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<td>Frank Herrlich, Enrico Leuzinger, Gabriele Link, Roman Sauer, Petra Schwer, Wilderich Tuschmann</td>
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Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
## Module: Geometric Numerical Integration  [M-MATH-102921]

**Responsibility:** Tobias Jahnke

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:** Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
Elective Field
Additional Examinations

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**Conditions**

none
Module: Geometry of Schemes [M-MATH-102866]

Responsibility: Frank Herrlich

Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
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<td>Geometry of Schemes (S. 284)</td>
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Module: Global Differential Geometry  [M-MATH-102912]

Responsibility:  Wilderich Tuschmann

Organisation:  KIT-Fakultät für Mathematik

Curricular Anchorage:  Compulsory Elective

Contained in:  Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
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Additional Examinations

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

Responsibility: Maria Aksenovich

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry

Elective Field

Additional Examinations

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Compulsory

Identifier Course ECTS Responsibility

T-MATH-102273 Graph Theory (S. 291) 8 Maria Aksenovich

Learning Control / Examinations

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).

Conditions

None

Qualification Objectives

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.

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.

Remarks

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

Responsibility: Wilderich Tuschmann
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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<td>Group Actions in Riemannian Geometry (S. 293)</td>
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Conditions
none
Module: Homotopy Theory  [M-MATH-102959]

Responsibility: Roman Sauer
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
Elective Field
Additional Examinations

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Module: Integral Equations  [M-MATH-102874]

Responsibility: Frank Hettlich

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied
- Numerical Mathematics, Optimization
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- Additional Examinations

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Economathematics (M.Sc.)  
Module Handbook, Date 11/17/2017, Winter term 17/18
**Module: Introduction into Particulate Flows  [M-MATH-102943]**

**Responsibility:** Willy Dörfler

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
- Elective Field
- Additional Examinations

**ECTS**
- **Recurrence:** Once
- **Duration:** 1 term
- **Version:** 1

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**Conditions**
- none
**Module: Introduction to Geometric Measure Theory  [M-MATH-102949]**

**Responsibility:** Steffen Winter

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
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**Conditions**

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Module: Introduction to Matlab and Numerical Algorithms  [M-MATH-102945]

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**Conditions**

none
Module: Introduction to Scientific Computing [M-MATH-102889]

Responsibility: Willy Dörfler, Tobias Jahnke

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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Module Handbook, Date 11/17/2017, Winter term 17/18
Module: Inverse Problems  [M-MATH-102890]

Responsibility:  Andreas Kirsch

Organisation:  KIT-Fakultät für Mathematik

Curricular Anchorage:  Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied
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- Elective Field
- Additional Examinations

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<td>Andreas Kirsch, Andreas Rieder</td>
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**Module: L2-Invariants [M-MATH-102952]**

**Responsibility:** Holger Kammeyer

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry
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**Conditions**

none
Module: Markov Decision Processes [M-MATH-102907]

Responsibility: Nicole Bäuerle

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Stochastics
Mathematical Methods / Elective Field Mathematical Methods / Stochastics
Elective Field
Additional Examinations

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<td>Markov Decision Processes (S. 326)</td>
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Conditions
none
**Module: Master Thesis [M-MATH-102917]**

**Responsibility:** Sebastian Grensing  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory  
**Contained in:** Master Thesis

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Economathematics (M.Sc.)  
Module Handbook, Date 11/17/2017, Winter term 17/18
**Module: Mathematical Methods in Signal and Image Processing**

**[M-MATH-102897]**

**Responsibility:** Andreas Rieder

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
- Elective Field
- Additional Examinations

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

Responsibility: Andreas Rieder

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
Elective Field
Additional Examinations

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

**Responsibility:**  
Gudrun Thäter

**Organisation:**  
KIT-Fakultät für Mathematik

**Curricular Anchorage:**  
Compulsory Elective

**Contained in:**  
Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization  
Elective Field  
Additional Examinations

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Module: Mathematical Statistics  [M-MATH-102909]

Responsibility: Bernhard Klar

Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Stochastics
- Mathematical Methods / Elective Field Mathematical Methods / Stochastics
- Elective Field
- Additional Examinations

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<td>T-MATH-105872</td>
<td>Mathematical Statistics (§. 331)</td>
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<td>Norbert Henze, Bernhard Klar</td>
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Conditions
none
### Module: Maxwell’s Equations  [M-MATH-102885]

**Responsibility:** Andreas Kirsch  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
- Mathematical Methods / Elective Field Mathematical Methods / Analysis  
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- Elective Field  
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<td>T-MATH-105856</td>
<td>Maxwell’s Equations (S. 332)</td>
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Economathematics (M.Sc.)  
Module Handbook, Date 11/17/2017, Winter term 17/18
## Module: Medical Imaging  [M-MATH-102896]

**Responsibility:** Andreas Rieder  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:** Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
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Additional Examinations

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### Conditions

None

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Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
Module: Nonlinear Maxwell Equations  [M-MATH-103257]

Responsibility: Roland Schnaubelt

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Analysis
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Compulsory

Identifier Course ECTS Responsibility
T-MATH-10648 Nonlinear Maxwell Equations (S. 346) 3 Roland Schnaubelt

Conditions

none

Content

- Short introduction to nonlinear contraction semigroups in Hilbert spaces and to the spaces H(curl) and H(div).
- Semilinear case: Maxwell’s equations with linear material laws and nonlinear conductivity. Wellposedness by means of maximal monotone operators. Long-term behavior.
- 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: Nonparametric Statistics [M-MATH-102910]

**Responsibility:** Norbert Henze  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Stochastics  
- Mathematical Methods / Elective Field Mathematical Methods / Stochastics  
- Elective Field  
- Additional Examinations

### ECTS, Recurrence, Duration, Version

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<td>T-MATH-105873</td>
<td>Nonparametric Statistics (S. 353)</td>
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### Conditions

none
Module: Numerical Continuation Methods  [M-MATH-102944]

Responsibility: Jens Rottmann-Matthes
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
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Additional Examinations

ECTS  Recurrence  Duration  Version
5       Irregular   1 term   1

Compulsory

Identifier       Course                                      ECTS  Responsibility
T-MATH-105912   Numerical Continuation Methods (S. 354)   5    Jens Rottmann-Matthes

Conditions
none
Module: Numerical Methods for Differential Equations  [M-MATH-102888]

Responsibility: Willy Dörfler, Tobias Jahnke

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
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Compulsory

Identifier Course ECTS Responsibility
T-MATH-105836 Numerical Methods for Differential Equations (S. 355) 8 Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
# Module: Numerical Methods for Hyperbolic Equations  [M-MATH-102915]

**Responsibility:** Willy Dörfler  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:** Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
Mathematical Methods / Elective Field Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization  
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Additional Examinations

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**Conditions**

- None

**Qualification Objectives**

-
Module: Numerical Methods for Integral Equations  [M-MATH-102930]

Responsibility: Tilo Arens
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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**Module: Numerical Methods for Maxwell’s Equations [M-MATH-102931]**

**Responsibility:** Marlis Hochbruck, Tobias Jahnke  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
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Module: Numerical Methods for Time-Dependent Partial Differential Equations [M-MATH-102928]

Responsibility: Marlis Hochbruck
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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Module: Numerical Methods in Computational Electrodynamics
[M-MATH-102894]

Responsibility: Willy Dörfler

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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Conditions
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Module: Numerical Methods in Fluid Mechanics  [M-MATH-102932]

Responsibility: Willy Dörfler, Gudrun Thäter

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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<td>Numerical Methods in Fluid Mechanics (S. 361)</td>
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Module: Numerical Methods in Mathematical Finance  [M-MATH-102901]

Responsibility: Tobias Jahnke
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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Conditions
none
Module: Numerical Methods in Mathematical Finance II  [M-MATH-102914]

Responsibility: Tobias Jahnke

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
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Conditions
none
Module: Numerical Optimisation Methods  [M-MATH-102892]

**Responsibility:** Christian Wieners

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization
- Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
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</table>
# Module: Optimisation and Optimal Control for Differential Equations

**[M-MATH-102899]**

**Responsibility:** Christian Wieners  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchor:** Compulsory Elective  
**Contained in:** Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization  
Elective Field  
**Additional Examinations**

![Table of ECTS, Recurrence, Duration, and Version](image)

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**Conditions**  
none
Module: Optimization in Banach Spaces  [M-MATH-102924]

Responsibility: Andreas Kirsch

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied
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Additional Examinations

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Conditions

- none
Module: Percolation  [M-MATH-102905]

Responsibility: Günter Last

Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Stochastics
- Mathematical Methods / Elective Field Mathematical Methods / Stochastics
- Elective Field
- Additional Examinations

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Conditions
none

Qualification Objectives
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.
Module: Poisson Processes  [M-MATH-102922]

**Responsibility:** Günter Last

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:** Mathematical Methods / Stochastics

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**Learning Control / Examinations**

oral exam

**Module Grade**

Marking: grade of exam

**Conditions**
none

**Qualification Objectives**

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.

**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]

Responsibility: Andreas Kirsch
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in:
Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied
Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization
Mathematical Methods / Elective Field Mathematical Methods / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization
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<td>Potential Theory (S. 380)</td>
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<td>Tilo Arens, Frank Hettlich, Andreas Kirsch, Wolfgang Reichel</td>
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Responsibility: Daniel Hug

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Stochastics
Mathematical Methods / Elective Field Mathematical Methods / Stochastics
Elective Field
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Conditions

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

**Responsibility:**  Gudrun Thäter

**Organisation:**  KIT-Fakultät für Mathematik

**Curricular Anchorage:**  Compulsory Elective

**Contained in:**  Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization

Mathematical Methods / Elective Field Mathematical Methods / Applied and Numerical Mathematics, Optimization

Elective Field

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### Conditions

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Module: Random Graphs  [M-MATH-102951]

Responsibility: Matthias Schulte

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Stochastics
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Module: Rational Homotopy Theory  [M-MATH-103256]

Responsibility: Manuel Amann, Roman Sauer

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Elective Field Mathematical Methods / Algebra and Geometry

Elective Field

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Conditions

none
# Module: Seminar [M-MATH-102730]

**Responsibility:** Stefan Kühnlein  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory  
**Contained in:** Mathematical Seminar

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Module: Sobolev Spaces [M-MATH-102926]

Responsibility: Andreas Kirsch
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in:
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Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
## Module: Spatial Stochastics  [M-MATH-102903]

**Responsibility:** Günter Last

**Organisation:** KIT-Fakultät für Mathematik

**Curricular Anchorage:** Compulsory Elective

**Contained in:**
- Mathematical Methods / Stochastics
- Mathematical Methods / Elective Field
- Mathematical Methods / Stochastics Elective Field
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### Conditions

none

### Qualification Objectives

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.

### Content

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

### Recommendations

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

Responsibility: Andreas Kirsch
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective

Contained in:
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
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Conditions
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**Module: Special Topics of Numerical Linear Algebra  [M-MATH-102920]**

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**Conditions**

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

Responsibility: Lutz Weis
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
Mathematical Methods / Elective Field Mathematical Methods / Analysis
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Additional Examinations

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Compulsory

Identifier Course ECTS Responsibility
T-MATH-103414 Spectral Theory - Exam (S. 452) 8 Gerd Herzog, Peer Kunstmann, Christoph Schmoeger, Roland Schnaubelt, Lutz Weis

Recommendations
It is recommended to attend the module ‘Functional Analysis’ previously.
# Module: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature

**[M-MATH-102958]**

**Responsibility:** Wilderich Tuschmann  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
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### Module: Stein’s Method  [M-MATH-102946]

**Responsibility:** Matthias Schulte  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
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**Conditions**

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

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**Conditions**

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

Responsibility: Lutz Weis

Organisation: KIT-Fakultät für Mathematik

Curricular Anchorage: Compulsory Elective

Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis Mathematical Methods / Elective Field Mathematical Methods / Analysis Elective Field Additional Examinations

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Compulsory

Identifier Course ECTS Responsibility
T-MATH-105852 Stochastic Differential Equations (S. 458) 8 Roland Schnaubelt, Lutz Weis

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
### Module: Stochastic Evolution Equations  [M-MATH-102942]

**Responsibility:** Lutz Weis  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective

**Contained in:**  
- Mathematical Methods / Stochastics  
- Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis  
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**Conditions**  
none
**Module**: Stochastic Geometry  [M-MATH-102865]

**Responsibility**: Daniel Hug

**Organisation**: KIT-Fakultät für Mathematik

**Curricular Anchorage**: Compulsory Elective

**Contained in**:
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**Qualification Objectives**

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

**Recommendations**

It is recommended to attend the module ‘Spatial Stochastics’ previously.
# Module: Time Series Analysis  [M-MATH-102911]

**Responsibility:** Bernhard Klar  
**Organisation:** KIT-Fakultät für Mathematik  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:**  
- Mathematical Methods / Stochastics  
- Mathematical Methods / Elective Field  
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**Conditions**

none
Module: Traveling Waves [M-MATH-102927]

Responsibility: Jens Rottmann-Matthes
Organisation: KIT-Fakultät für Mathematik
Curricular Anchorage: Compulsory Elective
Contained in: Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Analysis
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Module: Wavelets  [M-MATH-102895]

**Responsibility:**  Andreas Rieder  
**Organisation:**  KIT-Fakultät für Mathematik  
**Curricular Anchorage:**  Compulsory Elective  
**Contained in:**  Mathematical Methods / Analysis or Applied and Numerical Mathematics, Optimization / Applied and Numerical Mathematics, Optimization  
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<th>ECTS</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>T-MATH-105838</td>
<td>Wavelets (S. 475)</td>
<td>8</td>
<td>Andreas Rieder</td>
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</tbody>
</table>

**Conditions**

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

Responsibility: Hagen Lindstädt

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

<table>
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<tr>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<tbody>
<tr>
<td>T-WIWI-106188</td>
<td>Workshop Current Topics in Strategy and Management (S. 480)</td>
<td>3</td>
<td>Hagen Lindstädt</td>
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<tr>
<td>T-WIWI-106189</td>
<td>Workshop Business Wargaming – Analyzing Strategic Interactions (S. 479)</td>
<td>3</td>
<td>Hagen Lindstädt</td>
</tr>
<tr>
<td>T-WIWI-106190</td>
<td>Strategy and Management Theory: Developments and “Classics” (S. 463)</td>
<td>3</td>
<td>Hagen Lindstädt</td>
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</table>

Learning Control / Examinations
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.

Conditions
None

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

Content
The module is divided into three main topics:
The students
- analyze and discuss a wide range of business strategies on the basis of collectively selected case studies.
- participate in a business wargaming workshop and analyze strategic interactions.
- write a paper about current topics in the field of strategic management theory.

Recommendations
None
Remarks
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.

This module will be offered for the first time in the winter term 2017/18.
Module: Analytics and Statistics  [M-WIWI-101637]

Responsibility:  Oliver Grothe
Organisation:  KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage:  Compulsory Elective
Contained in:  Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

<table>
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Compulsory

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<tbody>
<tr>
<td>T-WIWI-103123</td>
<td>Advanced Statistics (S. 196)</td>
<td>4,5</td>
<td>Oliver Grothe</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose between 4,5 and 5 credits.

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<th>Identifier</th>
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<th>Responsibility</th>
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<tbody>
<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods (S. 343)</td>
<td>4,5</td>
<td>Oliver Grothe</td>
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</table>

Learning Control / Examinations
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.

Conditions
The course "Advanced Statistics" is compulsory.

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

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

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

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

Responsibility: Stefan Nickel
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics
Elective Field
Additional Examinations

ECTS 9  Recurrence Each term  Duration 1 term  Version 6

Wahlpflichtangebot
Non-Compulsory Block; You must choose between 1 und 2 courses.

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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management (S. 268)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management (S. 466)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose at most 1 courses.

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<th>Course</th>
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<tbody>
<tr>
<td>T-WIWI-102726</td>
<td>Global optimization I (S. 286)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-106199</td>
<td>Modeling and OR-Software: Introduction (S. 340)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-106545</td>
<td>Optimization under uncertainty (S. 372)</td>
<td>5</td>
<td>Steffen Rebennack</td>
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</table>

Learning Control / Examinations
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.

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

Qualification Objectives
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.

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.

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

**Remarks**
The examination Simulation I will be offered latest until winter term 2016/2017 (for beginners). The planned lectures and courses for the next three years are announced online.
Module: Collective Decision Making [M-WIWI-101504]

Responsibility: Clemens Puppe

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

Additional Examinations

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Compulsory

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<td>Public Management (S. 387)</td>
<td>4,5</td>
<td>Berthold Wigger</td>
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<tr>
<td>T-WIWI-102859</td>
<td>Social Choice Theory (S. 441)</td>
<td>4,5</td>
<td>Clemens Puppe</td>
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Learning Control / Examinations

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.

Conditions

None

Qualification Objectives

Students

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

Content

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

Workload

The total workload for this module is approximately 270 hours. For further information see German version.
Module: Decision and Game Theory  [M-WIWI-102970]

Responsibility: Clemens Puppe
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

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<td>T-WIWI-102614</td>
<td>Experimental Economics (S. 265)</td>
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<td>Advanced Game Theory (S. 191)</td>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

Learning Control / Examinations
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.

Conditions
None

Qualification Objectives
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.

Content
See German version.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Disruptive FinTech Innovations  [M-WIWI-103261]

Responsibility: Maxim Ulrich
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Finance - Risk Management - Managerial Economics
Elective Field

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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<td>Engineering FinTech Solutions (S. 261)</td>
<td>4.5</td>
<td>Maxim Ulrich</td>
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<tr>
<td>T-WIWI-106496</td>
<td>Computational FinTech with Python and C++ (S. 228)</td>
<td>1.5</td>
<td>Maxim Ulrich</td>
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<tr>
<td>T-WIWI-106495</td>
<td>Automated Financial Advisory (S. 209)</td>
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<td>Maxim Ulrich</td>
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Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
Students with a strong technological background and/or a strong interest for software development and investments will learn how to build a prototype that automates essential steps for a fully automated investment and risk management process. Students also learn to organize themselves efficiently in teams of several developers in order to complete a prototype in a limited amount of time. Moreover, students deepen their understanding of finance and technology and learn how to combine both in an effective way. Students will hence be well prepared to become leaders and pioneers for upcoming FinTech innovations (and beyond) to help society to better invest for the future and to better protect from adverse risks.

Content
See respective lecture

Recommendations
None

Remarks
See respective lecture

Workload
The total workload for this module is approximately 270 hours. For further information, see respective lecture.
Module: Econometrics and Statistics I [M-WIWI-101638]

Responsibility: Melanie Schienle
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

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Compulsory

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<tr>
<td>T-WIWI-103125</td>
<td>Applied Econometrics (S. 204)</td>
<td>4,5</td>
<td>Melanie Schienle</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose between 4,5 and 5 credits.

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<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications (S. 242)</td>
<td>4,5</td>
<td>Rheza Nakhaeizadeh</td>
</tr>
<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics (S. 271)</td>
<td>4,5</td>
<td>Melanie Schienle</td>
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<tr>
<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics (S. 345)</td>
<td>4,5</td>
<td>Melanie Schienle</td>
</tr>
<tr>
<td>T-WIWI-103127</td>
<td>Panel Data (S. 375)</td>
<td>4,5</td>
<td>Wolf-Dieter Heller</td>
</tr>
<tr>
<td>T-WIWI-103065</td>
<td>Statistical Modeling of generalized regression models (S. 453)</td>
<td>4,5</td>
<td>Wolf-Dieter Heller</td>
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</table>

Learning Control / Examinations
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.

Conditions
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 be passed.

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

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

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

Responsibility: Melanie Schienle

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field Additional Examinations

<table>
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Wahlpflichtangebot

Non-Compulsory Block; You must choose between 9 and 10 credits.

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<tr>
<td>T-WIWI-103066</td>
<td>Data Mining and Applications (S. 242)</td>
<td>4,5</td>
<td>Rheza Nakhaeizadeh</td>
</tr>
<tr>
<td>T-WIWI-103064</td>
<td>Financial Econometrics (S. 271)</td>
<td>4,5</td>
<td>Melanie Schienle</td>
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<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods (S. 343)</td>
<td>4,5</td>
<td>Oliver Grothe</td>
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<tr>
<td>T-WIWI-103126</td>
<td>Non- and Semiparametrics (S. 345)</td>
<td>4,5</td>
<td>Melanie Schienle</td>
</tr>
<tr>
<td>T-WIWI-103127</td>
<td>Panel Data (S. 375)</td>
<td>4,5</td>
<td>Wolf-Dieter Heller</td>
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<tr>
<td>T-WIWI-103128</td>
<td>Portfolio and Asset Liability Management (S. 379)</td>
<td>4,5</td>
<td>Mher Safarian</td>
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<td>T-WIWI-103065</td>
<td>Statistical Modeling of generalized regression models (S. 453)</td>
<td>4,5</td>
<td>Wolf-Dieter Heller</td>
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<tr>
<td>T-WIWI-103129</td>
<td>Stochastic Calculus and Finance (S. 455)</td>
<td>4,5</td>
<td>Mher Safarian</td>
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Learning Control / Examinations

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.

Conditions

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.

Modeled Conditions

The following conditions must be met:

- The module [M-WIWI-101638] Econometrics and Statistics I must have been started.

Qualification Objectives

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

Content

This 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.

Economathematics (M.Sc.)

Module Handbook, Date 11/17/2017, Winter term 17/18
Workload
The total workload for this module is approximately 270 hours.
Module: Economic Theory and its Application in Finance  [M-WIWI-101502]

Responsibility: Kay Mitusch

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

Additional Examinations

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**Ergänzungsangebot**
Non-Compulsory Block; You must choose 1 courses.

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<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy (S. 238)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
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<tr>
<td>T-WIWI-102623</td>
<td>Financial Intermediation (S. 272)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
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<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing (S. 206)</td>
<td>4,5</td>
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**Wahlpflichtangebot**
Non-Compulsory Block; You must choose 1 courses.

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<th>Course</th>
<th>ECTS</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory (S. 198)</td>
<td>4,5</td>
<td>Kay Mitusch</td>
</tr>
<tr>
<td>T-WIWI-102861</td>
<td>Advanced Game Theory (S. 191)</td>
<td>4,5</td>
<td>Karl-Martin Ehrhart, Clemens Puppe, Johannes Philipp Reiß</td>
</tr>
</tbody>
</table>

**Learning Control / Examinations**
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.

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

**Qualification Objectives**
The students

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

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

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

Responsibility: Christof Weinhardt
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Finance - Risk Management - Managerial Economics
Elective Field

<table>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose at least 9 credits.

<table>
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<tbody>
<tr>
<td>T-WIWI-107501</td>
<td>Energy Market Engineering (S. 257)</td>
<td>4,5</td>
<td>Christof Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-107503</td>
<td>Energy Networks and Regulation (S. 259)</td>
<td>4,5</td>
<td>Christof Weinhardt</td>
</tr>
<tr>
<td>T-WIWI-107504</td>
<td>Smart Grid Applications (S. 439)</td>
<td>4,5</td>
<td>Johannes Gärttner, Christof Weinhardt</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
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.

Conditions
None.

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

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

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

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

Responsibility: Wolf Fichtner
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics
Elective Field Additional Examinations

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Wahlpflichtangebot
Non-Compulsory Block; You must choose at least 9 credits.

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<tr>
<td>T-WIWI-102793</td>
<td>Efficient Energy Systems and Electric Mobility (S. 253)</td>
<td>3,5</td>
<td>Patrick Jochem, Russell McKenna</td>
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<tr>
<td>T-WIWI-102650</td>
<td>Energy and Environment (S. 256)</td>
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<td>Ute Karl</td>
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<tr>
<td>T-WIWI-102830</td>
<td>Energy Systems Analysis (S. 260)</td>
<td>3</td>
<td>Valentin Bertsch</td>
</tr>
<tr>
<td>T-WIWI-107464</td>
<td>Smart Energy Infrastructure (S. 438)</td>
<td>3</td>
<td>Armin Ardone, Andrej Marko Pustisek</td>
</tr>
<tr>
<td>T-WIWI-102694</td>
<td>Technological Change in Energy Economics (S. 467)</td>
<td>3</td>
<td>Martin Wietschel</td>
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<tr>
<td>T-WIWI-102695</td>
<td>Heat Economy (S. 294)</td>
<td>3</td>
<td>Wolf Fichtner</td>
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</table>

Learning Control / Examinations
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. Additional courses might be accredited upon request.

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

Qualification Objectives
The student

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

Content
Strategical Aspects of Energy Economy: Long-term planning methods, generation technologies
Technological Change in Energy Economics: Future energy technologies, learning curves, energy demand
Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
Energy and Environment: emission factors, emission reduction measures, environmental impact
Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Experimental Economics  [M-WIWI-101505]

Responsibility:  Johannes Philipp Reiß
Organization:  KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage:  Compulsory Elective
Contained in:  Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

ECTS 9  Language  German  Version 3

Wahlpflichtangebot
Non-Compulsory Block; You must choose 2 courses.

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<tr>
<td>T-WIWI-102862</td>
<td>Predictive Mechanism and Market Design (S. 382)</td>
<td>4,5</td>
<td>Johannes Philipp Reiß</td>
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<tr>
<td>T-WIWI-102863</td>
<td>Topics in Experimental Economics (S. 472)</td>
<td>4,5</td>
<td>Johannes Philipp Reiß</td>
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<tr>
<td>T-WIWI-105781</td>
<td>Incentives in Organizations (S. 296)</td>
<td>4,5</td>
<td>Petra Nieken</td>
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<tr>
<td>T-WIWI-102614</td>
<td>Experimental Economics (S. 265)</td>
<td>4,5</td>
<td>Timm Teubner, Christof Weinhardt</td>
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</table>

Learning Control / Examinations
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.

Conditions
None.

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

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

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

Remarks
- The course Advanced Game Theory is not offered before Winter 2014/15.
- The course Predictive Mechanism and Market Design is not offered each year.
Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Finance 1  [M-WIWI-101482]

Responsibility: Martin Ruckes, Marliese Uhrig-Homburg

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

Additional Examinations

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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<tr>
<td>T-WIWI-102643</td>
<td>Derivatives (S. 246)</td>
<td>4,5</td>
<td>Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102621</td>
<td>Valuation (S. 474)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
</tr>
<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing (S. 206)</td>
<td>4,5</td>
<td>Martin Ruckes, Marliese Uhrig-Homburg</td>
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</tbody>
</table>

Learning Control / Examinations
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.

Conditions
None

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

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

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

**Responsibility:** Martin Ruckes, Marliese Uhrig-Homburg

**Organisation:** KIT-Fakultät für Wirtschaftswissenschaften

**Curricular Anchorage:** Compulsory Elective

**Contained in:** Finance - Risk Management - Managerial Economics

**Elective Field**

**Additional Examinations**

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**Wahlpflichtangebot**
Non-Compulsory Block; You must choose 9 credits.

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<tr>
<td>T-WIWI-102644</td>
<td>Fixed Income Securities (S. 275)</td>
<td>4,5</td>
<td>Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102622</td>
<td>Corporate Financial Policy (S. 238)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
</tr>
<tr>
<td>T-WIWI-102645</td>
<td>Credit Risk (S. 239)</td>
<td>4,5</td>
<td>Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102647</td>
<td>Asset Pricing (S. 206)</td>
<td>4,5</td>
<td>Martin Ruckes, Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102621</td>
<td>Valuation (S. 474)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
</tr>
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<td>T-WIWI-102643</td>
<td>Derivatives (S. 246)</td>
<td>4,5</td>
<td>Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102646</td>
<td>International Finance (S. 306)</td>
<td>3</td>
<td>Marliese Uhrig-Homburg</td>
</tr>
<tr>
<td>T-WIWI-102626</td>
<td>Business Strategies of Banks (S. 217)</td>
<td>3</td>
<td>Wolfgang Müller</td>
</tr>
<tr>
<td>T-WIWI-102625</td>
<td>Exchanges (S. 264)</td>
<td>1,5</td>
<td>Jörg Franke</td>
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<tr>
<td>T-WIWI-102623</td>
<td>Financial Intermediation (S. 272)</td>
<td>4,5</td>
<td>Martin Ruckes</td>
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<tr>
<td>T-WIWI-102600</td>
<td>eFinance: Information Engineering and Management for Securities Trading (S. 254)</td>
<td>4,5</td>
<td>Christof Weinhardt</td>
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<tr>
<td>T-WIWI-102900</td>
<td>Financial Analysis (S. 270)</td>
<td>4,5</td>
<td>Torsten Luedecke</td>
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**Learning Control / Examinations**

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.

**Conditions**

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.

**Modeled Conditions**

The following conditions must be met:

- The module [M-WIWI-101482] Finance 1 must have been started.

**Qualification Objectives**

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

**Content**

The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.
Remarks
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.
Module: Finance 3 [M-WIWI-101480]

Responsibility: Martin Ruckes, Marliese Uhrig-Homburg

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

ECTS Recurrence Duration Version
9 Each term 1 term 2

Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<td>Credit Risk (S. 239)</td>
<td>4,5</td>
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<td>International Finance (S. 306)</td>
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<td>Marliese Uhrig-Homburg</td>
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<td>Christof Weinhardt</td>
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<td>Financial Analysis (S. 270)</td>
<td>4,5</td>
<td>Torsten Luedeecke</td>
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Learning Control / Examinations
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.

Conditions
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.

Modeled Conditions
The following conditions must be met:

1. The module [M-WIWI-101482] Finance 1 must have been started.
2. The module [M-WIWI-101483] Finance 2 must have been started.

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

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

Remarks
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.
Module: Growth and Agglomeration  [M-WIWI-101496]

Responsibility: Ingrid Ott

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<tr>
<td>T-WIWI-102785</td>
<td>Theory of Endogenous Growth (S. 469)</td>
<td>4.5</td>
<td>Ingrid Ott</td>
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<td>T-WIWI-103107</td>
<td>Spatial Economics (S. 444)</td>
<td>4.5</td>
<td>Ingrid Ott</td>
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Learning Control / Examinations
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.

Conditions
None

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

Content
The module includes the contents of the lectures Endogenous Growth Theory [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.

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
## Module: Informatics  [M-WIWI-101472]

**Responsibility:**  Andreas Oberweis, Harald Sack, York Sure-Vetter, Johann Marius Zöllner

**Organisation:**  KIT-Fakultät für Wirtschaftswissenschaften

**Curricular Anchorage:**  Compulsory Elective

**Contained in:**  Operations Management - Data Analysis - Informatics

### Elective Field

- Additional Examinations

### Additional Information

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**Wahlpflichtangebot**

Non-Compulsory Block; You must choose between 9 and 10 credits.

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<tr>
<td>T-WIWI-102759</td>
<td>Requirements Analysis and Requirements Management (S. 392)</td>
<td>4</td>
<td>Ralf Kneuper</td>
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<tr>
<td>T-WIWI-102651</td>
<td>Applied Informatics II - IT Systems for eCommerce (S. 205)</td>
<td>5</td>
<td>York Sure-Vetter</td>
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<tr>
<td>T-WIWI-102680</td>
<td>Computational Economics (S. 226)</td>
<td>5</td>
<td>Pradyumn Kumar Shukla</td>
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<td>T-WIWI-102661</td>
<td>Database Systems and XML (S. 244)</td>
<td>5</td>
<td>Andreas Oberweis</td>
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<tr>
<td>T-WIWI-102663</td>
<td>Document Management and Groupware Systems (S. 251)</td>
<td>4</td>
<td>Stefan Klink</td>
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<td>T-WIWI-102668</td>
<td>Enterprise Architecture Management (S. 262)</td>
<td>5</td>
<td>Thomas Wolf</td>
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<td>T-WIWI-106423</td>
<td>Information Service Engineering (S. 298)</td>
<td>5</td>
<td>Harald Sack</td>
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<td>T-WIWI-102666</td>
<td>Knowledge Discovery (S. 313)</td>
<td>5</td>
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<td>T-WIWI-106340</td>
<td>Machine Learning 1 - Basic Methods (S. 316)</td>
<td>5</td>
<td>Roland Schätzle</td>
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<tr>
<td>T-WIWI-106341</td>
<td>Machine Learning 2 – Advanced Methods (S. 317)</td>
<td>5</td>
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<tr>
<td>T-WIWI-102697</td>
<td>Business Process Modelling (S. 215)</td>
<td>5</td>
<td>Andreas Oberweis</td>
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<td>T-WIWI-102679</td>
<td>Nature-Inspired Optimisation Methods (S. 344)</td>
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<tr>
<td>T-WIWI-102874</td>
<td>Semantic Web Technologies (S. 394)</td>
<td>5</td>
<td>Andreas Harth, York Sure-Vetter</td>
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<tr>
<td>T-WIWI-105801</td>
<td>Service Oriented Computing (S. 434)</td>
<td>5</td>
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<tr>
<td>T-WIWI-102895</td>
<td>Software Quality Management (S. 442)</td>
<td>5</td>
<td>Andreas Oberweis</td>
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<tr>
<td>T-WIWI-102676</td>
<td>Special Topics of Enterprise Information Systems (S. 448)</td>
<td>5</td>
<td>Andreas Oberweis</td>
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<tr>
<td>T-WIWI-102657</td>
<td>Special Topics of Efficient Algorithms (S. 447)</td>
<td>5</td>
<td>Hartmut Schmeck</td>
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<tr>
<td>T-WIWI-102678</td>
<td>Special Topics of Software- and Systemsengineering (S. 451)</td>
<td>5</td>
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<tr>
<td>T-WIWI-102671</td>
<td>Special Topics of Knowledge Management (S. 449)</td>
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<tr>
<td>T-WIWI-102669</td>
<td>Strategic Management of Information Technology (S. 462)</td>
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<td>Thomas Wolf</td>
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<tr>
<td>T-WIWI-103112</td>
<td>Web Science (S. 476)</td>
<td>5</td>
<td>York Sure-Vetter</td>
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<tr>
<td>T-WIWI-102662</td>
<td>Workflow-Management (S. 477)</td>
<td>5</td>
<td>Andreas Oberweis</td>
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<tr>
<td>T-WIWI-103523</td>
<td>Advanced Lab Informatics (S. 193)</td>
<td>4</td>
<td>Andreas Oberweis, Harald Sack, York Sure-Vetter, Johann Marius Zöllner</td>
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</tbody>
</table>
Learning Control / Examinations
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:

Conditions
It is only allowed to choose one lab.

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

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

Remarks
The course “Document Management and Groupware Systems” expires after summer term 2017. Last examination date is winter term 2017/2018 (only for repeaters).

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Innovation and growth  [M-WIWI-101478]

Responsibility: Ingrid Ott

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

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<th>ECTS</th>
<th>Recurrence</th>
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<th>Version</th>
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<tr>
<td>9</td>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose between 9 and 10 credits.

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<th>Identifier</th>
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<tbody>
<tr>
<td>T-WIWI-102840</td>
<td>Innovationtheory and -Policy (S. 300)</td>
<td>4,5</td>
<td>Ingrid Ott</td>
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<tr>
<td>T-WIWI-102785</td>
<td>Theory of Endogenous Growth (S. 469)</td>
<td>4,5</td>
<td>Ingrid Ott</td>
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Learning Control / Examinations
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.

Conditions
None

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

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

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
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.
Module: Insurance Management I  [M-WIWI-101469]

Responsibility: Ute Werner
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Finance - Risk Management - Managerial Economics
Elective Field
Additional Examinations

<table>
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<td>9</td>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

<table>
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<tr>
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<th>ECTS</th>
<th>Responsibility</th>
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<tbody>
<tr>
<td>T-WIWI-102603</td>
<td>Principles of Insurance Management (S. 383)</td>
<td>4,5</td>
<td>Ute Werner</td>
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<tr>
<td>T-WIWI-102601</td>
<td>Insurance Marketing (S. 302)</td>
<td>4,5</td>
<td>Edmund Schwake</td>
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<tr>
<td>T-WIWI-102648</td>
<td>Insurance Production (S. 303)</td>
<td>4,5</td>
<td>Ute Werner</td>
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<tr>
<td>T-WIWI-102637</td>
<td>Current Issues in the Insurance Industry (S. 241)</td>
<td>2</td>
<td>Wolf-Rüdiger Heilmann</td>
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<tr>
<td>T-WIWI-102636</td>
<td>Insurance Risk Management (S. 304)</td>
<td>2,5</td>
<td>Harald Maser</td>
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<tr>
<td>T-WIWI-102797</td>
<td>P&amp;C Insurance Simulation Game (S. 374)</td>
<td>3</td>
<td>Ute Werner</td>
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<tr>
<td>T-WIWI-102649</td>
<td>Risk Communication (S. 393)</td>
<td>4,5</td>
<td>Ute Werner</td>
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<tr>
<td>T-WIWI-102841</td>
<td>Modelling, Measuring and Managing of Extreme Risks (S. 341)</td>
<td>2,5</td>
<td>Ute Werner</td>
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</table>

Learning Control / Examinations
From 01.10.2017 (winter term 2017/2018) the module is no longer available.
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None

Qualification Objectives
See German version.

Content
See German version.

Remarks
Please note:
- T-WIWI-102636 Insurance Risk Management will be offered as a seminar starting summer term 2017.
- T-WIWI-102797 P+C Insurance Simulation Game will not be offered anymore from winter term 2016/2017 on;
- T-WIWI-102603 Principles of Insurance Management will be offered latest until summer term 2017 (beginners only);
- T-WIWI-102648 Insurance Production will be offered latest until summer term 2017 (beginners only);
- T-WIWI-102636 Insurance Risk Management will be offered latest until summer term 2017 (beginners only);
- T-WIWI-102649 Risk Communication will be offered latest until winter term 2017/2018 (beginners only);
- T-WIWI-102841 Modelling, Measuring and Managing of Extreme Risks will be offered latest until summer term 2017 (beginners only).
Workload
See German version.
Module: Intelligent Risk and Investment Advisory [M-WIWI-103247]

Responsibility: Maxim Ulrich

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

<table>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<tr>
<td>T-WIWI-106442</td>
<td>Building Intelligent and Robo-Advised Portfolios (S. 213)</td>
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<td>Maxim Ulrich</td>
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<tr>
<td>T-WIWI-107032</td>
<td>Computational Risk and Asset Management I (S. 229)</td>
<td>4.5</td>
<td>Maxim Ulrich</td>
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<tr>
<td>T-WIWI-106494</td>
<td>Computational Risk and Asset Management II (S. 230)</td>
<td>4.5</td>
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<tr>
<td>T-WIWI-106193</td>
<td>Engineering FinTech Solutions (S. 261)</td>
<td>4.5</td>
<td>Maxim Ulrich</td>
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</table>

Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
Students obtain a practical and yet research oriented introduction into the field of quantitative and computational risk and investment management. Students learn how to use concepts from computer science, statistics, OR and economics to build intelligent risk and investment systems. Based on personal preferences, students can specialize within the module on either more practical programming and statistical learning points or more on the economic and mathematical insights and intuition.

After successful completion of the module, students know the industry intuition as well as state-of-the-art academic ‘financial engineering’ methods necessary to successfully contribute to sustainable and value oriented innovations in the field of intelligent risk and investment advisory.

Content
See respective lecture

Recommendations
None

Remarks
See respective lecture

Workload
The total workload for this module is approximately 270 hours. For further information, see respective lecture.
Module: Marketing Management  [M-WIWI-101490]

Responsibility: Martin Klarmann
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics
Elective Field
Additional Examinations

ECTS  Recurrence  Duration  Version
9       Each summer term  1 term  5

Wahlpflichtangebot
Non-Compulsory Block; You must choose at least 1 courses and at least 9 credits.

<table>
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<th>Course</th>
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<tbody>
<tr>
<td>T-WIWI-106569</td>
<td>Consumer Behavior (S. 232)</td>
<td>3</td>
<td>Sven Feurer</td>
</tr>
<tr>
<td>T-WIWI-102902</td>
<td>Marketing Communication (S. 322)</td>
<td>4,5</td>
<td>Ju-Young Kim</td>
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<tr>
<td>T-WIWI-107720</td>
<td>Market Research (S. 321)</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-102812</td>
<td>Product and Innovation Management (S. 385)</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose at most 1 courses.

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<th>Course</th>
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<th>Responsibility</th>
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<tbody>
<tr>
<td>T-WIWI-102835</td>
<td>Marketing Strategy Business Game (S. 323)</td>
<td>1,5</td>
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<tr>
<td>T-WIWI-102901</td>
<td>Open Innovation - Concepts, Methods and Best Prac-</td>
<td>1,5</td>
<td>Alexander Hahn</td>
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<tr>
<td></td>
<td>tices (S. 365)</td>
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<tr>
<td>T-WIWI-102842</td>
<td>Strategic Brand Management (S. 461)</td>
<td>1,5</td>
<td>Joachim Blickhäuser, Martin Klarmann</td>
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</table>

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

Conditions
The course “Market Research” is obligatory.

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

Content
The aim of this module is to deepen central marketing contents in different areas. Therefore the students can choose
between the following marketing courses:

- Product and Innovation Marketing
- Market Research – this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- Marketing Strategy Business Game
- Strategic Brand Management
- Open Innovation

Recommendations
None

Remarks
The course “Open Innovation – Concepts, Methods and Best Practices” [2571199] has been added summer 2015. Please note that only one of the following courses can be chosen in the Marketing Management Module: Marketing Strategy Business Game, Strategic Brand Management, Open Innovation – Concepts, Methods and Best Practices or Business Plan Workshop.
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
Module: Mathematical Programming  [M-WIWI-101473]

Responsibility: Oliver Stein
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics
Elective Field
Additional Examinations

<table>
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<td>9</td>
<td>Each term</td>
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**Wahlpflichtangebot**
Non-Compulsory Block; You must choose at most 2 courses.

<table>
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<th>Identifier</th>
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<th>ECTS</th>
<th>Responsibility</th>
</tr>
</thead>
<tbody>
<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I (S. 334)</td>
<td>4,5</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-102733</td>
<td>Mixed Integer Programming I and II (S. 336)</td>
<td>9</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-102856</td>
<td>Convex Analysis (S. 235)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102855</td>
<td>Parametric Optimization (S. 376)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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</table>

**Ergänzungsangebot**
Non-Compulsory Block; You must choose at most 2 courses.

<table>
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<th>ECTS</th>
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<tr>
<td>T-WIWI-106548</td>
<td>Advanced Stochastic Optimization (S. 197)</td>
<td>4,5</td>
<td>Steffen Rebennack</td>
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<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II (S. 338)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102726</td>
<td>Global optimization I (S. 286)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<td>T-WIWI-102727</td>
<td>Global optimization II (S. 289)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-103638</td>
<td>Global optimization I and II (S. 288)</td>
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<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models</td>
<td>4,5</td>
<td>Stefan Nickel</td>
</tr>
<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I (S. 347)</td>
<td>4,5</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-102725</td>
<td>Nonlinear Optimization II (S. 351)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-103637</td>
<td>Nonlinear Optimization I and II (S. 349)</td>
<td>9</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management (S. 368)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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</tbody>
</table>

**Learning Control / Examinations**
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.

**Conditions**
At least one of the courses “Mixed Integer Programming I”, “Parametric Optimization” and “Convex Analysis” has to be taken.

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

Content
The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables.

Remarks
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu). For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
**Module: Methodical Foundations of OR [M-WIWI-101414]**

**Responsibility:** Oliver Stein  
**Organisation:** KIT-Fakultät für Wirtschaftswissenschaften  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:** Operations Management - Data Analysis - Informatics  
**Elective Field:**  
**Additional Examinations**

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<th>ECTS</th>
<th>Recurrence</th>
<th>Duration</th>
<th>Version</th>
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<tr>
<td>T-WIWI-102726</td>
<td>Global optimization I (S. 286)</td>
<td>4,5</td>
<td>Each term</td>
<td>1 term</td>
<td>7</td>
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<tr>
<td>T-WIWI-103638</td>
<td>Global optimization I and II (S. 288)</td>
<td>9</td>
<td>Each term</td>
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<td>7</td>
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<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I (S. 347)</td>
<td>4,5</td>
<td>Each term</td>
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<tr>
<td>T-WIWI-103637</td>
<td>Nonlinear Optimization I and II (S. 349)</td>
<td>9</td>
<td>Each term</td>
<td>1 term</td>
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**Wahlpflichtangebot**  
Non-Compulsory Block; You must choose at least 1 courses and between 4,5 and 9 credits.

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<tr>
<td>T-WIWI-102726</td>
<td>Global optimization I (S. 286)</td>
<td>4,5</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-103638</td>
<td>Global optimization I and II (S. 288)</td>
<td>9</td>
<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-102724</td>
<td>Nonlinear Optimization I (S. 347)</td>
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<td>Oliver Stein</td>
</tr>
<tr>
<td>T-WIWI-103637</td>
<td>Nonlinear Optimization I and II (S. 349)</td>
<td>9</td>
<td>Oliver Stein</td>
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**Ergänzungsangebot**  
Non-Compulsory Block;

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<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization (S. 311)</td>
<td>4,5</td>
<td>Steffen Rebennack</td>
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<td>T-WIWI-102727</td>
<td>Global optimization II (S. 289)</td>
<td>4,5</td>
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<td>T-WIWI-102725</td>
<td>Nonlinear Optimization II (S. 351)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Manage ment (S. 268)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
</tr>
</tbody>
</table>

**Learning Control / Examinations**  
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.  

**Conditions**  
At least one of the courses Nonlinear Optimization I and Global Optimization I has to be examined.

**Qualification Objectives**  
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.

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

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

**Remarks**
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: Clemens Puppe

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Finance - Risk Management - Managerial Economics

Elective Field

Additional Examinations

ECTS Recurrence Duration Language Version
9 Each term 2 terms German 2

Wahlpflichtangebot
Non-Compulsory Block; You must choose 9 credits.

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<tr>
<td>T-WIWI-102609</td>
<td>Advanced Topics in Economic Theory (S. 198)</td>
<td>4,5</td>
<td>Kay Mitusch</td>
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<tr>
<td>T-WIWI-102861</td>
<td>Advanced Game Theory (S. 191)</td>
<td>4,5</td>
<td>Karl-Martin Ehrhart, Clemens Puppe, Johannes Philipp Reiß</td>
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<tr>
<td>T-WIWI-102859</td>
<td>Social Choice Theory (S. 441)</td>
<td>4,5</td>
<td>Clemens Puppe</td>
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<tr>
<td>T-WIWI-102613</td>
<td>Auction Theory (S. 208)</td>
<td>4,5</td>
<td>Karl-Martin Ehrhart</td>
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<tr>
<td>T-WIWI-105781</td>
<td>Incentives in Organizations (S. 296)</td>
<td>4,5</td>
<td>Petra Nieken</td>
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</table>

Learning Control / Examinations
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.

Conditions
None

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

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

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

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

Responsibility: Stefan Nickel

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Operations Management - Data Analysis - Informatics
Elective Field
Additional Examinations

<table>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose at most 2 courses.

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<th>Responsibility</th>
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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models  (S. 292)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-106200</td>
<td>Modeling and OR-Software: Advanced Topics (S. 339)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management  (S. 368)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose at most 2 courses.

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<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics (S. 249)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-106548</td>
<td>Advanced Stochastic Optimization (S. 197)</td>
<td>4,5</td>
<td>Steffen Rebennack</td>
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<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I (S. 334)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II (S. 338)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-106549</td>
<td>Large-scale Optimization (S. 315)</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-102704</td>
<td>Facility Location and Strategic Supply Chain Management  (S. 268)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management  (S. 466)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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Learning Control / Examinations
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.

Conditions
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.

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

Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

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

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research [WI1OR] is assumed.

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

Workload
Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours
Module: Seminar [M-WIWI-102971]

Responsibility: Hagen Lindstädt, Oliver Stein

Organisation: KIT-Fakultät für Wirtschaftswissenschaften

Curricular Anchorage: Compulsory Elective

Contained in: Elective Field

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Wahlpflichtangebot
Non-Compulsory Block; You must choose 3 credits.

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<td>3</td>
<td>Wolf Fichtner, Hansjörg Fromm, Andreas Geyer-Schulz, Ju-Young Kim, Martin Klar-</td>
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<tr>
<td></td>
<td>(S. 396)</td>
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<td>mann, Peter Knauth, Hagen Lindstädt, David Lorenz, Torsten Luedecke, Thomas</td>
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<td>Lützkendorf, Alexander Mädche, Bruno Neibecker, Stefan Nickel, Petra Nieken,</td>
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<td>Martin Ruckes, Gerhard Satzger, Frank Schultmann, Thomas Setzer, Orestis</td>
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<td>Terzidis, Marielle Uhrig-Homburg, Maxim Ulrich, Christof Weinhardt, Marion</td>
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<td>Weissenberger-Eibl, Ute Werner, Marcus Wouters</td>
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<tr>
<td>T-WIWI-103478</td>
<td>Seminar in Economics A (Master) (S. 412)</td>
<td>3</td>
<td>Johannes Brumm, Jan Kowalski, Kay Mitusch, Ingrid Ott, Clemens Puppe, Johannes</td>
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<td>Philipp Reiß, Nora Szech, Berthold Wigger</td>
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<tr>
<td>T-WIWI-103483</td>
<td>Seminar in Statistics A (Master) (S. 431)</td>
<td>3</td>
<td>Oliver Grothe, Melanie Schienle</td>
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Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
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.
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.

Recommendations
None.

Remarks
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]

Responsibility:  Hagen Lindstädt, Oliver Stein
Organisation:  KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage:  Compulsory Elective
Contained in:  Elective Field

ECTS
Language
Version
3
German
1

Wahlpflichtangebot
Non-Compulsory Block; You must choose 3 credits.

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<td>Seminar in Informatics A (Master) (S. 416)</td>
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<tr>
<td>T-WIWI-103481</td>
<td>Seminar in Operations Research A (Master) (S. 427)</td>
<td>3</td>
<td>Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann</td>
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Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
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.

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.

Recommendations
None.

Remarks
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-102972]

Responsibility: Hagen Lindstädt, Oliver Stein
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Elective Field

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<td>Each term</td>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose 1 courses.

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<tbody>
<tr>
<td>T-WIWI-103477</td>
<td>Seminar in Economics B (Master) (S. 414)</td>
<td>3</td>
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<tr>
<td>T-WIWI-103484</td>
<td>Seminar in Statistics B (Master) (S. 432)</td>
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</table>

Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
- 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.
**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.

**Remarks**

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: Seminar  [M-WIWI-102974]

Responsibility:  Hagen Lindstädt, Oliver Stein
Organisation:  KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage:  Compulsory Elective
Contained in:  Elective Field

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Wahlpflichtangebot
Non-Compulsory Block; You must choose 1 courses.

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<td>Andreas Oberweis, Harald Sack, Hartmut Schmeck, York Sure-Vetter, Johann Marius Zöllner</td>
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<tr>
<td>T-WIWI-103482</td>
<td>Seminar in Operations Research B (Master) (S. 429)</td>
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<td>Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann</td>
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Learning Control / Examinations
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.

Conditions
None.

Qualification Objectives
- 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.

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.

Remarks
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]

Responsibility: Stefan Nickel
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics

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Wahlpflichtangebot
Non-Compulsory Block; You must choose at most 2 courses.

<table>
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<tr>
<th>Identifier</th>
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<th>ECTS</th>
<th>Responsibility</th>
</tr>
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<tbody>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management (S. 368)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102884</td>
<td>Operations Research in Health Care Management (S. 367)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102716</td>
<td>Practical Seminar: Health Care Management (with Case Studies) (S. 381)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose at most 2 courses.

<table>
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<th>Course Description</th>
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<th>Responsibility</th>
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<tr>
<td>T-WIWI-102718</td>
<td>Discrete-Event Simulation in Production and Logistics (S. 249)</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-102860</td>
<td>Supply Chain Management in the Process Industry (S. 464)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-102872</td>
<td>Challenges in Supply Chain Management (S. 219)</td>
<td>4,5</td>
<td>Robert Blackburn</td>
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</table>

Learning Control / Examinations
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.

Conditions
At least one of the three courses Operations Research in Supply Chain Management, Operations Research in Health Care Management or Practical seminar: Health Care Management has to be assigned.
The course Challenges in Supply Chain Management can only be assigned, if this module is assigned as an elective module.

Qualification Objectives
Students

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

Content
The importance of services in modern economies is most evident – nearly 70% of gross value added are achieved in the tertiary sector and a growing number of industrial enterprises add customer specific services to their material goods or transform their business models fundamentally. The growing availability of data “Big Data” and their intelligent processing by applying analytic methods and business intelligence systems plays a key role.
It is the goal of the module to give students a comprehensive overview on the subject Business Intelligence & Analytics focusing on service issues. Various scenarios illustrate how the methods and systems introduced help to improve existing services or create innovative data-based services.

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

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

Workload
The total workload for this module is approximately 270 hours. For further information see German version.
# Module: Stochastic Methods and Simulation  [M-WIWI-101400]

**Responsibility:** Karl-Heinz Waldmann  
**Organisation:** KIT-Fakultät für Wirtschaftswissenschaften  
**Curricular Anchorage:** Compulsory Elective  
**Contained in:** Operations Management - Data Analysis - Informatics
elective Field  
Additional Examinations

## ECTS  
| Recurrence | Duration | Version | 9 | Each term | 1 term | 5 |

| **Wahlpflichtangebot** | Non-Compulsory Block; You must choose between 1 und 2 courses.  
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<tr>
<td>T-WIWI-102710</td>
<td>Markov Decision Models I (S. 324)</td>
<td>5</td>
<td>Karl-Heinz Waldmann</td>
</tr>
<tr>
<td>T-WIWI-102627</td>
<td>Simulation I (S. 435)</td>
<td>4,5</td>
<td>Karl-Heinz Waldmann</td>
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| **Ergänzungsangebot** | Non-Compulsory Block; You must choose at most 2 courses.  
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<tbody>
<tr>
<td>T-WIWI-102711</td>
<td>Markov Decision Models II (S. 325)</td>
<td>4,5</td>
<td>Karl-Heinz Waldmann</td>
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<td>T-WIWI-102703</td>
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<tr>
<td>T-WIWI-102724</td>
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<td>4,5</td>
<td>Oliver Stein</td>
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<td>T-WIWI-102714</td>
<td>Tactical and Operational Supply Chain Management (S. 466)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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</table>

## Learning Control / Examinations  
The module is offered from winter term 2017.  
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.

### Conditions  
At least one of the courses Markov Decision Models [2550679] or Simulation I [2550662] has to be attended.

## Qualification Objectives  
The student possesses profound knowledge in modelling, analyzing and optimizing stochastic systems in economy and engineering.

## Content  
Markov Decision Models I: Markov Chains, Poisson Processes  
Markov Decision Models II: Queuing Systems, Stochastic Decision Processes  
Simulation I: Generation of random numbers, Monte Carlo integration, Discrete event simulation, Discrete and continuous random variables, Statistical analysis of simulated data.  
Simulation II: Variance reduction techniques, Simulation of stochastic processes, Case studies.

## Recommendations  
The courses Introduction to Operations Research I and II are helpful.
Remarks
The examination

- T-WIWI-102627 Simulation I will be offered latest until winter term 2016/2017 (for beginners).
- T-WIWI-102703 Simulation II will be offered latest until summer term 2017 (for beginners).
- T-WIWI-102711 Markov Decision Models II will be offered latest until winter term 2016/2017 (for beginners).
- T-WIWI-102710 Markov Decision Models I will be offered latest until summer term 2017 (for beginners).

The planned lectures and courses for the next two years are announced online (http://www.ior.kit.edu/).
**Module: Stochastic Modelling and Optimization [M-WIWI-101454]**

**Responsibility:** Karl-Heinz Waldmann

**Organisation:** KIT-Fakultät für Wirtschaftswissenschaften

**Curricular Anchorage:** Compulsory Elective

**Contained in:** Operations Management - Data Analysis - Informatics

**Elective Field**

**Additional Examinations**

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**Wahlpflichtangebot**

Non-Compulsory Block; You must choose between 9 and 10 credits.

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<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization (S. 311)</td>
<td>4.5</td>
<td>Steffen Rebennack</td>
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<tr>
<td>T-WIWI-102628</td>
<td>Optimization in a Random Environment (S. 370)</td>
<td>4.5</td>
<td>Karl-Heinz Waldmann</td>
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<tr>
<td>T-WIWI-102730</td>
<td>OR-Oriented Modeling and Analysis of Real Problems (Project) (S. 373)</td>
<td>4.5</td>
<td>Karl-Heinz Waldmann</td>
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<tr>
<td>T-WIWI-102728</td>
<td>Quality Control I (S. 388)</td>
<td>4.5</td>
<td>Karl-Heinz Waldmann</td>
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<tr>
<td>T-WIWI-102729</td>
<td>Quality Control II (S. 389)</td>
<td>4.5</td>
<td>Karl-Heinz Waldmann</td>
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<td>Simulation I (S. 435)</td>
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<td>Karl-Heinz Waldmann</td>
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<tr>
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<td>Karl-Heinz Waldmann</td>
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<td>Markov Decision Models II (S. 325)</td>
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**Learning Control / Examinations**

The module is not offered from summer term 2017.

The assessment is carried out as partial written 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.

**Conditions**

None

**Qualification Objectives**

The student possesses detailed knowledge in modelling, analyzing and optimizing stochastic systems in economy and engineering.

**Content**


Markov Decision Models II: Queuing Systems, Stochastic Decision Processes

Simulation I: Generation of random numbers, Monte Carlo integration, Discrete event simulation, Discrete and continuous random variables, Statistical analysis of simulated data.

Simulation II: Variance reduction techniques, Simulation of stochastic processes, Case studies.

Quality Control I: Statistical Process Control, Acceptance Sampling, Design of experiments

Quality Control II: Reliability of complex systems with and without repair, Maintenance

OR-orientied modeling and analysis of real problems: project-based modelling and analysis

**Remarks**

The examination
The planned lectures and courses for the next two 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: Stochastic Optimization  [M-WIWI-103289]

Responsibility: Steffen Rebennack
Organisation: KIT-Fakultät für Wirtschaftswissenschaften
Curricular Anchorage: Compulsory Elective
Contained in: Operations Management - Data Analysis - Informatics
Elective Field

<table>
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Wahlpflichtangebot
Non-Compulsory Block; You must choose at most 2 courses.

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<tbody>
<tr>
<td>T-WIWI-106546</td>
<td>Introduction to Stochastic Optimization (S. 311)</td>
<td>4,5</td>
<td>Steffen Rebennack</td>
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<tr>
<td>T-WIWI-106548</td>
<td>Advanced Stochastic Optimization (S. 197)</td>
<td>4,5</td>
<td>Steffen Rebennack</td>
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<tr>
<td>T-WIWI-106549</td>
<td>Large-scale Optimization (S. 315)</td>
<td>4,5</td>
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Ergänzungsangebot
Non-Compulsory Block; You must choose at most 2 courses.

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<tr>
<td>T-WIWI-102723</td>
<td>Graph Theory and Advanced Location Models (S. 292)</td>
<td>4,5</td>
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<tr>
<td>T-WIWI-102719</td>
<td>Mixed Integer Programming I (S. 334)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-102720</td>
<td>Mixed Integer Programming II (S. 338)</td>
<td>4,5</td>
<td>Oliver Stein</td>
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<tr>
<td>T-WIWI-103124</td>
<td>Multivariate Statistical Methods (S. 343)</td>
<td>4,5</td>
<td>Oliver Grothe</td>
</tr>
<tr>
<td>T-WIWI-102715</td>
<td>Operations Research in Supply Chain Management (S. 368)</td>
<td>4,5</td>
<td>Stefan Nickel</td>
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<tr>
<td>T-WIWI-106545</td>
<td>Optimization under uncertainty (S. 372)</td>
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<tr>
<td>T-WIWI-106552</td>
<td>Simulation of Stochastic Systems (S. 437)</td>
<td>4,5</td>
<td>Oliver Grothe, Steffen Rebennack</td>
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</table>

Learning Control / Examinations
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.

Conditions
At least one of the courses “Advanced Stochastic Optimization” and "Large-scale Optimization" has to be taken.

Qualification Objectives
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.

Recommendations
It is recommended to listen to the lecture “Introduction to Stochastic Optimization” before the lecture “Advanced Stochastic Optimization” is visited.
Part V

Courses

Course: Spin Manifolds, Alpha Invariant and Positive Scalar Curvature
[T-MATH-105932]

Responsibility: Stephan Klaus, Wilderich Tuschmann

Contained in: [M-MATH-102958] Spin Manifolds, Alpha Invariant and Positive Scalar Curvature
Course: Adaptive Finite Element Methods [T-MATH-105898]

Responsibility: Willy Dörfler

Contained in: [M-MATH-102900] Adaptive Finite Elemente Methods

ECTS 6  Version 1

Conditions
none
Course: Advanced Game Theory [T-WIWI-102861]

Responsibility: Karl-Martin Ehrhart, Clemens Puppe, Johannes Philipp Reiß

Contained in: [M-WIWI-101500] Microeconomic Theory
[M-WIWI-101502] Economic Theory and its Application in Finance
[M-WIWI-102970] Decision and Game Theory

ECTS 4.5 Language englisch Recurrence Jedes Wintersemester Version 1

Events

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<tr>
<th>Term</th>
<th>Event-No.</th>
<th>Events</th>
<th>Type</th>
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<th>Lecturers</th>
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<tr>
<td>WS 17/18</td>
<td>2521533</td>
<td>Advanced Game Theory</td>
<td>Vorlesung (V)</td>
<td>2</td>
<td>Johannes Philipp Reiß</td>
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<tr>
<td>WS 17/18</td>
<td>2521534</td>
<td>Übung (Ü)</td>
<td>1</td>
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<td>Johannes Philipp Reiß</td>
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</table>

Learning Control / Examinations
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.

Conditions
None

Recommendations
Basic knowledge of mathematics and statistics is assumed.

Event excerpt: Advanced Game Theory (WS 17/18)

Aim
The student
- deepens and broadens his/her basic knowledge of Game Theory,
- develops a rigorous understanding of newer concepts in Game Theory,
- develops the capability to independently model and analyze complex systems of strategic decision-making, and to develop appropriate solutions.

Content
This course offers an advanced and rigorous treatment of game theory.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Course: Advanced Inverse Problems: Nonlinearity and Banach Spaces
[T-MATH-105927]

Responsibility: Andreas Rieder
Contained in: [M-MATH-102955] Advanced Inverse Problems: Nonlinearity and Banach Spaces

ECTS 5  Version 1

Conditions none
Course: Advanced Lab Informatics [T-WIWI-103523]

Responsibility: Andreas Oberweis, Harald Sack, York Sure-Vetter, Johann Marius Zöllner

Contained in: [M-WIWI-101472] Informatics

<table>
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<tr>
<th>Term</th>
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<th>Type</th>
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<th>Lecturers</th>
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<td>2512101</td>
<td>Praktikum (P)</td>
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<td>Andreas Drescher, Andreas Oberweis, Frederic Toussaint</td>
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<td>Andreas Drescher, Andreas Oberweis</td>
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<td>SS 2017</td>
<td>2512200</td>
<td>Praktikum (P)</td>
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<td>Aditya Mogadala, Achim Rettinger, York Sure-Vetter, Steffen Thoma</td>
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<td>SS 2017</td>
<td>2512300</td>
<td>Seminar / Praktikum (S/P)</td>
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<td>SS 2017</td>
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<td>Praktikum (P)</td>
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<tr>
<td>WS 17/18</td>
<td>2512100</td>
<td>Security</td>
<td>Praktikum (P)</td>
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<td>Maribel Acosta Deibe, Andreas Harth, Tobias Christof Käfer, York Sure-Vetter</td>
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<td>WS 17/18</td>
<td>2512307</td>
<td>Applications of Semantic MediaWiki</td>
<td>Seminar / Praktikum (S/P)</td>
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<td>WS 17/18</td>
<td>2512310</td>
<td>Smart Services and the IoT</td>
<td>Seminar (S/P)</td>
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<tr>
<td>WS 17/18</td>
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<td>Data Science with Open Data</td>
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<td>WS 17/18</td>
<td>2512312</td>
<td>Cooperation seminar: Innovative applications on single board computers as well as their economic relevance</td>
<td>Seminar (S/P)</td>
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<td>David Bälz, Maria Maleshkova, Ingrid Ott, York Sure-Vetter, Tobias Weller</td>
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</table>
Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of:

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

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

Conditions
None

Remarks
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.

Event excerpt: Smart Services and the IoT (WS 17/18)

Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Event excerpt: (SS 2017)

Aim
Die Studierenden können Kenntnisse aus der Vorlesung Maschinelles Lernen auf einem ausgewählten Gebiet der aktuellen Forschung im Bereich Robotik oder kognitive Automobile praktisch anwenden.
Die Studierenden beherrschen die Analyse und Lösung entsprechender Problemstellungen im Team.
Die Studierenden können ihre Konzepte und Ergebnisse evaluieren, dokumentieren und präsentieren.

Content
Umsetzung einzelner, durch die Studenten ausgewählter Verfahren des Maschinellen Lernens an einer konkreten Aufgabenstellung entweder aus dem Bereich Robotik oder kognitive Automobile.

Die einzelnen Projekte erfordern die Analyse der gestellten Aufgabe, Auswahl geeigneter Lernverfahren, Spezifikation und Implementierung und Evaluierung eines Lösungsansatzes. Schließlich ist die gewählte Lösung zu dokumentieren und in einem Kurzvortrag vorzustellen.

Workload
Der Arbeitsaufwand von 4 SWS setzt sich zusammen aus Präsenzzeit am Versuchsort zur praktischen Umsetzung der gewählten Lösung, sowie der Zeit für Literaturrecherchen und Planung/Spezifikation der geplanten Lösung. Zusätzlich wird ein kurzer Bericht und eine Präsentation der durchgeführten Arbeit erstellt.

Event excerpt: (SS 2017)

Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:
Event excerpt: Applications of Semantic MediaWiki (WS 17/18)

Content
Topics of interest include, but are not limited to:

- Analysis of Medical Processes
- Correlation analysis of medical data
- Visualization of data in SMW
- Sentiment analysis of Twitter data
- Upload Interface for SMW
- Process Matching of process data

Event excerpt: Cooperation seminar: Innovative applications on single board computers as well as their economic relevance (WS 17/18)

Content
Topics of interest include, but are not limited to:

- Smart Home Applications
- Environmental measurements
- Gesture control
- Security systems

Event excerpt: (WS 17/18)

Workload
Topics of interest include, but are not limited to:

- Travel Security
- Geo data
- Linked News
- Social Media
Course: Advanced Statistics [T-WIWI-103123]

Responsibility: Oliver Grothe
Contained in: [M-WIWI-101637] Analytics and Statistics

<table>
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Events

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<td>Anika Kaufmann</td>
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Learning Control / Examinations
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.

Conditions
None

Remarks
New course starting winter term 2015/2016
Course: Advanced Stochastic Optimization [T-WIWI-106548]

Responsibility: Steffen Rebennack

Contained in:
- [M-WIWI-101473] Mathematical Programming
- [M-WIWI-103289] Stochastic Optimization

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Learning Control / Examinations
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.

Conditions
None.
Course: Advanced Topics in Economic Theory [T-WIWI-102609]

Responsibility: Kay Mitusch

Contained in:
- [M-WIWI-101500] Microeconomic Theory
- [M-WIWI-101502] Economic Theory and its Application in Finance

ECTS: 4.5
Recurrence: Unregelmäßig
Version: 1

Learning Control / Examinations
The course T-WIWI-102609 - Advanced Topics in Economic Theory restarts in winter term 2017/2018. 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.

Conditions
None

Recommendations
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.
Course: Algebra [T-MATH-102253]
Responsibility: Frank Herrlich, Stefan Kühnlein, Claus-Günther Schmidt
Contained in: [M-MATH-101315] Algebra

ECTS 8  Version 1
<table>
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<td><strong>Responsibility:</strong> Frank Herrlich, Stefan Kühnlein</td>
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<td><strong>Contained in:</strong> [M-MATH-101724] Algebraic Geometry</td>
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Course: Algebraic Number Theory [T-MATH-103346]

Responsibility: Stefan Kühnlein, Claus-Günther Schmidt

Contained in: [M-MATH-101725] Algebraic Number Theory

ECTS 8  Version 1
Course: Algebraic Topology [T-MATH-105915]

Responsibility: Holger Kammeyer, Roman Sauer
Contained in: [M-MATH-102948] Algebraic Topology

ECTS: 8  Recurrence: Unregelmäßig  Version: 1

Conditions:
none
Course: Algebraic Topology II [T-MATH-105926]

Responsibility: Roman Sauer

Contained in: [M-MATH-102953] Algebraic Topology II

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Conditions

none
Course: Applied Econometrics [T-WIWI-103125]

Responsibility: Melanie Schienle
Contained in: [M-WIWI-101638] Econometrics and Statistics I

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Learning Control / Examinations
The assessment of this course is a written examination (90 min) according to §4(2), 1 of the examination regulation.

Conditions
None
**Course: Applied Informatics II - IT Systems for eCommerce [T-WIWI-102651]**

**Responsibility:** York Sure-Vetter  
**Contained in:** [M-WIWI-101472] Informatics

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**Events**

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<td>Agnes Koschmider</td>
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</table>

**Learning Control / Examinations**

The assessment consists of a written exam (120 min) according to Section 4(2), 1 of the examination regulation. The successful completion of the compulsory exercises is prerequisite for the admission to the written exam. The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

**Conditions**

None

**Recommendations**

Knowledge of content of the modules Foundations in Informatics [IW1INF1] and Algorithms I [IW2INF2] is expected.


**Aim**

The student learns about concepts and technologies for designing big, distributed application architectures. Students apply industry-relevant technology to solve application-oriented problems in lab classes.

**Content**

The course Applied Informatics II [2511032] covers various facets of electronic commerce which have to be supported by adequate and efficient distributed information systems. Key topics are middleware technologies and distributed application architectures. Document description and exchange (incl. XML), Java EE, Web technologies, and Web services are additional topics.

**Workload**

The total workload for this course is approximately 150 hours. For further information see German version.

**Literature**

Tba in the lecture.
**Course: Asset Pricing [T-WIWI-102647]**

**Responsibility:** Martin Ruckes, Marliese Uhrig-Homburg

**Contained in:**
- [M-WIWI-101480] Finance 3
- [M-WIWI-101482] Finance 1
- [M-WIWI-101502] Economic Theory and its Application in Finance
- [M-WIWI-101483] Finance 2

**ECTS** 4.5

**Language** deutsch

**Recurrence** Jedes Sommersemester

**Version** 1

### Events

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<td>Marcel Müller, Martin Ruckes, Marliese Uhrig-Homburg</td>
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</table>

### Learning Control / Examinations

See German version.

### Conditions

None

**Recommendations**

We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

### Event excerpt: Asset Pricing (SS 2017)

**Aim**

Students are familiar with advanced concepts in asset pricing (in particular the stochastic discount factor model). They are able to apply their acquired skills to solve empirical questions related to securities.

**Content**

This lecture deals with the valuation of risky cash flows. A stochastic discount model and a central equation will be introduced, which form the basis of nearly every valuation model in finance. That includes the valuation of stocks, bonds and derivatives. The first part of the lecture will present the theory, the second part covers empirical questions related to this approach.

**Workload**

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

**Literature**

**Basic literature**


**Elective literature**

## Course: Asymptotic Stochastics [T-MATH-105866]

**Responsibility:** Vicky Fasen-Hartmann, Norbert Henze, Bernhard Klar  
**Contained in:** [M-MATH-102902] Asymptotic Stochastics

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**Conditions**

none
Course: Auction Theory [T-WIWI-102613]

Responsibility: Karl-Martin Ehrhart

Contained in: [M-WIWI-101500] Microeconomic Theory
[M-WIWI-102970] Decision and Game Theory

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Learning Control / Examinations

The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Conditions

None

Event excerpt: (WS 17/18)

Aim

The student

- learns the game-theoretic modeling and analysis of auctions,
- learns about various auction formats and their specific characteristics,
- understands the challenge for participating in auctions as bidder,
- understands the challenge of designing auctions as auctioneer,
- gains insight into practice by case studies,
- participates in and analyzes demonstration experiments.

Content

This course deals with the analysis and modeling of auction which are based on game theory. This also includes aspects of applying and designing auctions as well as experiences with auctions. Main topics are:

- Single- and multi-unit auctions
- Selling and procurement auctions
- Electronic auctions (e.g. eBay, C2C, B2B)
- Multi-attributive auctions.

Workload

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

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
Course: Automated Financial Advisory [T-WIWI-106495]

Responsibility: Maxim Ulrich

Contained in: [M-WIWI-103261] Disruptive FinTech Innovations

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<td>Automated Financial Advisory (Master)</td>
<td>Seminar (S)</td>
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<td>Maxim Ulrich</td>
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</table>

Learning Control / Examinations
The grade consists of a written thesis and an oral presentation.

Conditions
There are two conditions for taking this course:

1. This course is only open for registered students of the module “Disruptive FinTech Innovations”.
2. Registered students do also attend in the same semester the lecture “Engineering FinTech Solutions” and the programming internship “Computational FinTech with Python and C++”.

Modeled Conditions
The following conditions must be met:

1. The course [T-WIWI-106193] Engineering FinTech Solutions must have been started.
2. The course [T-WIWI-106496] Computational FinTech with Python and C++ must have been started.

Event excerpt: Automated Financial Advisory (Master) (SS 2017)

Aim
In this seminar students work on issues related to the automatization of risk and investment management applications.

Content
At the beginning of the semester, a selection of seminar topics will be discussed with each student of the seminar.

Workload
The total workload for this course is approximately 90 hours.

Literature
Literature will be distributed during the first lecture.
### Course: Bifurcation Theory [T-MATH-106487]

**Responsibility:** Rainer Mandel  
**Contained in:** [M-MATH-103259] Bifurcation Theory

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**Conditions**  
None
Course: Brownian Motion [T-MATH-105868]

Responsibility: Nicole Bäuerle, Vicky Fasen-Hartmann, Günter Last

Contained in: [M-MATH-102904] Brownian Motion

ECTS 4

Version 1

Conditions

none
Course: Building Intelligent and Robo-Advised Portfolios [T-WIWI-106442]

Responsibility: Maxim Ulrich
Contained in: [M-WIWI-103247] Intelligent Risk and Investment Advisory

ECTS 9
Language englisch
Recurrence Jedes Sommersemester
Version 1

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Learning Control / Examinations
There are two grading schemes. The student will be graded with the scheme that gives him the highest score. Grading Scheme A: 70% of the grade is based on the exam, 30% is based on problem sets and quizzes. Grading Scheme B: 100% of the grade is based on the exam.
The exam tests the material of the current semester and takes place during the lecture-free period. Students who don’t pass the exam are allowed to re-take the exam.

Conditions
None.

Recommendations
Good skills in applied math modeling (differential equations).

Remarks
New course starting summer term 2017.

Event excerpt: Building Intelligent and Robo-Advised Portfolios (SS 2017)

Aim
Representatives of the FinTech industry (at least in Germany) often emphasize that engineering- and IT- oriented employees lack intuition and insights necessary for building improved automated (robo-advised) portfolios for a set of different clients. It is hence the goal of this course to teach the essential intuition and economic thinking of intelligent and robo-advised portfolio management.

Students learn

1. Decision making under uncertainty using utility functions
2. Construction of statically optimal portfolios (Markowitz)
3. Construction of dynamically optimal portfolios (Merton)
   (a) Economic insights
   (b) Mathematical solution using Ito-lemma and stochastic differential equations
   (c) Strategic vs tactical asset allocation
4. Theory of factor risk premia
5. Predicting factor returns and constructing factor portfolios across different asset classes (equity, bonds, currency, vol)
6. Alpha and price anomalies
Content
This lecture offers a practical, yet rigorous, introduction to intelligent and automated portfolio management. We cover the following content

1. Optimal portfolios for CARA investors, applied to Gaussian and non-Gaussian asset returns
2. Building optimal short-term portfolios (Markowitz), applied to ‘socially responsible investing’
3. Building optimal long-term portfolios (Merton), applied to the 2008 financial crisis
   (a) Hands-on introduction to time continuous calculus (Ito) for solving stochastic differential equations
   (b) Tactical vs strategic vs opportunity vs. hedging portfolio
   (c) Optimal portfolio rebalancing
   (d) Accounting for time-varying correlation
4. Life-cycle investing
5. Factor Theory
   (a) Risk factors across asset classes
   (b) Theory of the stochastic discount factor
6. Generating Alpha strategies on
   (a) Equity
   (b) Bond
   (c) Currency
   (d) Option markets.

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

Literature
Mandatory:
Munk (2008): Dynamic Asset Allocation
Complementary:
Course: Business Process Modelling [T-WIWI-102697]

Responsibility: Andreas Oberweis

Contained in: [M-WIWI-101472] Informatics

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Learning Control / Examinations

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.

Conditions

None

Event excerpt: Business Process Modelling (WS 17/18)

Aim

Students

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

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.

Workload

Lecture 30h
Exercise 15h
Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam 1h

Total: 150h

Literature

Further Literature will be given in the lecture.
Course: Business Strategies of Banks [T-WIWI-102626]

Responsibility: Wolfgang Müller
Contained in: [M-WIWI-101480] Finance 3
[M-WIWI-101483] Finance 2

ECTS 3 Language deutsch
Recurrence Jedes Wintersemester
Version 1

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<td>Wolfgang Müller</td>
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</table>

Learning Control / Examinations
See German version.

Conditions
None

Recommendations
None

Event excerpt: Business Strategies of Banks (WS 17/18)

Aim
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.

Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank’s success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management’s perspective.

The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank’s corporate policy.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Elective literature:
- A script is disseminated chapter by chapter during the course of the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 6th edition, Springer
Course: Calculus of Variations [T-MATH-105853]

Responsibility: Andreas Kirsch, Tobias Lamm, Michael Plum, Wolfgang Reichel

Contained in: [M-MATH-102882] Calculus of Variations

ECTS: 8
Version: 1
Course: Challenges in Supply Chain Management [T-WIWI-102872]

Responsibility: Robert Blackburn
Contained in: [M-WIWI-102805] Service Operations

Events

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<td>Vorlesung (V)</td>
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</table>

Learning Control / Examinations
The assessment consists of a written paper and an oral exam (non exam assessment (§4 (2), 3 SPO 2007) respectively alternative exam assessments (§4(2), 3 SPO 2015)).

Conditions
None

Recommendations
Basic knowledge as conveyed in the module “Introduction to Operations Research [WI1OR]” is assumed.

Remarks
Please notice that this course can be attended only in the elective part of the course program.
The number of participants is restricted due to the execution of joint projects with BASF teams and the resulting examination effort. 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.

Event excerpt: Challenges in Supply Chain Management (SS 2017)

Aim
The student
- analyzes and evaluates current developments and approaches in the design and planning of supply chain strategies, especially with respect to future challenges in this area,
- explains and utilizes theoretical concepts and methods for the design and strategy of supply chains,
- classifies and accounts for trend-setting theories in the SCM context such as Behavioral Supply Chain Management or Supply Chain Analytics.

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.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Literature
To be defined depending on the topic.
Course: Classical Methods for Partial Differential Equations [T-MATH-105832]

Responsibility: Dirk Hundertmark, Tobias Lamm, Michael Plum, Wolfgang Reichel, Jens Rottmann-Matthes, Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-102870] Classical Methods for Partial Differential Equations

ECTS

Version

1
Course: Combinatorics [T-MATH-105916]

Responsibility: Maria Aksenovich

Contained in: [M-MATH-102950] Combinatorics

ECTS: 8

Recurrence: Unregelmäßig

Version: 1

Conditions
none
Course: Comparison Geometry [T-MATH-105917]

Responsibility: Wilderich Tuschmann
Contained in: [M-MATH-102940] Comparison Geometry

ECTS 5
Recurrence Unregelmäßig
Version 1

Conditions
Keine
Course: Complex Analysis [T-MATH-105849]

Responsibility: Gerd Herzog, Michael Plum, Wolfgang Reichel, Christoph Schmoeger, Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-102878] Complex Analysis

ECTS 8

Version 1
Course: Compressive Sensing [T-MATH-105894]

Responsibility: Andreas Rieder

Contained in: [M-MATH-102935] Compressive Sensing

ECTS
5

Version
1
Course: Computational Economics [T-WIWI-102680]

Responsibility: Pradyumn Kumar Shukla

Contained in: [M-WIWI-101472] Informatics

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Learning Control / Examinations

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.

Conditions
None

Remarks
The credits have been changed to 5 starting summer term 2016.

Event excerpt: Computational Economics (WS 17/18)

Aim
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.

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.

Literature

Elective literature:

Course: Computational FinTech with Python and C++ [T-WIWI-106496]

Responsibility:
Contained in:  [M-WIWI-103261] Disruptive FinTech Innovations

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Learning Control / Examinations
The grade is based on a larger or several smaller programming exercises.

Conditions
There are two conditions for taking this course:

1. This course is only open for registered students of the module “Disruptive FinTech Innovations”.
2. Registered students do also attend in the same semester the lecture “Engineering FinTech Solutions” and the seminar “Automated Financial Advisory”.

Modeled Conditions
The following conditions must be met:

1. The course [T-WIWI-106193] Engineering FinTech Solutions must have been started.
2. The course [T-WIWI-106495] Automated Financial Advisory must have been started.

Event excerpt:  (SS 2017)

Aim
Implementation of different programming specific concepts and skills.

Content
At the beginning of the semester, each student receives a personalized set of programming tasks.

Workload
Roughly 45 hours.
Course: Computational Risk and Asset Management I [T-WIWI-107032]

Responsibility: Maxim Ulrich
Contained in: [M-WIWI-103247] Intelligent Risk and Investment Advisory

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Learning Control / Examinations
The grade consists of an exam and seven problem sets, which are distributed throughout the semester. All problem sets count equally and make up in total 25% of the final grade. The exam accounts for the remaining 75%. The exam is based on all the material that is taught in the current semester. The exam takes place in the last week of the lecture period. Students who fail the exam are allowed to retake the exam.

Conditions
None.

Recommendations
None
### Course: Computational Risk and Asset Management II [T-WIWI-106494]

**Responsibility:** Maxim Ulrich  
**Contained in:** [M-WIWI-103247] Intelligent Risk and Investment Advisory

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#### Learning Control / Examinations

The grade consists of an exam and seven problem sets, which are distributed throughout the semester. All problem sets count equally and make up in total 25% of the final grade. The exam accounts for the remaining 75%. The exam is based on all the material that is taught in the current semester. The exam takes place in the last week of the lecture period. Students who fail the exam are allowed to retake the exam.

**Conditions**  
None.

**Recommendations**  
It is recommend that students have studied the material of „Computational Risk and Asset Management“.

**Remarks**  
Course: Computer-Assisted Analytical Methods for Boundary and Eigenvalue Problems [T-MATH-105854]

Responsibility: Michael Plum


ECTS: 8
Version: 1
**Course: Consumer Behavior [T-WIWI-106569]**

**Responsibility:** Sven Feurer  
**Contained in:** [M-WIWI-101490] Marketing Management

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**Learning Control / Examinations**

Please note: This course is offered only once in winter term 2017/18. The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation). Since the course is only offered in winter term 2017/18, students are required to take the exam in winter term 2017/18 at the first exam date offered. Exclusively for students who need to retake the exam, a re-examination will be offered in the following semester if required.

**Conditions**

None.

**Remarks**

For further information, please contact the research group Marketing and Sales (http://marketing.iism.kit.edu/).

**Event excerpt: Consumer Behavior (WS 17/18)**

**Aim**

Students...

- ... understand how consumers acquire, consume and dispose of products
- ... understand underlying processes of buying decisions
- ... understand important concepts of consumer behavior and are able to identify these in everyday buying situations
- ... are able to evaluate how consumers may react to real-life marketing decisions and derive recommendations for marketers
- ... are able to critically evaluate their own buying behavior

**Content**

- Motivation
- Exposure, Attention, Perception
- Attitudes and Persuasion
- The Process of Consumer Decision Making
- Heuristics and Biases
- Social Influence

**Literature**

will be given in the lecture if necessary.
Course: Continuous Time Finance [T-MATH-105930]

Responsibility: Nicole Bäuerle, Vicky Fasen-Hartmann

Contained in: [M-MATH-102860] Continuous Time Finance

ECTS 8  Version 1
Course: Control Theory [T-MATH-105909]

Responsibility: Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-102941] Control Theory

ECTS 6  Version 1

Conditions
none
Course: Convex Analysis [T-WIWI-102856]

Responsibility: Oliver Stein

Contained in: [M-WIWI-101473] Mathematical Programming

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Learning Control / Examinations

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.

Conditions
None

Recommendations

It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Remarks

The lecture is offered irregularly. The curriculum of the next three years is available online (www.iop.kit.edu).

Event excerpt: (SS 2017)

Aim

The student

- knows and understands the fundamentals of convex analysis,
- is able to choose, design and apply modern techniques of convex analysis in practice.

Content

Convex Analysis deals with properties of convex functions and convex sets, in particular with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number a applications which are not covered by techniques from smooth optimization, e.g. approximation problems with respect to the Manhattan or maximum norms, classification problems or the theory of statistical estimates. The lecture develops along another, geometrically simple example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introductory examples and terminology
- Convex subdifferential, Lipschitz continuity and the safety margin
- Normal cones, error bounds and the maximal distance

Literature

Elective literature:

Course: Convex Geometry [T-MATH-105831]

Responsibility: Daniel Hug

Contained in: [M-MATH-102864] Convex Geometry

ECTS: 8
Version: 1
Course: Corporate Financial Policy [T-WIWI-102622]

Responsibility: Martin Ruckes
Contained in: [M-WIWI-101480] Finance 3  
[M-WIWI-101502] Economic Theory and its Application in Finance  
[M-WIWI-101483] Finance 2

ECTS 4.5  Language englisch  Recurrence Jedes Sommersemester  Version 1

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Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Conditions
None

Event excerpt: (SS 2017)

Aim
Students
- are in a position to explain the importance of informational frictions for the financing of firms,
- are able to evaluate financing contracts with respect to their incentive effects,
- are able to analyse financing contracts with respect to their information they provide to outsiders,
- are in a position to derive optimal financing contracts in prototypical situations,
- are able to discuss the financial determinants of corporate distribution policy.

Content
Students are told profound knowledge about appropriate financing of firms. The course is concerned with the theory of corporate financing:

- Financing contracts
- Financing capacity
- Issuance of securities
- Capital structure
- Payout policy

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

Literature
Elective Literature
Course: Credit Risk [T-WIWI-102645]

Responsibility: Marliese Uhrig-Homburg

Contained in: [M-WIWI-101480] Finance 3
[M-WIWI-101483] Finance 2

ECTS: 4.5
Language: deutsch
Recurrence: Jedes Wintersemester
Version: 1

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Learning Control / Examinations

The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation SPO2015 and may be supplemented by a non exam assessment according to § 4 paragraph 2 Nr. 3. The examination is offered every semester and can be repeated at every regular examination date.

Conditions
None

Recommendations
See German version.

Remarks
See German version.

Event excerpt: Credit Risk (WS 17/18)

Aim
The objective of this course is to become familiar with the credit markets and the credit risk indicators like ratings, default probabilities and credit spreads. The students learn about the components of credit risk (e.g. default time and default rate) and quantify these in different theoretical models to price credit derivatives.

Content
The lecture deals with the diverse issues arising in the context of measuring and controlling credit risk. At first, the theoretical and empirical relations between ratings, probabilities of default, and credit spreads are analysed. After that, the focus is on the valuation of credit risk. Finally, the management of credit risk, e.g. using credit derivatives and credit portfolio analysis, is examined, and the legal framework and its implications are discussed.

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

Literature

Elective literature:
Course: Current Issues in the Insurance Industry [T-WIWI-102637]

Responsibility: Wolf-Rüdiger Heilmann
Contained in: [M-WIWI-101469] Insurance Management I

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Learning Control / Examinations
The exam is offered latest in summer term 2016.
The assessment consists of a written exam (according to Section 4 (2), 1 of the examination regulation).
The exam takes place every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None

Recommendations
For the understanding of this course knowledge of Private and Social Insurance [2530050] is required.

Remarks
Block course. For organizational reasons, please register with the secretay of the chair: thomas.mueller3@kit.edu.
Course: Data Mining and Applications [T-WIWI-103066]

Responsibility: Rheza Nakhaeizadeh

Contained in: [M-WIWI-101638] Econometrics and Statistics I
[M-WIWI-101639] Econometrics and Statistics II

ECTS: 4.5
Language: deutsch
Recurrence: Jedes Sommersemester
Version: 1

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Learning Control / Examinations
- Conduction of a larger empirical study in groups
- Reporting of milestones
- Final presentation

Conditions
None

Event excerpt: (SS 2017)

Aim
After completing of the course the students:
- know the definition of Data Mining
- are familiar with the CRISP-DM
- are familiar with at least six important Data Mining Tasks
- can recognize whether a given problem can be formulated as a data mining problem
- are familiar with the most important Data Mining Algorithms like Decision Tree, K-Means, Artificial Neural Networks, Association Rules, Regression Analysis
- are familiar with evaluation of DM-algorithms
- will be able to use a DM-Tool

Content
Part one: Data Mining

Why Data Mining?
- What is Data Mining?
- History of Data Mining
- Conferences and Journals on Data Mining
- Potential Applications
- Data Mining Process:
- Business Understanding
- Data Understanding
- Data Preparation
- Modeling
- Evaluation
- Deployment
- Interdisciplinary aspects of Data Mining
- Data Mining tasks
- Data Mining Algorithms (Decision Trees, Association Rules, Regression, Clustering, Neural Networks)
- Fuzzy Mining
- OLAP and Data Warehouse
- Data Mining Tools
- Trends in Data Mining

Part two: Examples of application of Data Mining
- Success parameters of Data Mining Projects
- Application in industry
- Application in Commerce

Workload
The total workload for this course is approximately 135 hours. For further information see German version.

Literature

- Jiawei Han, Micheline Kamber, Data Mining : Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
- David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining, MIT Press, Fall 2000
Aim
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.

Content
Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly more important with the emergence of the extensible Markup Language XML. XML is a data format for structured, semi-structured, and unstructured data. In order to store XML documents consistently and reliably, databases or extensions of existing database systems are required. Among other things, this lecture covers the data model of XML, concepts of XML query languages, aspects of storage of XML documents, and XML-oriented database systems.

Workload
Lecture 30h
Exercise 15h

Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam 1h

Total: 150h

Literature
- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
Further literature will be given individually.
**Course: Derivatives [T-WIWI-102643]**

**Responsibility:** Marliese Uhrig-Homburg

**Contained in:**
- [M-WIWI-101480] Finance 3
- [M-WIWI-101482] Finance 1
- [M-WIWI-101483] Finance 2

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**Learning Control / Examinations**

See German version.

**Conditions**

None

**Recommendations**

None

**Event excerpt: Derivatives (SS 2017)**

**Aim**
The objective of the Derivatives lecture is to become familiar with financial markets, especially derivatives markets. Traded securities and frequently used trading strategies will be introduced. Furthermore the pricing of derivatives will be derived and their use in risk management will be discussed.

**Content**
The lecture deals with the application areas and valuation of financial derivatives. After an overview of the most important derivatives and their relevance, forwards and futures are analysed. Then, an introduction to the Option Pricing Theory follows. The main emphasis is on option valuation in discrete and continuous time models. Finally, construction and usage of derivatives are discussed, e.g. in the context of risk management.

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

**Literature**


**Elective literature:**

Course: Differential Geometry [T-MATH-102275]

Responsibility: Sebastian Grensing, Enrico Leuzinger, Wilderich Tuschmann

Contained in: [M-MATH-101317] Differential Geometry

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<td><strong>Contained in:</strong> [M-MATH-102919] Discrete Time Finance</td>
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**Conditions**

none
Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsibility: Stefan Nickel
Contained in: [M-WIWI-102805] Service Operations

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<td>Sven Spieckermann</td>
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Learning Control / Examinations
The assessment consists of a written paper and an oral exam (non exam assessment (§4 (2), 3 SPO 2007) respectively alternative exam assessments (§4(2), 3 SPO 2015)).

Conditions
None

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research [WI1OR] is assumed.

Remarks
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.

Event excerpt: (SS 2017)

Aim
The student
- knows basic concepts of discrete event simulation models,
- applies computer-based simulation systems,
- structures and implements simulation studies according to specific process models,
- has an in-depth knowledge for logistics issues and discovers the importance of statistical methods in modeling and evaluation of simulation models,
- explains coupled systems of simulation and meta-heuristics, and characterizes simulation programs.

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.

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

Literature
Course: Document Management and Groupware Systems [T-WIWI-102663]

Responsibility: Stefan Klink
Contained in: [M-WIWI-101472] Informatics

ECTS 4 Language deutsch Recurrence Jedes Sommersemester Version 1

Events

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Learning Control / Examinations
The course expires after summer term 2017. Last examination date is winter term 2017/2018 (only for repeaters). The assessment consists of an 1h written exam in the first week after lecture period according to Section 4(2), 1 of the examination regulation.

Conditions
None


Aim
Students master the basics of integration and structure of document management systems (DMS) and know the complete DMS process - from document capture of the archiving until retrieval. Students know how to realize operative workflows. They know which activities are needed to carry out the conceptual design and installation of DMS and they are able to apply a DMS as an archive system, workflow system and retrieval system. Furthermore, they know groupware systems exemplarily and can use them for collaborative tasks.

Content
The lecture gives basics of document management and groupware systems. It covers different system categories, their interaction and their use areas and illustrates this with concrete examples. These include document management in the strict sense, scanning, Document Imaging (acquisition and visualization of scanned documents), indexing, electronic archiving, retrieval of relevant documents, workflow, groupware, and office communications.

Workload
Workload: 120h overall,
Lecture 30h
Review and preparation of lectures 60h
Exam preparation 29h
Exam 1h

Literature

Further literature is given in each lecture individually.
### Course: Dynamical Systems [T-MATH-106114]

**Responsibility:** Jens Rottmann-Matthes  
**Contained in:** [M-MATH-103080] Dynamical Systems

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**Conditions**
none
Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsibility: Patrick Jochem, Russell McKenna

Language: englisch

Recurrence: Jedes Sommersemester

Version: 1

### Events

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<td>Efficient Energy Systems and Electric Mobility</td>
<td>Vorlesung (V)</td>
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<td>Patrick Jochem, Russell McKenna</td>
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</table>

### Learning Control / Examinations

See German version.

### Conditions

None

### Recommendations

None

### Event excerpt: Efficient Energy Systems and Electric Mobility (SS 2017)

#### Aim

- 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

#### 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.

The energy efficiency part of the lecture provides an introduction to the concept of energy efficiency, the means of affecting it and the relevant framework conditions. Further insights into economy-wide measurements of energy efficiency, and associated difficulties, are given with recourse to several practical examples. The problems associated with market failures in this area are also highlighted, including the Rebound Effect. Finally and by way of an outlook, perspectives for energy efficiency in diverse economic sectors are examined.

The electric mobility part of the lecture examines all relevant issues associated with an increased penetration of electric vehicles including their technology, their impact on the electricity system (power plants and grid), their environmental impact as well as their optimal integration in the future private electricity demand (i.e. smart grids and V2G). Besides technical aspects the user acceptance and behavioral aspects are also discussed.

#### Workload

The total workload for this course is approximately 105.0 hours. For further information see German version.

#### Literature

Will be announced in the lecture.
**Course: eFinance: Information Engineering and Management for Securities Trading**

**[T-WIWI-102600]**

**Responsibility:** Christof Weinhardt

**Contained in:**
- [M-WIWI-101480] Finance 3
- [M-WIWI-101483] Finance 2

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<td>Benedikt Notheisen, Christof</td>
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**Learning Control / Examinations**

The assessment consists of a written exam (60 min) (§4(2), 1 of the examination regulations) and by submitting written essays as part of the exercise (§4(2), 3 SPO 2007 respectively §4(3) SPO 2015). 70% of the final grade is based on the written exam and 30% is based on assignments from the exercises. The points obtained in the exercises only apply to the first and second exam of the semester in which they were obtained.

**Conditions**

None

**Recommendations**

None

**Event excerpt: eFinance: Information Engineering and Management for Securities Trading (WS 17/18)**

**Aim**

The students
- are able to understand the theoretical and practical aspects of securities trading,
- are able to handle the relevant electronic tools for the evaluation of financial data,
- are able to identify the incentives of the traders for participation in different market platforms,
- are able to analyse capital marketplaces concerning their efficiency, weaknesses and technical configuration,
- are able to apply theoretical methods of econometrics,
- are able to understand, criticize and present articles with a finance-scientific background,
- learn to elaborate solutions in a team.

**Content**

The theoretical part of the course examines the New Institutions Economics which provides a theoretically found explanation for the existence of markets and intermediaries. Building upon the foundations of the market microstructure, several key parameters and factors of electronic trading are examined. These insights gained along a structured securities trading process are complemented and verified by the analysis of prototypical trading systems developed at the institute as well as selected trading systems used by leading exchanges in the world. In the more practical-oriented second part of the lecture, speakers from practice will give talks about financial trading systems and link the theoretical findings to real-world systems and applications.

**Workload**

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

**Literature**

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18

Elective literature:

Course: Energy and Environment [T-WIWI-102650]

Responsibility: Ute Karl
Contained in: [M-WIWI-101452] Energy Economics and Technology

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<td>SS 2017</td>
<td>2581004</td>
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<td>Übung (Ü)</td>
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<td>Katrin Seddig</td>
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</table>

Learning Control / Examinations
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation.

Conditions
None.

Event excerpt: Energy and Environment (SS 2017)

Aim
The student should identify environmental problems of energy from fossil fuels. The student can identify appropriate technologies for pollution control. The student knows methods for assessing environmental problems and their ways of application.

Content
The focus of the lecture is put on environmental impacts of fossil fuel conversion and related assessment methods. The list of topics is given below.

- Fundamentals of energy conversion
- Air pollutant formation from fossil fuel combustion
- Control of air pollutant emissions from fossil-fuelled power plants.
- Measures to improve conversion efficiency of fossil fuelled power plants.
- External effects of energy supply (Life Cycle Assessment of selected energy systems)
- Integrated Assessment models supporting the European Thematic Strategy on Air
- Cost-effectiveness analyses and cost-benefit analyses of air pollution control measures
- Monetary evaluation of external effects of energy supply (external costs)

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

Literature
Thr references for further reading are included in the lecture documents (see ILIAS)
Course: Energy Market Engineering [T-WIWI-107501]

Responsibility: Christof Weinhardt


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**Learning Control / Examinations**

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). The bonus only applies to the first and second exam of the semester in which it was obtained.

**Conditions**

None

**Recommendations**

None

**Remarks**

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.


**Aim**

The student

- know the scientifically discussed design options for energy markets.
- can evaluate and discuss advantages and disadvantages of different energy market design options.
- can judge which design is ideal in which environment.
- is able to understand and employ scientific methods to evaluate energy market designs

**Content**

This lecture discusses different design options for electricity markets. We will focus on different approaches of nodal and zonal pricing as well as single price mechanisms and capacity markets. After a short recap of German and European market designs, the different design options will be discussed scientifically and with the help of examples. Furthermore, we will evaluate alternative market design options like microgrids. Besides the fundamental functioning of those markets, we will introduce and discuss methodological knowledge to evaluate market design options.

**Workload**

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

**Literature**

Course: Energy Networks and Regulation [T-WIWI-107503]

Responsibility: Christof Weinhardt

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Learning Control / Examinations
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.

Conditions
None

Recommendations
None

Remarks
Former course title until summer term 2017: T-WIWI-103131 “Regulatory Management and Grid Management - Economic Efficiency of Network Operation”

Event excerpt: Energy Networks and Regulation (WS 17/18)

Content
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
- 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.

Workload
The total workload for this course is approximately 135.0 hours. For further information see German version.
Course: Energy Systems Analysis [T-WIWI-102830]

Responsibility: Valentin Bertsch

Contained in: [M-WIWI-101452] Energy Economics and Technology

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<td>Armin Ardone, Valentin Bertsch</td>
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</table>

### Learning Control / Examinations

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

### Conditions

None

### Recommendations

None

### Remarks

Since 2011 the lecture is offered in winter term. Exams can still be taken in summer term.

### Event excerpt: Energy Systems Analysis (WS 17/18)

#### Aim

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

#### 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

#### Workload

The total workload for this course is approximately 90 hours. For further information see German version.

#### Literature

Weiterführende Literatur:

Course: Engineering FinTech Solutions [T-WIWI-106193]

Responsibility: Maxim Ulrich

Contained in: [M-WIWI-103247] Intelligent Risk and Investment Advisory
[M-WIWI-103261] Disruptive FinTech Innovations

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Learning Control / Examinations

The grade consists of a written part and an oral exam. In the written part, students solve an academic problem from the field of risk and asset management. This part counts for 30% of the grade. An oral exam at the end of the semester accounts for 70% of the final grade and gives the student a chance to present and defend his solution.

Conditions

There are two conditions for taking this course:

1. This course is only open for registered students of the module “Intelligent Risk and Investment Advisory” and “Disruptive FinTech Solutions”.
2. Registered students have completed a Bachelor thesis with a grade of 1.3 or better on a topic that has had a significant exposure to IT- or software engineering content. Alternatively, students who completed at least one of the following lectures with a grade of 1.7 or better are also eligible to participate: Computational Risk and Asset Management, Bayesian Risk Analytics and Machine Learning.

Recommendations

None

Remarks

New course starting summer term 2017.

Event excerpt: Engineering FinTech Solutions (SS 2017)

Aim

Students develop modern IT-technologies to solve financial problems.

Content

This project-oriented lecture invites students to work independently and yet, under close monitoring of researchers and the professor of the C-RAM research group, on a sub-problem of a larger FinTech research question. Students will in a personalized manner be introduced to the necessary concepts, tools and methods that are necessary to solve the question at hand. Students obtain the opportunity to connect newest research insights with modern information technology to move a step closer towards their own development of a prototype. Depending on the topic, students work alone or in groups. An essential part of the guided research mentoring is that students take part in weekly meetings to discuss open issues, to present their progress and to learn from their fellow students.

Workload

The total workload for this course is approximately 135 hours. For further information see German version.

Literature

Literature will be distributed during the first lecture.
### Course: Enterprise Architecture Management [T-WIWI-102668]

**Responsibility:** Thomas Wolf  
**Contained in:** [M-WIWI-101472] Informatics

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#### Learning Control / Examinations

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.

**Conditions**

None

### Event excerpt: Enterprise Architecture Management (WS 17/18)

**Aim**

Students understand the connection between enterprise strategy, business processes and business objects and IT architecture; they know methods to depict these connections and how they can be developed based on each other.

**Content**

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

**Literature**

- Doppler, K., Lauterburg, Ch.: Change Management. Campus Verlag 1997

Economathematics (M.Sc.)  
Module Handbook, Date 11/17/2017, Winter term 17/18
Course: Evolution Equations [T-MATH-105844]

Responsibility: Roland Schnaubelt, Lutz Weis
Contained in: [M-MATH-102872] Evolution Equations

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**Course: Exchanges [T-WIWI-102625]**

**Responsibility:** Jörg Franke

**Contained in:**
- [M-WIWI-101480] Finance 3
- [M-WIWI-101483] Finance 2

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<td>Exchanges</td>
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</table>

**Learning Control / Examinations**
See German version.

**Conditions**
None

**Recommendations**
None

**Event excerpt: Exchanges (SS 2017)**

**Aim**
Students are in a position to discuss and evaluate current developments regarding the organisation of exchanges and securities trading.

**Content**
- Organisation of exchanges: Changing Zeitgeist - Corporates instead of cooperative structures
- Market models: order driven vs. market maker - Liquidity provision for less frequently traded securities
- Trading systems: The end of an era? - No more need for running traders?
- Clearing: Diversity instead of uniformity - Safety for all?
- Settlement: Increasing importance - Does efficient settlement assure the “value added” of exchanges in the long run?

**Workload**
The total workload for this course is approximately 45.0 hours. For further information see German version.

**Literature**

**Elective literature:**
Educational material will be offered within the lecture.
**Course: Experimental Economics [T-WIWI-102614]**

**Responsibility:** Timm Teubner, Christof Weinhardt

**Contained in:**
- [M-WIWI-102970] Decision and Game Theory
- [M-WIWI-101505] Experimental Economics

**ECTS**
- 4.5

**Language**
- deutsch

**Recurrence**
- Jedes Wintersemester

**Version**
- 1

### Events

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### Learning Control / Examinations

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). The bonus only applies to the first and second exam of the semester in which it was obtained.

### Conditions

None

### Event excerpt: Experimental Economics (WS 17/18)

**Aim**

The students should learn

- how to gain scientific experience and knowledge (philosophy of science),
- how Game Theory and Experimental Economics influenced each other in scientific research,
- about the methods as well as the strengths and weaknesses of Experimental Economics,
- some examples of experimental research, such as markets and auctions, coordination games, bargaining, decision making under risk,
- how to evaluate data.

**Content**

Experimental Economics have become a separate field in Economics. Nearly all fields of the economic discipline use economic experiments to verify theoretical results. 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 shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

**Workload**

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

**Literature**

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2nd ed., 2006.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.
Course: Extremal Graph Theory [T-MATH-105931]

Responsibility: Maria Aksenovich

Contained in: [M-MATH-102957] Extremal Graph Theory

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Course: Facility Location and Strategic Supply Chain Management
[T-WIWI-102704]

Responsibility: Stefan Nickel

[M-WIWI-101414] Methodical Foundations of OR

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Learning Control / Examinations
The assessment consists of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation. The exam takes place in every semester. Prerequisite for admission to examination is the successful completion of the online assessments.

Conditions
Prerequisite for admission to examination is the successful completion of the online assessments.

Recommendations
None

Remarks
The lecture is held in every winter term. The planned lectures and courses for the next three years are announced online.

Event excerpt: Facility Location and Strategic Supply Chain Management (WS 17/18)

Aim
The student
- knows and describes basic quantitative methods in location planning in the context of strategic Supply Chain Planning,
- applies several criteria for the evaluation of the locations of facilities in the context of classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models),
- implements the considered models in practical problems.

Content
Since the classical work “Theory of the Location of Industries” of Weber from 1909, the determination of an optimal location of a new facility with respect to existing customers is strongly connected to strategical logistics planning. 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 allows an efficient flow of materials and leads to lower costs and increased customer service.
Subject of the course is an introduction to the most important terms and definitions in location planning as well as the presentation of basic quantitative location planning models. Furthermore, specialized location planning models for Supply Chain Management will be addressed as they are part in many commercial SCM tools for strategic planning tasks.

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

Elective literature:

- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
Course: Financial Analysis [T-WIWI-102900]

Responsibility: Torsten Luedecke

Contained in: [M-WIWI-101480] Finance 3
[M-WIWI-101483] Finance 2

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Learning Control / Examinations
See German version.

Conditions
None

Recommendations
Basic knowledge in corporate finance, accounting, and valuation is required.
Course: Financial Econometrics [T-WIWI-103064]

Responsibility: Melanie Schienle

Contained in: [M-WIWI-101638] Econometrics and Statistics I  
[M-WIWI-101639] Econometrics and Statistics II

ECTS 4.5  Recurrence Unregelmäßig  Version 1

Learning Control / Examinations
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

Modeled Conditions
The following conditions must be met:

- The course [T-MATH-105874] Time Series Analysis must not have been started.

Recommendations
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Remarks
The course takes place each second summer term: 2018/2020. . .
Course: Financial Intermediation [T-WIWI-102623]

Responsibility: Martin Ruckes

Contained in:
- [M-WIWI-101480] Finance 3
- [M-WIWI-101502] Economic Theory and its Application in Finance
- [M-WIWI-101483] Finance 2

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Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins. The exam is offered each semester.

Conditions
None

Recommendations
None

Event excerpt: Financial Intermediation (WS 17/18)

Aim
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.

Content
- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Stability of the financial system
- The macroeconomic role of financial intermediation
- Principles of the prudential regulation of banks

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

Literature
Elective literature:
Course: Finite Element Methods [T-MATH-105857]

Responsibility: Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners

Contained in: [M-MATH-102891] Finite Element Methods

ECTS: 8
Version: 1
### Course: Finite group schemes [T-MATH-106486]

**Responsibility:** Fabian Januszewski  
**Contained in:** [M-MATH-103258] Finite group schemes

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**Course: Fixed Income Securities [T-WIWI-102644]**

**Responsibility:** Marliese Uhrig-Homburg

**Contained in:**
- [M-WIWI-101480] Finance 3
- [M-WIWI-101483] Finance 2

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**Events**

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**Learning Control / Examinations**
The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation SPO2015 and may be supplemented by a non exam assessment according to § 4 paragraph 2 Nr. 3. The examination is offered every semester and can be repeated at every regular examination date.

**Conditions**
None

**Recommendations**
See German version.

**Remarks**
See German version.

**Event excerpt: Fixed Income Securities (WS 17/18)**

**Aim**
The objective of this course is to become familiar with national and international bond markets. Therefore, we first have a look at financial instruments that are of particular importance. Thereafter, specific models and methods that allow the evaluation of interest rate derivatives are introduced and applied.

**Content**
The lecture deals with both German and international bond markets, which are an important source of funding for both the corporate and the public sector. After an overview of the most important bond markets, various definitions of return are discussed. Based on that, the concept of the yield curve is presented. The modelling of the dynamics of the term structure of interest rates provides the theoretical foundation for the valuation of interest rate derivatives, which is discussed in the last part of the lecture.

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

**Literature**

**Elective literature:**
Course: Forecasting: Theory and Practice [T-MATH-105928]

Responsibility: Tilmann Gneiting

Contained in: [M-MATH-102956] Forecasting: Theory and Practice

ECTS: 8
Version: 1

Conditions
none
Course: Fourier Analysis [T-MATH-105845]

Responsibility: Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-102873] Fourier Analysis

ECTS: 8
Version: 1
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Course: Functions of Matrices [T-MATH-105906]

Responsibility: Volker Grimm
Contained in: [M-MATH-102937] Functions of Matrices

ECTS 8 Version 1

Conditions
none
Course: Functions of Operators [T-MATH-105905]

Responsibility:

Contained in:  [M-MATH-102936] Functions of Operators

ECTS 6  Version 1
Course: Generalized Regression Models [T-MATH-105870]

Responsibility: Norbert Henze, Bernhard Klar

Contained in: [M-MATH-102906] Generalized Regression Models

ECTS 4  Version 1

Conditions
none
Course: Geometric Group Theory [T-MATH-105842]

Responsibility: Frank Herrlich, Enrico Leuzinger, Gabriele Link, Roman Sauer, Petra Schwer, Wilderich Tuschmann

Contained in: [M-MATH-102867] Geometric Group Theory

ECTS 8
Recurrence Unregelmäßig
Version 1
Course: Geometric Numerical Integration [T-MATH-105919]

Responsibility: Marlis Hochbruck, Tobias Jahnke

Contained in: [M-MATH-102921] Geometric Numerical Integration

ECTS 6

Version 1

Conditions
none
Course: Geometry of Schemes [T-MATH-105841]

Responsibility: Frank Herrlich, Stefan Kühnlein

Contained in: [M-MATH-102866] Geometry of Schemes

ECTS

Version

1
# Course: Global Differential Geometry [T-MATH-105885]

**Responsibility:** Sebastian Grensing, Wilderich Tuschmann  
**Contained in:** [M-MATH-102912] Global Differential Geometry

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**Conditions**  
none

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Economathematics (M.Sc.)  
Course: Global optimization I [T-WIWI-102726]

Responsibility: Oliver Stein

Contained in:
- Applications of Operations Research [M-WIWI-101413]
- Methodical Foundations of OR [M-WIWI-101414]
- Mathematical Programming [M-WIWI-101473]

ECTS: 4.5
Recurrence: Jedes Wintersemester
Version: 1

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Learning Control / Examinations
Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO) and possibly of a compulsory prerequisite.
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.

Conditions
None

Modeled Conditions
The following conditions must be met:
- The course [T-WIWI-103638] Global optimization I and II must not have been started.

Recommendations
None

Remarks
Part I and II of the lecture are held consecutively in the same semester.

Event excerpt: (SS 2017)

Aim
The student

- knows and understands the fundamentals of deterministic global optimization in the convex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the convex case in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.
Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:
- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture. The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Literature**

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
# Course: Global optimization I and II [T-WIWI-103638]

**Responsibility:** Oliver Stein  
**Contained in:**  
- [M-WIWI-101414] Methodical Foundations of OR  
- [M-WIWI-101473] Mathematical Programming

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## Learning Control / Examinations

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.

The examination is held in the semester of the lecture and in the following semester.

### Conditions

None

### Modeled Conditions

The following conditions must be met:

1. The course [T-WIWI-102726] *Global optimization I* must not have been started.
2. The course [T-WIWI-102727] *Global optimization II* must not have been started.

### Recommendations

None

### Remarks

Part I and II of the lecture are held consecutively in the same semester.
**Course: Global optimization II [T-WIWI-102727]**

**Responsibility:** Oliver Stein  
**Contained in:** [M-WIWI-101414] Methodical Foundations of OR  
[M-WIWI-101473] Mathematical Programming

**ECTS**  
Recurrence: Jedes Wintersemester  
Version: 1

### Events

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**Learning Control / Examinations**
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation and possibly of a compulsory prerequisite.
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.

**Conditions**
None

**Modeled Conditions**
The following conditions must be met:
- The course [T-WIWI-103638] Global optimization I and II must not have been started.

**Remarks**
Part I and II of the lecture are held consecutively in the same semester.

**Event excerpt:** (SS 2017)

**Aim**
The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

**Content**
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify local optimizers, while it is much harder to find globally optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.
The global solution of convex optimization problems is subject of part I of the lecture.
Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via αBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

**Literature**

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
Course: Graph Theory [T-MATH-102273]

Responsibility: Maria Aksenovich
Contained in: [M-MATH-101336] Graph Theory

ECTS 8  Version 1

Conditions
None
Course: Graph Theory and Advanced Location Models [T-WIWI-102723]

Responsibility: Stefan Nickel

Contained in: [M-WIWI-101473] Mathematical Programming
[M-WIWI-103289] Stochastic Optimization

ECTS: 4.5  Recurrence: Unregelmäßig  Version: 1

Learning Control / Examinations
The assessment is a 120 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.

Conditions
None

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research [WI1OR] is assumed.

Remarks
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.
Course: Group Actions in Riemannian Geometry [T-MATH-105925]

Responsibility: Wilderich Tuschmann

Contained in: [M-MATH-102954] Group Actions in Riemannian Geometry

ECTS 5

Version 1

Conditions
none
**Course: Heat Economy [T-WIWI-102695]**

**Responsibility:** Wolf Fichtner  
**Contained in:** [M-WIWI-101452] Energy Economics and Technology

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**Learning Control / Examinations**

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

**Conditions**

None.

**Recommendations**

None

**Remarks**

See German version.

**V Event excerpt: Heat Economy (SS 2017)**

**Aim**

The student gains detailed knowledge about heat generating technologies and their areas of application, in particular in the area of combined heat and power. The student is able to deal with technical and economic questions in this field.

**Content**

1. Introduction: Heat economy  
2. CHP technologies (incl. calculation of profitability)  
3. Heat systems (incl. calculation of profitability)  
4. Distribution of heat  
5. Demand for space heating and thermal insulation measures  
6. Heat storage  
7. Legal framework conditions  
8. Laboratory experiment: compression heat pump

**Workload**

The total workload for this course is approximately 90 hours. For further information see German version.
Course: Homotopy Theory [T-MATH-105933]

Responsibility: Roman Sauer

Contained in: [M-MATH-102959] Homotopy Theory

ECTS: 8
Version: 1
**Course: Incentives in Organizations [T-WIWI-105781]**

**Responsibility:** Petra Nieken

**Contained in:**
- [M-WIWI-101500] Microeconomic Theory
- [M-WIWI-101505] Experimental Economics

**ECTS**
- 4.5

**Language**
- englisch

**Recurrence**
- Jedes Sommersemester

**Version**
- 1

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<td>2573004</td>
<td>Übung zu Incentives in Organizations</td>
<td>Übung (Ü)</td>
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<td>Mitarbeiter, Petra Nieken</td>
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**Learning Control / Examinations**

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. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

**Conditions**

None

**Recommendations**

Knowledge of microeconomics, game theory, and statistics is assumed.

**Remarks**

The course is carried out routinely in summer.

---

**Event excerpt: Incentives in Organizations (SS 2017)**

**Aim**

The student

- develops a strategic understanding about incentives systems and how they work.
- analyzes models from personnel economics. He / she is able to use both, standard economic models and behavioral models.
- understands how econometric methods can be used to analyze performance and compensation data.
- is able to read and interpret results from regressions and derive economic relevance from those results.
- knows incentives 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 for companies.
- understands the challenges of managing incentive and compensation systems and their relationship with corporate strategy.

**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.

**Workload**

The total workload for this course is approximately 135 hours.

- Lecture 32h
- Preparation of lecture 52h
- Exam preparation 51h
Literature
Literature (mandatory): Slides, case studies, and selected research papers announced in the lecture
Literature (additional):
Brickley / Smith / Zimmerman: Managerial Economics and Organizational Architecture
Camerer: Behavioral Game Theory
Lazear / Gibbs: Personnel Economics in Practice
Wooldridge: Introduction to Econometrics
Wooldridge: Econometric Analysis of Cross Section and Panel Data
**Course: Information Service Engineering [T-WIWI-106423]**

**Responsibility:** Harald Sack  
**Contained in:** [M-WIWI-101472] Informatics

**ECTS** 5  
**Language** englisch  
**Recurrence** Jedes Sommersemester  
**Version** 1

**Events**

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**Learning Control / Examinations**

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.

**Conditions**

None

**Remarks**

New course starting summer term 2017.

---

**V Event excerpt: (SS 2017)**

**Aim**

- 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.

**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
- Linked Data Engineering
  - Knowledge Representations and Ontologies
• What’s in an URI?
• Resource Description Framework (RDF)
• Creating new Models with RDFS
• Querying RDF(S) with SPARQL
• More Expressivity with Web Ontology Language (OWL)
• The Web of Data
• Vocabularies and Ontologies in the Web of Data
• Wikipedia, DBpedia, and Wikidata

- Information Retrieval
  • Information Retrieval Models
  • Retrieval Evaluation
  • Web Information Retrieval
  • Document Crawling, Text Processing, and Indexing
  • Query Processing and Result Representation
  • Question Answering

- Knowledge Mining
  • From Data to Knowledge
  • Data Mining
  • Machine Learning Basics for Knowledge Mining
  • Mining Knowledge from Wikipedia
  • Named Entity Resolution

- Exploratory Search and Recommender Systems
  • Semantic Search and Entity Centric Search
  • Collaborative Filtering and Content Based Recommendations
  • From Search to Intelligent Browsing
  • Linked Data Based Exploratory Search
  • Fact Ranking

Literature
Course: Innovationtheory and -Policy [T-WIWI-102840]

Responsibility: Ingrid Ott
Contained in: [M-WIWI-101478] Innovation and growth

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<td>Levent Eraydin, Ingrid Ott</td>
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Learning Control / Examinations
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.

Conditions
None

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.

Event excerpt: Innovationtheory and -policy (SS 2017)
Aim
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

Content
- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

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

Literature
Excerpt:
Course: Insurance Marketing [T-WIWI-102601]

Responsibility: Edmund Schwake
Contained in: [M-WIWI-101469] Insurance Management I

ECTS: 4.5
Recurrence: Jedes Sommersemester
Version: 1

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None

Recommendations
None
Course: Insurance Production [T-WIWI-102648]

Responsibility: Ute Werner
Contained in: [M-WIWI-101469] Insurance Management I

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<td>Klaus Besserer, Ute Werner</td>
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Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).
T-WIWI-102648 Insurance Production will be offered latest until summer term 2017 (beginners only).

Conditions
None

Recommendations
None

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.kit.edu

Event excerpt: Insurance Production (SS 2017)

Aim
See German version.

Content
See German version.

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

Literature
Elective literature:
Course: Insurance Risk Management [T-WIWI-102636]

Responsibility: Harald Maser
Contained in: [M-WIWI-101469] Insurance Management I

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<td>Vorlesung (V)</td>
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<td>Harald Maser</td>
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Learning Control / Examinations
The assessment consists of a written or an oral exam (according to Section 4 (2), 1 or 2 of the examination regulation). T-WIWI-102636 Insurance Risk Management will be offered as a seminar starting summer term 2017. The examination will be offered latest until summer term 2017 (beginners only).

Conditions
None

Recommendations
None

Remarks
Block course. For organizational reasons, please register with the secretary of the chair: thomas.mueller3@kit.edu.

Event excerpt: Insurance Risk Management (SS 2017)

Aim
Getting to know basic principles of risk management in insurance companies and credit institutions.

Content


Workload
The total workload for this course is approximately 75.0 hours. For further information see German version.

Literature

Elective literature:
- “Mindestanforderungen an ein (Bank-)Risikomanagement”, www.bafin.de
Course: Integral Equations [T-MATH-105834]

Responsibility: Tilo Arens, Frank Hettlich, Andreas Kirsch

Contained in: [M-MATH-102874] Integral Equations

ECTS 8

Version 1
Course: International Finance [T-WIWI-102646]

Responsibility: Marliese Uhrig-Homburg

Contained in: [M-WIWI-101480] Finance 3
[M-WIWI-101483] Finance 2

ECTS: 3
Language: deutsch
Recurrence: Jedes Sommersemester
Version: 1

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Learning Control / Examinations
See German version.

Conditions
None

Recommendations
None

Remarks
See German version.

Event excerpt: International Finance (SS 2017)

Aim
The objective of this course is to become familiar with the basics of investment decisions on international markets and to manage foreign exchange risks.

Content
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Elective literature:
Course: Introduction into Particulate Flows [T-MATH-105911]

Responsibility:  Willy Dörfler
Contained in:  [M-MATH-102943] Introduction into Particulate Flows

ECTS  Version
3   1

Conditions
none
Course: Introduction to Geometric Measure Theory [T-MATH-105918]

Responsibility: Steffen Winter

Contained in: [M-MATH-102949] Introduction to Geometric Measure Theory

ECTS: 6

Version: 1

Conditions
none
Course: Introduction to Matlab and Numerical Algorithms [T-MATH-105913]

Responsibility: Daniel Weiß, Christian Wieners

Contained in: [M-MATH-102945] Introduction to Matlab and Numerical Algorithms

ECTS: 5
Version: 1

Conditions: none
Course: Introduction to Scientific Computing [T-MATH-105837]

Responsibility: Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners

Contained in: [M-MATH-102889] Introduction to Scientific Computing

ECTS 8  Version 1
Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsibility: Steffen Rebennack

Contained in: [M-WIWI-101414] Methodical Foundations of OR
[M-WIWI-101454] Stochastic Modelling and Optimization
[M-WIWI-103289] Stochastic Optimization

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Learning Control / Examinations

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.

Conditions

None.

Event excerpt: (SS 2017)

Aim

The student

- names and describes basic notions of stochastic optimization,
- knows the indispensable methods and models for quantitative analysis,
- models and classifies stochastic optimization problems and is able to quantify the value of the stochastic optimization approach compared to a deterministic method,
- validates, illustrates and interprets the obtained solutions.

Content

This class is an introduction in stochastic optimization. Stochastic optimization is the discipline of modeling and solving optimization problems, where some input data are not know with certainty at the time when the decision is made. However, stochastic information is assumed available for these uncertain data, in form of a distribution. This class focuses on discrete distributions and it quantifies the value of stochastic optimization approaches. In addition, we cover special algorithms to solve stochastic optimization approaches. Other methods to model optimization problems under uncertainty are also discussed.

Literature

- Antonio J. Conejo, Miguel Carrión and Juan M. Morales, Decision Making Under Uncertainty in Electricity Markets, Springer, 2010
Course: Inverse Problems [T-MATH-105835]

Responsibility: Tilo Arens, Frank Hettlich, Andreas Kirsch, Andreas Rieder

Contained in: [M-MATH-102890] Inverse Problems

ECTS: 8  Version: 1
Course: Knowledge Discovery [T-WIWI-102666]

Responsibility: York Sure-Vetter

Contained in: [M-WIWI-101472] Informatics

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<td>WS 17/18</td>
<td>2511302</td>
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<td>Exercises to Knowledge Discovery</td>
<td>Übung (U)</td>
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<td>Aditya Mogadala, Achim Rettinger, York Sure-Vetter</td>
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Learning Control / Examinations

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.

Conditions

None

Event excerpt: Knowledge Discovery (WS 17/18)

Aim

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.

Content

Topics of the lectures comprise the whole Machine Learning and Data Mining process like CRISP, data warehousing, OLAP-techniques, learning algorithms, visualization and empircal evaluation. Covered learning techniques range from traditional approaches like decision trees, neural networks and support vector machines to selected approaches resulting from current research. Discussed learning problems are amongst others feauturevector-based learning, text mining and social network analysis.

Workload

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

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
Course: L2-Invariants [T-MATH-105924]

Responsibility: Holger Kammeyer, Roman Sauer

Contained in: [M-MATH-102952] L2-Invariants

ECTS: 5  Version: 1

Conditions: none
Course: Large-scale Optimization [T-WIWI-106549]

Responsibility: Steffen Rebennack

Contained in:
- [M-WIWI-101473] Mathematical Programming
- [M-WIWI-103289] Stochastic Optimization

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Learning Control / Examinations
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.

Conditions
None.
Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]

Responsibility: Johann Marius Zöllner

Contained in: [M-WIWI-101472] Informatics

ECTS: 5
Language: deutsch
Recurrence: Jedes Wintersemester
Version: 1

Events

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<td>WS 17/18</td>
<td>24150</td>
<td>Machine Learning 1 - Basic methods</td>
<td>Vorlesung (V)</td>
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<td>Rüdiger Dillmann, Johann Marius Zöllner</td>
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Learning Control / Examinations
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.

Conditions
None.

Remarks

Event excerpt: Machine Learning 1 - Basic methods (WS 17/18)

Aim
- Studierende erlangen Kenntnis der grundlegenden Methoden im Bereich des Maschinellen Lernens.
- Studierende können Methoden des Maschinellen Lernens einordnen, formal beschreiben und bewerten.
- Die Studierenden können ihr Wissen für die Auswahl geeigneter Modelle und Methoden für ausgewählte Probleme im Bereich des Maschinellen Lernens einsetzen.

Content
Das Themenfeld Wissensakquisition und Maschinelles Lernen ist ein stark expandierendes Wissensgebiet und Gegenstand zahlreicher Forschungs- und Entwicklungsvorhaben. Der Wissenserwerb kann dabei auf unterschiedliche Weise erfolgen. So kann ein System Nutzen aus bereits gemachten Erfahrungen ziehen, es kann trainiert werden, oder es zieht Schlüsse aus umfangreichem Hintergrundwissen.

Workload
Vorlesung mit 2 SWS, plus Nachbereitung durch die Studierenden.
Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]

Responsibility: Johann Marius Zöllner
Contained in: [M-WIWI-101472] Informatics

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Learning Control / Examinations
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.

Conditions
None.

Remarks
New course starting summer term 2017.

Event excerpt: Machine Learning 2 - Advanced methods (SS 2017)

Aim
- Students gain knowledge of the basic methods in the field of machine learning.
- Students understand advanced concepts of machine learning and their application.
- 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.

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.).

Workload
Vorlesung mit 2 SWS, plus Nachbereitung durch die Studierenden.

Literature
Die Foliensätze sind als PDF verfügbar.

Weiterführende Literatur
• Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.
Course: Management of IT-Projects [T-WIWI-102667]

Responsibility: Roland Schätzle
Contained in: [M-WIWI-101472] Informatics

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<td>SS 2017</td>
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</table>

Learning Control / Examinations
The assessment of this course is a written examination (60 min) in the first week after lecture period according to Section 4(2), 1 of the examination regulation.

Conditions
None

Event excerpt: Management of IT-Projects (SS 2017)

Aim
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 organizational and social impact factors.

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.

Workload
Lecture 30h
Exercise 15h
Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam & 1h

Total: 150h

**Literature**

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004

Further literature is given in each lecture individually.
Course: Market Research [T-WIWI-107720]

Responsibility:


ECTS
4.5

Recurrence
Jedes Sommersemester

Version
1

Learning Control / Examinations

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

Recommendations
None

Remarks
Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.
**Course: Marketing Communication [T-WIWI-102902]**

**Responsibility:** Ju-Young Kim

**Contained in:** [M-WIWI-101490] Marketing Management

**ECTS:** 4.5

**Language:** deutsch

**Recurrence:** Jedes Sommersemester

**Version:** 1

### Events

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</table>

**Learning Control / Examinations**

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

**Conditions**

None

**Recommendations**

None

### Event excerpt: Marketing Communication (SS 2017)

**Content**

The aim of this lecture is to provide an overview of research on marketing communication tools, such as offline and online advertising, WOM communication and viral marketing, price promotions and corporate social responsibility activities.

**Literature**

- Esch, F.-R./Herrmann, A./Sattler, H. “Marketing – Eine managerorientierte Einführung”
- Kroeber-Riel, W./Esch, F-R. “Strategie und Technik der Werbung”

See lecture slides for further recommendations on literature.
Course: Marketing Strategy Business Game [T-WIWI-102835]

Responsibility: Martin Klarmann  

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Learning Control / Examinations


Conditions

None

Recommendations

None

Remarks

Please note that only one of the following courses can be chosen in the Marketing Management Module: Marketing Strategy Business Game, Strategic Brand Management, Open Innovation – Concepts, Methods and Best Practices or Business Plan Workshop.

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.

Event excerpt: Marketing Strategy Business Game (SS 2017)

Aim
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

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.

Workload
The total workload for this course is approximately 45.0 hours. For further information see German version.

Literature
Course: Markov Decision Models I [T-WIWI-102710]

Responsibility: Karl-Heinz Waldmann

Contained in: [M-WIWI-101400] Stochastic Methods and Simulation
[M-WIWI-101454] Stochastic Modelling and Optimization

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Learning Control / Examinations
The examination T-WIWI-102710 Markov Decision Models I will be offered latest until summer term 2017 (for beginners). The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

Conditions
None
Course: Markov Decision Models II [T-WIWI-102711]

Responsibility: Karl-Heinz Waldmann

Contained in: [M-WIWI-101400] Stochastic Methods and Simulation
[M-WIWI-101454] Stochastic Modelling and Optimization

ECTS: 4.5
Recurrence: Jedes Sommersemester
Version: 1

Learning Control / Examinations
The examination T-WIWI-102711 Markov Decision Models II will be offered latest until winter term 2016/2017 (for beginners).
The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

Conditions
None

Recommendations
Foundations in the field of the Markov Decision Models I [2550679] are desired.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Markov Decision Processes [T-MATH-105921]

Responsibility: Nicole Bäuerle

Contained in: [M-MATH-102907] Markov Decision Processes

ECTS: 5  Version: 1

Conditions: none
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<th>Course: Master Thesis [T-MATH-105878]</th>
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<td><strong>Responsibility:</strong> Sebastian Grensing</td>
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Economathematics (M.Sc.)
Course: Mathematical Methods in Signal and Image Processing [T-MATH-105862]

Responsibility: Andreas Rieder


ECTS

Version 1

Conditions
none
Course: Mathematical Methods of Imaging [T-MATH-106488]

Responsibility:  Andreas Rieder

Contained in:  [M-MATH-103260] Mathematical Methods of Imaging

ECTS  5  
Recurrence  Unregelmäßig  
Version  1  

Conditions  
None
Course: Mathematical Modelling and Simulation in Practise [T-MATH-105889]

Responsibility: Gudrun Thäter

Contained in: [M-MATH-102929] Mathematical Modelling and Simulation in Practise

ECTS: 4
Version: 1
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<th>Course: Mathematical Statistics [T-MATH-105872]</th>
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<tr>
<td><strong>Responsibility:</strong> Norbert Henze, Bernhard Klar</td>
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Course: Maxwell’s Equations [T-MATH-105856]

Responsibility:  Tilo Arens, Frank Hettlich, Andreas Kirsch

Contained in:  [M-MATH-102885] Maxwell’s Equations

ECTS:  8  
Version:  1
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**Conditions**
none
**Course: Mixed Integer Programming I [T-WIWI-102719]**

**Responsibility:** Oliver Stein

**Contained in:**
- Mathematical Programming [M-WIWI-101473]
- Stochastic Optimization [M-WIWI-103289]
- Operations Research in Supply Chain Management [M-WIWI-102832]

**ECTS**

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**Learning Control / Examinations**

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.

**Conditions**
None

**Recommendations**
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

**Remarks**
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

**Event excerpt:** (WS 17/18)

**Aim**
The student
- knows and understands the fundamentals of linear mixed integer programming,
- is able to choose, design and apply modern techniques of linear mixed integer programming in practice.

**Content**
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.

The lecture treats methods for the numerical solution of linear optimization problems which depend on continuous as well as discrete variables. It is structured as follows:
- Existence results and concepts of linear as well as convex optimization
- LP relaxation and error bounds for rounding
- Gomory’s cutting plane method
- Benders decomposition

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
Part II of the lecture treats nonlinear mixed integer programs. The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature

- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
Course: Mixed Integer Programming I and II [T-WIWI-102733]

Responsibility: Oliver Stein

Contained in: [M-WIWI-101473] Mathematical Programming

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<td>mann, Oliver Stein</td>
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Learning Control / Examinations

The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation.

Conditions

None.

Remarks

Please refer to the partial exams to find the learning objectives and content.

Event excerpt: (WS 17/18)

Aim

The student

- knows and understands the fundamentals of linear mixed integer programming,
- is able to choose, design and apply modern techniques of linear mixed integer programming in practice.

Content

Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.

The lecture treats methods for the numerical solution of linear optimization problems which depend on continuous as well as discrete variables. It is structured as follows:

- Existence results and concepts of linear as well as convex optimization
- LP relaxation and error bounds for rounding
- Gomory's cutting plane method
- Benders decomposition

Part II of the lecture treats nonlinear mixed integer programs.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature

- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
Course: Mixed Integer Programming II [T-WIWI-102720]

Responsibility: Oliver Stein

Contained in:
- [M-WIWI-101473] Mathematical Programming
- [M-WIWI-103289] Stochastic Optimization

ECTS: 4.5
Recurrence: Jedes Sommersemester
Version: 1

Learning Control / Examinations
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.

Conditions
None

Recommendations
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.iwr.kit.edu).
Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

Responsibility: Stefan Nickel

ECTS
Recurrence
Version
4.5
Jedes Semester
2

Learning Control / Examinations
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.

Conditions
None.

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research is assumed.
Successful completion of the course Modeling and OR-Software: Introduction.

Remarks
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.
**Course: Modeling and OR-Software: Introduction**

**Responsibility:** Stefan Nickel

**Contained in:** [M-WIWI-101413] Applications of Operations Research

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<td>Praktikum (P)</td>
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**Learning Control / Examinations**

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.

**Conditions**

None

**Recommendations**

Firm knowledge of the contents from the lecture *Introduction to Operations Research* [2550040] of the module *Operations Research* [WW1OR].

**Remarks**

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.

**Event excerpt: (WS 17/18)**

**Aim**

The student

- evaluates the possibilities of computer usage in practical applications of Operations Research,
- is capable of classifying and utilizing the general possibilities and fields of usage of modeling and implementation software for solving OR models in practice,
- models and solves problems arising in industry applications with the aid of computer-supported optimization methods.

**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.

**Workload**

The total workload for this course is approximately 135.0 hours. For further information see German version.
Course: Modelling, Measuring and Managing of Extreme Risks [T-WIWI-102841]

Responsibility: Ute Werner

Contained in: [M-WIWI-101469] Insurance Management I

ECTS: 2.5
Language: deutsch
Recurrence: Jedes Sommersemester
Version: 1

Events

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<td>2530355</td>
<td>Modelling, Measuring and Managing of Extreme Risks</td>
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</table>

Learning Control / Examinations
Non exam assessment (following §4(2), 3 of the examination regulation).
T-WIWI-102841 Modelling, Measuring and Managing of Extreme Risks will be offered latest until summer term 2017 (beginners only).

Conditions
None

Recommendations
None

Event excerpt: Modelling, Measuring and Managing of Extreme Risks (SS 2017)

Aim
See German version.

Content

- Threshold models, generalized pareto distribution, threshold selection, parameter estimation, point process characterization, estimation under maximum domain: Pickands’s estimator, Hill’s estimator, Deckers-Einmahl-de Haan estimator.
- Catastrophe model approaches, simulation of earthquakes, hurricanes, and floods, vulnerability functions, loss estimation. Indirectvsdirecteffects.
- Case study presentations: Household level index based insurance systems (India, Ethiopia, SriLanka, China), insurance back-up systems coupled with public-private partnerships (France, US), Reinsurance approaches (Munich Re, Swiss Re, Allianz).

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18

341
• Climate Change topics: IPCC report, global and climate change.

Workload
The total workload for this course is approximately 75.0 hours. For further information see German version.

Literature
Course: Multivariate Statistical Methods [T-WIW1-103124]

Responsibility: Oliver Grothe

Contained in: [M-WIW1-101637] Analytics and Statistics
[M-WIW1-101639] Econometrics and Statistics II
[M-WIW1-103289] Stochastic Optimization

ECTS
Recurrence
Version

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<td>Maximilian Coblenz, Oliver Grothe</td>
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Learning Control / Examinations
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.

Conditions
None

Recommendations
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.
**Course: Nature-Inspired Optimisation Methods [T-WIWI-102679]**

**Responsibility:** Pradyumn Kumar Shukla  
**Contained in:** [M-WIWI-101472] Informatics

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### Events

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**Learning Control / Examinations**

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).

**Conditions**

None

---

**V Event excerpt: (SS 2017)**

**Aim**

To learn:

1. Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
2. Different aspects and limitation of the methods
3. Applications of such methods
4. Multi-objective optimization methods
5. Constraint handling methods
6. Different aspects in parallelization and computing platforms

**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.

**Literature**

Course: Non- and Semiparametrics [T-WIWI-103126]

Responsibility: Melanie Schienle
Contained in: [M-WIWI-101638] Econometrics and Statistics I
[M-WIWI-101639] Econometrics and Statistics II

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Learning Control / Examinations
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

Recommendations
Knowledge of the contents covered by the course “Applied Econometrics” [2520020]
## Course: Nonlinear Maxwell Equations [T-MATH-106484]

**Responsibility:** Roland Schnaubelt  
**Contained in:** [M-MATH-103257] Nonlinear Maxwell Equations

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**Conditions**  
Keine
Course: Nonlinear Optimization I [T-WWI-102724]

Responsibility: Oliver Stein

Contained in: [M-WWI-101414] Methodical Foundations of OR
[M-WWI-101473] Mathematical Programming
[M-WWI-101400] Stochastic Methods and Simulation

ECTS: 4.5
Recurrence: Jedes Semester
Version: 2

Events

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</table>

Learning Control / Examinations

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 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.

Conditions

The module component exam T-WWI-103637 “Nonlinear Optimization I and II” may not be selected.

Remarks

Part I and II of the lecture are held consecutively in the same semester.

Event excerpt: (WS 17/18)

Aim

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.

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, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.
Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
Course: Nonlinear Optimization I and II [T-WIWI-103637]

Responsibility: Oliver Stein
Contained in: [M-WIWI-101414] Methodical Foundations of OR
[M-WIWI-101473] Mathematical Programming

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</table>

Learning Control / Examinations
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.

Conditions
None.

Remarks
Part I and II of the lecture are held consecutively in the same semester.

Event excerpt: (WS 17/18)

Aim
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.

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, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of 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 for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:
- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
Event excerpt: (WS 17/18)

Aim
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.

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, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality conditions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- 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]

Responsibility: Oliver Stein

Contained in: [M-WIWI-101414] Methodical Foundations of OR
[M-WIWI-101473] Mathematical Programming

ECTS

Recurrence
Jedes Wintersemester

Version
2

Events

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<td>Vorlesung (V)</td>
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Learning Control / Examinations

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.

Conditions

None.

Remarks

Part I and II of the lecture are held consecutively in the same semester.

Event excerpt: (WS 17/18)

Aim

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.

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, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of 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 for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature

Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
• M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
Course: Nonparametric Statistics [T-MATH-105873]

Responsibility: Norbert Henze, Bernhard Klar
Contained in: [M-MATH-102910] Nonparametric Statistics

ECTS 4  Version 1

Conditions
none
Course: Numerical Continuation Methods [T-MATH-105912]

Responsibility: Jens Rottmann-Matthes

Contained in: [M-MATH-102944] Numerical Continuation Methods

ECTS 5

Version 1

Conditions
none
Course: Numerical Methods for Differential Equations [T-MATH-105836]

Responsibility: Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners


ECTS 8  Version 1
Course: Numerical Methods for Hyperbolic Equations [T-MATH-105900]

Responsibility: Willy Dörfler

Contained in: [M-MATH-102915] Numerical Methods for Hyperbolic Equations

ECTS

Version

Conditions
none
Course: Numerical Methods for Integral Equations [T-MATH-105901]

Responsibility: Tilo Arens, Frank Hettlich, Andreas Kirsch

Contained in: [M-MATH-102930] Numerical Methods for Integral Equations

ECTS 8  Version 1
Course: Numerical Methods for Maxwell's Equations [T-MATH-105920]

Responsibility: Marlis Hochbruck, Tobias Jahnke


ECTS 6  Version 1
Course: Numerical Methods for Time-Dependent Partial Differential Equations
[T-MATH-105899]

Responsibility: Marlis Hochbruck, Tobias Jahnke


ECTS 8  Version 1
Course: Numerical Methods in Computational Electrodynamics [T-MATH-105860]

Responsibility: Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners

Contained in: [M-MATH-102894] Numerical Methods in Computational Electrodynamics

ECTS 6  Version 1

Conditions
none
Course: Numerical Methods in Fluid Mechanics [T-MATH-105902]

Responsibility: Willy Dörfler, Gudrun Thäter

Contained in: [M-MATH-102932] Numerical Methods in Fluid Mechanics

ECTS 4
Version 1
Course: Numerical Methods in Mathematical Finance [T-MATH-105865]

Responsibility: Tobias Jahnke

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

ECTS 8  Version 1

Conditions

none
Course: Numerical Methods in Mathematical Finance II [T-MATH-105880]

Responsibility: Tobias Jahnke
Contained in: [M-MATH-102914] Numerical Methods in Mathematical Finance II

ECTS 8  Version 1

Learning Control / Examinations
Mündliche Prüfung im Umfang von ca. 30 Minuten

Conditions
none
Course: Numerical Optimisation Methods [T-MATH-105858]

Responsibility:  Willy Dörfler, Marlis Hochbruck, Tobias Jahnke, Andreas Rieder, Christian Wieners

Contained in:  [M-MATH-102892] Numerical Optimisation Methods

ECTS 8  Version 1
Course: Open Innovation - Concepts, Methods and Best Practices  
[T-WIWI-102901]  

Responsibility:  Alexander Hahn  

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<td>Open Innovation – Concepts, Methods and Best Practices</td>
<td>Block (B)</td>
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<td>Alexander Hahn</td>
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</table>

### Learning Control / Examinations


### Conditions

None  

### Recommendations

None  

### Remarks

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.ism.kit.edu) shortly before the lecture period in summer term starts.  

Please note that only one of the following courses can be chosen in the Marketing Management Module: Marketing Strategy Business Game, Strategic Brand Management, Open Innovation – Concepts, Methods and Best Practices or Business Plan Workshop.  

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.  

### Event excerpt: Open Innovation – Concepts, Methods and Best Practices (SS 2017)

**Aim**

Students

- know approaches, objectives, advantages and disadvantages of Open Innovation,  
- know strategy, processes, methods and fields of application of Open Innovation,  
- understand success factors by means of best practices from real life projects,  
- can apply Open Innovation methods on their own.  

**Content**

Joy’s Law: “No matter who you are, most of the smartest people work for someone else” (Bill Joy, Co-Founder Sun Microsystems)  

This lecture conveys an understanding and practical application of Open Innovation, i.e. the collaborative opening of the innovation process to customers, suppliers, partners, competitors, new markets.... The contents encompass among others:

- approaches, objectives, advantages and disadvantages of Open Innovation  
- knowledge of approaches, objectives, advantages and disadvantages of Open Innovation  
- strategy, processes, methods and fields of application of Open Innovation  
- focus mainly on customer integration into the innovation process (e.g. Netnography, Crowdsourcing, Lead User, Trend Receiver,...)
- Independent application of Open Innovation methods.

**Workload**
Total workload for 1.5 ECTS: ca. 45 hours

**Literature**
To be announced in the course.
Course: Operations Research in Health Care Management [T-WIWI-102884]

Responsibility: Stefan Nickel
Contained in: [M-WIWI-102805] Service Operations

ECTS: 4.5
Recurrence: Unregelmäßig
Version: 1

Learning Control / Examinations
The assessment is a 120 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.

Conditions
None

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research [WI1OR] is assumed.

Remarks
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.
Course: Operations Research in Supply Chain Management [T-WIWI-102715]

Responsibility: Stefan Nickel

Contained in:
- [M-WIWI-101473] Mathematical Programming
- [M-WIWI-103289] Stochastic Optimization
- [M-WIWI-102805] Service Operations

ECTS: 4.5, Recurrence: Unregelmäßig, Version: 1

Learning Control / Examinations
The assessment is a 120 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.

Conditions
None

Recommendations
Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM, Tactical and operational SCM is assumed.

Remarks
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.
Course: Optimisation and Optimal Control for Differential Equations
[T-MATH-105864]

Responsibility:
Contained in: [M-MATH-102899] Optimisation and Optimal Control for Differential Equations

ECTS
4

Version
1

Conditions
none
Course: Optimization in a Random Environment [T-WIWI-102628]

Responsibility: Karl-Heinz Waldmann

Contained in: [M-WIWI-101454] Stochastic Modelling and Optimization

ECTS: 4.5
Recurrence: Unregelmäßig
Version: 1

Learning Control / Examinations
There are no further examination dates for this course. The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

Conditions
None

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
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<tr>
<th>Responsibility:</th>
<th>Andreas Kirsch</th>
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Conditions
none
Course: Optimization under uncertainty [T-WIWI-106545]

Responsibility: Steffen Rebennack

[M-WIWI-103289] Stochastic Optimization

ECTS: 5
Recurrence: Unregelmäßig
Version: 1

Events

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<td>Assistenten, Steffen Rebennack</td>
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Learning Control / Examinations
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.

Conditions
None.
# Course: OR-Oriented Modeling and Analysis of Real Problems (Project)

[T-WWI-102730]

**Responsibility:** Karl-Heinz Waldmann  
**Contained in:** [M-WWI-101454] Stochastic Modelling and Optimization

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**Learning Control / Examinations**  
There are no further examination dates for this course.  
Presentation and documentation of the results.

**Conditions**  
None

**Remarks**  
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: P&C Insurance Simulation Game [T-WIWI-102797]

Responsibility: Ute Werner
Contained in: [M-WIWI-101469] Insurance Management I

ECTS | Recurrence | Version
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3 | Jedes Wintersemester | 1

Learning Control / Examinations
T-WIWI-102797 P+C Insurance Simulation Game will not be offered anymore from winter term 2016/2017 on.

Conditions
None

Recommendations
See German version.
Course: Panel Data [T-WIWI-103127]

Responsibility: Wolf-Dieter Heller

Contained in: [M-WIWI-101638] Econometrics and Statistics I
           [M-WIWI-101639] Econometrics and Statistics II

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<td>Wolf-Dieter Heller, Carlo Siebenschuh</td>
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Conditions

None
Course: Parametric Optimization [T-WIWI-102855]

Responsibility: Oliver Stein

Contained in: [M-WIWI-101473] Mathematical Programming

ECTS Recurrence Version
4.5 Unregelmäßig 1

Learning Control / Examinations
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.

Conditions
None

Recommendations
It is strongly recommended to visit at least one lecture from the Bachelor program of this chair before attending this course.

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).
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<th>Course: Percolation [T-MATH-105869]</th>
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<tr>
<td>Responsibility: Günter Last</td>
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<tr>
<td>Contained in: [M-MATH-102905] Percolation</td>
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Economathematics (M.Sc.)
Course: Poisson Processes [T-MATH-105922]

Responsibility: Vicky Fasen-Hartmann, Daniel Hug, Günter Last

Contained in: [M-MATH-102922] Poisson Processes

ECTS

Version

Conditions
none
**Course: Portfolio and Asset Liability Management [T-WIWI-103128]**

**Responsibility:** Mher Safarian  
**Contained in:** [M-WIWI-101639] Econometrics and Statistics II

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**Learning Control / Examinations**

The assessment of this course consists of a written examination (following §4(2), 1 SPOs) and of possible additional assignments during the course (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

**Conditions**

None

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**Event excerpt: Portfolio and Asset Liability Management (SS 2017)**

**Aim**
Introduction and deepening of various portfolio management techniques in the financial industry.

**Content**

**Workload**
The total workload for this course is approximately 150 hours. For further information see German version.

**Literature**
To be announced in lecture.

**Elective literature:**
To be announced in lecture.
Course: Potential Theory [T-MATH-105850]

Responsibility: Tilo Arens, Frank Hettlich, Andreas Kirsch, Wolfgang Reichel

Contained in: [M-MATH-102879] Potential Theory

ECTS 8  Version 1
Course: Practical Seminar: Health Care Management (with Case Studies)
[T-WIWI-102716]

Responsibility: Stefan Nickel
Contained in: [M-WIWI-102805] Service Operations

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<td>2550498</td>
<td>Practical seminar: Health Care Management</td>
<td>Veranstaltung (Veranstalt.)</td>
<td>5</td>
<td>Stefan Nickel, Melanie Reuter-Oppermann, Anne Zander</td>
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Learning Control / Examinations
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).

Conditions
None.

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

Remarks
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.
Course: Predictive Mechanism and Market Design [T-WIWI-102862]

Responsibility: Johannes Philipp Reiß
Contained in: [M-WIWI-101505] Experimental Economics

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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

Remarks
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.
Course: Principles of Insurance Management [T-WIWI-102603]

Responsibility: Ute Werner

Contained in: [M-WIWI-101469] Insurance Management I

ECTS: 4.5
Language: deutsch
Recurrence: Jedes Sommersemester
Version: 1

Events

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Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).
The examination will be offered latest until summer term 2017 (beginners only).

Conditions
None

Recommendations
None

Event excerpt: Principles of Insurance Management (SS 2017)

Aim
See German version.

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

Literature

Elective literature:
Will be announced during the lecture.
Course: Probability Theory and Combinatorial Optimization [T-MATH-105923]

Responsibility: Daniel Hug, Günter Last


ECTS
Version

Conditions
none
Course: Product and Innovation Management [T-WIWI-102812]

Responsibility: Martin Klarmann


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Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

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

Event excerpt: Product and Innovation Marketing (SS 2017)

Aim
See German version.

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.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
## Course: Project Centered Software-Lab [T-MATH-105907]

**Responsibility:** Gudrun Thäter  
**Contained in:** [M-MATH-102938] Project Centered Software-Lab

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**Conditions**  
none
Course: Public Management [T-WIWI-102740]

Responsibility: Berthold Wigger
Contained in: [M-WIWI-101504] Collective Decision Making

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Learning Control / Examinations
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.

Conditions
None

Recommendations
Basic knowledge of Public Finance is required.
Course: Quality Control I [T-WIWI-102728]

Responsibility: Karl-Heinz Waldmann
Contained in: [M-WIWI-101454] Stochastic Modelling and Optimization

ECTS: 4.5  Recurrence: Unregelmäßig  Version: 1

Learning Control / Examinations
There are no further examination dates for this course.
The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

Conditions
None

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.
### Course: Quality Control II [T-WIWI-102729]

**Responsibility:** Karl-Heinz Waldmann  
**Contained in:** [M-WIWI-101454] Stochastic Modelling and Optimization

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#### Learning Control / Examinations

There are no further examination dates for this course. The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

**Conditions**
None

**Remarks**
The lecture is offered irregularly. The curriculum of the next two years is available online.
Course: Random Graphs [T-MATH-105929]

Responsibility: Matthias Schulte

Contained in: [M-MATH-102951] Random Graphs

ECTS

Version

Conditions
none
Course: Rational Homotopy Theory [T-MATH-106483]

Responsibility: Manuel Amann, Roman Sauer

Contained in: [M-MATH-103256] Rational Homotopy Theory

ECTS 4

Recurrence Einmalig

Version 1

Conditions
Keine
Course: Requirements Analysis and Requirements Management [T-WIWI-102759]

Responsibility: Ralf Kneuper

Contained in: [M-WIWI-101472] Informatics

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<td>WS 17/18</td>
<td>2511218</td>
<td>Requirements Analysis and Requirements</td>
<td>Vorlesung (V)</td>
<td>2</td>
<td>Ralf Kneuper</td>
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</table>

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None

Event excerpt: Requirements Analysis and Requirements Management (WS 17/18)

Aim
The students have a full understanding of the foundations of the analysis and management of requirements as part of the development process of software and systems. They know the main terminology and approaches of this topic, and are able to express requirements themselves using different description methods.

Content
The analysis and management of requirements is a central task in the development of software and systems, addressing the border between the application discipline and computer science. The adequate performance of this task has a decisive influence on the whether or not a development project will be successful. The lecture provides an introduction to this topic, using the syllabus for the “Certified Professional for Requirements Engineering” (CPRE) as a guideline.

Lecture structure:
1. Introduction and overview, motivation
2. Identifying requirements
3. Documenting requirements (in natural language or using a modelling language such as UML)
4. Verification and validation of requirements
5. Management of requirements
6. Tool support

Workload
Workload: 120h overall,
Lecture 30h
Review and preparation of lectures 60h
Exam preparation 29h
Exam 1h

Literature
Literature will be given in the lecture.
Learning Control / Examinations

The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (30 min.) according to Section 4 (2), 2 of the examination regulation. The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions

None

Recommendations

None

Event excerpt: (WS 17/18)

Aim

Die in die Veranstaltung eingebundenen Fallstudien sollen dabei helfen, Prozesse der Risikokommunikation verstehen zu lernen, um darauf basierend kommunikationspolitische Strategien und Instrumente entwerfen zu können. Dies kann abschließend an einem Konzept für Vision Zero in Deutschland und ähnlichen Risikokommunikationsproblemen geübt werden.

Content

Beispiele zu nicht beabsichtigten Wirkungen bei der Kommunikation zu Unternehmen, Ereignissen, Aktivitäten oder Zielen zeigen immer wieder, wie wichtig es ist, die möglichen Interpretationen der Empfänger bei der Gestaltung von Botschaften zu berücksichtigen.


Die in die Veranstaltung eingebundenen Fallstudien sollen dabei helfen, Prozesse der Risikokommunikation verstehen zu lernen, um darauf basierend kommunikationspolitische Strategien und Instrumente entwerfen zu können. Dies kann abschließend an einem Konzept für Vision Zero in Deutschland.

Alle Teilnehmer tragen aktiv zur Veranstaltung bei, indem sie einen Vortrag halten und eine Ausarbeitung anzufertigen. Dies ist eine Veranstaltung im Modul 'Insurance Management' (M.Sc.), in der auch Seminarscheine erworben werden können. Die Präsentationen und Ausarbeitungen werden überwiegend in Gruppenarbeit erstellt.

Literature

Themenspezifische Literatur wird rechtzeitig vor Veranstaltungsbeginn genannt.
Course: Semantic Web Technologies [T-WIWI-102874]

Responsibility: Andreas Harth, York Sure-Vetter

Contained in: [M-WIWI-101472] Informatics

ECTS 5 Language englisch Recurrence Jedes Sommersemester Version 1

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<td>Andreas Harth, York Sure-Vetter</td>
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<td>SS 2017</td>
<td>2511311</td>
<td>Exercises to Semantic Web Technologies</td>
<td>Übung (U)</td>
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<td>Maribel Acosta, Andreas Harth, York Sure-Vetter</td>
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Learning Control / Examinations
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.

Conditions
None

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

Event excerpt: Semantic Web Technologies (SS 2017)

Aim
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

Content
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

Workload
- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

Literature
Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18

Additional Literature

**Course: Seminar in Business Administration A (Master) [T-WIWI-103474]**

**Responsibility:** Wolf Fichtner, Hansjörg Fromm, Andreas Geyer-Schulz, Ju-Young Kim, Martin Klarmann, Peter Knauth, Hagen Lindstädt, David Lorenz, Torsten Luedcke, Thomas Lützkendorf, Alexander Mädche, Bruno Neibecker, Stefan Nickel, Petra Nieken, Martin Ruckes, Gerhard Satzger, Frank Schultmann, Thomas Setzer, Orestis Terzidis, Marliese Uhrig-Homburg, Maxim Ulrich, Christof Weinhardt, Marion Weissenberger-Eibl, Ute Werner, Marcus Wouters

**Contained in:** [M-WIWI-102971] Seminar

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<td>Seminar Management Accounting and Costing Practices</td>
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<td>SS 2017</td>
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<td>Seminar Management Accounting and Innovation</td>
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Module Handbook, Date 11/17/2017, Winter term 17/18
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**Learning Control / Examinations**

The non examassessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

**Conditions**

None.

**Recommendations**

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

**Remarks**

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.

**Event excerpt: Seminar Human Resources and Organizations (WS 17/18)**

**Aim**
The student
- looks critically into current research topics in the fields of Human Resources an 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.

**Content**
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Chair.

**Workload**
The total workload for this course is approximately 90 hours.
- Lecture 30h
- Preparation of lecture 45h
- Exam preparation 15h

**Event excerpt: Master Seminar in Information Engineering and Management (WS 17/18)**

**Aim**
The student is able to
- to perform a literature search for a given topic, to identify, find, value and evaluate the relevant literature.
- to commit to a topic (pr.n., in teamwork); this may include technical conceptual work and implementation.
- to write his seminar thesis of 15-20 pages in a structured scientific manner.
- to communicate his results in a presentation with discussion afterwards.

**Content**
The seminar serves on one hand to improve the scientific working skills. On the other hand, the student should work intensively on a given topic and develop a scientific work, that is based on a profound literature research.

The seminar can also be a implementation of software for a scientific problem (e.g. Business Games/dynamic systems) according to the individual focus in the current semester. The software has to be well documented. The written elaboration covers a description and explanation of the software as well as a discussion about limits and extensibility. Furthermore the software must be deployable und shall be presented on the infrastructure stack of the chair. An implementation of a software has to examine the scientific state of the art in a critical way, too.

A concrete description of the current topics is announced in time for the begin of the application stage.

**Workload**
The total workload for this course is approximately 90 hours (3 ECTS). Depending on the realization of the work, the times may vary. The main focus is always on working independently.

**Event excerpt: Automated Financial Advisory (Master) (SS 2017)**

**Aim**
In this seminar students work on issues related to the automatization of risk and investment management applications.

**Content**
At the beginning of the semester, a selection of seminar topics will be discussed with each student of the seminar.

**Workload**
The total workload for this course is approximately 90 hours.
Literature
Literature will be distributed during the first lecture.

Event excerpt: Hospital Management (SS 2017)

Aim
The student
• knows the scope of duties and decisions of a hospital manager and
• is able to give profound guidance.

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.

Workload
The total workload for this course is approximately 90 hours.


Aim
Students
• are largely independently able to identify a distinct topic in Management Accounting,
• are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
• can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.
Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify ( provisionally) the topic for your paper.
Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.
Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: Seminar Management Accounting (SS 2017)

Aim
Students
• are largely independently able to identify a distinct topic in Management Accounting,
• are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
• can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Content
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Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

V Event excerpt: Seminar in Finance (SS 2017)

Aim
The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance.

Through the presentations in this seminar the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.

The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced at the end of the foregoing semester.

V Event excerpt: (WS 17/18)

Aim
Die in die Veranstaltung eingebundenen Fallstudien sollen dabei helfen, Prozesse der Risikokommunikation verstehen zu lernen, um darauf basierend kommunikationspolitische Strategien und Instrumente entwerfen zu können. Dies kann abschließend an einem Konzept für Vision Zero in Deutschland und ähnlichen Risikokommunikationsproblemen geübt werden.

Content
Beispiele zu nicht beabsichtigten Wirkungen bei der Kommunikation zu Unternehmen, Ereignissen, Aktivitäten oder Zielen zeigen immer wieder, wie wichtig es ist, die möglichen Interpretationen der Empfänger bei der Gestaltung von Botschaften zu berücksichtigen.


Die in die Veranstaltung eingebundenen Fallstudien sollen dabei helfen, Prozesse der Risikokommunikation verstehen zu lernen, um darauf basierend kommunikationspolitische Strategien und Instrumente entwerfen zu können. Dies kann abschließend an einem Konzept für Vision Zero in Deutschland.


Literature
Themenspezifische Literatur wird rechtzeitig vor Veranstaltungsbeginn genannt.

V Event excerpt: Seminar: Energy Informatics (WS 17/18)
Aim

Er/sie ist in der Lage eine Seminararbeit (und später die Bachelor-/Masterarbeit) mit minimalem Einarbeitungsaufwand anzufertigen und dabei Formatvorgaben zu berücksichtigen, wie sie von allen Verlagen bei der Veröffentlichung von Dokumenten vorgegeben werden. Außerdem versteht er/sie das vorgegebene Thema in Form einer wissenschaftlichen Präsentation auszuarbeiten und kennt Techniken um die vorzustellenden Inhalte auditoriumsgerecht aufzuarbeiten und vorzutragen. Somit besitzt er/sie die Kenntnis wissenschaftliche Ergebnisse der Recherche in schriftlicher Form derart zu präsentieren, wie es in wissenschaftlichen Publikationen der Fall ist.

Content

Daher sollen im Rahmen des Seminars „Seminar: Energieinformatik“, unterschiedliche Algorithmen, Simulationen und Modellierungen bzgl. ihrer Vor- und Nachteile in den verschiedenen Bereichen der Netzinfrastruktur untersucht werden.

Workload
4 LP entspricht ca. 120 Stunden
ca. 21 Std. Besuch des Seminars,
ca. 45 Std. Analyse und Bearbeitung des Themas,
ca. 27 Std. Vorbereitung und Erstellung der Präsentation, und
ca. 27 Std. Schreiben der Ausarbeitung.
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: Special Topics in Management Accounting (SS 2017)

Aim
Students
- are largely independently able to identify a distinct topic in Management Accounting,
- are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: (WS 17/18)

Aim
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
Content
The seminary 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.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
will be announced in the seminary.

Event excerpt: (WS 17/18)

Aim
Learning to identify, to analyse and to assess business risks; this serves as a basis for strategy and policy design regarding risks and opportunities of an enterprise. Introduction to approaches that allow to consider area-specific risk objectives, risk-bearing capacity and risk acceptance.

Content
1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and policies for the identification, analysis, assessment and management of risks
3. Insurance as an instrument for loss-financing
4. Selected aspects of risk management: e.g. environmental protection, organizational failure and D&O-coverage, development of a risk management culture
5. Organisation of risk management
6. Approaches for determining optimal combinations of risk management measures considering their investment costs and outcomes.

Workload
The overall amount of work necessary for this course is approx. 135 hours (4.5 ECTS-Credits).

Literature

Elective literature:
Additional literature is recommended during the course.
### Course: Seminar in Business Administration B (Master) [T-WIWI-103476]

**Responsibility:** Wolf Fichtner, Hansjörg Fromm, Andreas Geyer-Schulz, Ju-Young Kim, Martin Klarmann, Peter Knauth, Hagen Lindstädt, David Lorenz, Torsten Lueddecke, Thomas Lützkendorf, Alexander Mädeche, Bruno Neibecker, Stefan Nickel, Petra Nieken, Martin Ruckes, Gerhard Satzger, Frank Schultmann, Thomas Setzer, Orestis Terzidis, Marliese Uhrig-Homburg, Maxim Ulrich, Christof Weinhardt, Marion Weissenberger-Eibl, Ute Werner, Marcus Wouters

**Contained in:** [M-WIWI-102972] Seminar

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<td>Seminar in Production and Operations Management IV</td>
<td>Seminar (S)</td>
<td>2 Joris Dehler, Daniel Fett, Christoph Fraunholz, Dogan Keles Armin Ardone, Rafael Finck, Max Kleinebrahm, Nico Lehmann, Viktor Slednev Felix Hübner, Frank Schultmann, Rebekka Volk</td>
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**Learning Control / Examinations**

The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

**Conditions**

None.

**Recommendations**

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

**Remarks**

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.

**Event excerpt: Seminar Human Resources and Organizations (WS 17/18)**

**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.

**Content**
The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Chair.

**Workload**
The total workload for this course is approximately 90 hours.
Lecture 30h
Preparation of lecture 45h
Exam preparation 15h

**Event excerpt: Master Seminar in Information Engineering and Management (WS 17/18)**

**Aim**
The student is able to

- to perform a literature search for a given topic, to identify, find, value and evaluate the relevant literature.
- to commit to a topic (pr.n., in teamwork); this may include technical conceptual work and implementation.
- to write his seminar thesis of 15-20 pages in a structured scientific manner.
- to communicate his results in a presentation with discussion afterwards.

**Content**
The seminar serves on one hand to improve the scientific working skills. On the other hand, the student should work intensively on a given topic and develop a scientific work, that is based on a profound literature research. The seminar can also be a implementation of software for a scientific problem (e.g. Business Games/dynamic systems) according to the individual focus in the current semester. The software has to be well documented. The written elaboration covers a description and explanation of the software as well as a discussion about limits and extensibility. Furthermore the software must be deployable und shall be presented on the infrastructure stack of the chair. An implementation of a software has to examine the scientific state of the art in a critical way, too. A concrete description of the current topics is announced in time for the begin of the application stage.

**Workload**
The total workload for this course is approximately 90 hours (3 ECTS). Depending on the realization of the work, the times may vary. The main focus is always on working independently.

**Event excerpt: Automated Financial Advisory (Master) (SS 2017)**

**Aim**
In this seminar students work on issues related to the automatization of risk and investment management applications.

**Content**
At the beginning of the semester, a selection of seminar topics will be discussed with each student of the seminar.

**Workload**
The total workload for this course is approximately 90 hours.
**Event excerpt: Hospital Management (SS 2017)**

**Aim**
The student
- knows the scope of duties and decisions of a hospital manager and
- is able to give profound guidance.

**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.

**Workload**
The total workload for this course is approximately 90 hours.

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**Aim**
Students
- are largely independently able to identify a distinct topic in Management Accounting,
- are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

**Content**
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

**Workload**
The total workload for this course is approximately 90 hours. For further information see German version.

**Literature**
Will be announced in the course.

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**Event excerpt: Seminar Management Accounting (SS 2017)**

**Aim**
Students
- are largely independently able to identify a distinct topic in Management Accounting,
- are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources).

**Content**
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.
Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.

Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.

Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: Seminar in Finance (SS 2017)

Aim
The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance. Through the presentations in this seminar the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures. The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced at the end of the foregoing semester.

Event excerpt: (WS 17/18)

Aim
Die in die Veranstaltung eingebundenen Fallstudien sollen dabei helfen, Prozesse der Risikokommunikation verstehen zu lernen, um darauf basierend kommunikationspolitische Strategien und Instrumente entwerfen zu können. Dies kann abschließend an einem Konzept für Vision Zero in Deutschland und ähnlichen Risikokommunikationsproblemen geübt werden.

Content
Beispiele zu nicht beabsichtigten Wirkungen bei der Kommunikation zu Unternehmen, Ereignissen, Aktivitäten oder Zielen zeigen immer wieder, wie wichtig es ist, die möglichen Interpretationen der Empfänger bei der Gestaltung von Botschaften zu berücksichtigen.


Literature
Themenspezifische Literatur wird rechtzeitig vor Veranstaltungsbeginn genannt.
Aim
Er/sie ist in der Lage eine Seminararbeit (und später die Bachelor-/Masterarbeit) mit minimalem Einarbeitungsaufwand anzufertigen und dabei Formatvorgaben zu berücksichtigen, wie sie von allen Verlagen bei der Veröffentlichung von Dokumenten vorgegeben werden. Außerdem versteht er/sie das vorgegebene Thema in Form einer wissenschaftlichen Präsentation auszuarbeiten und kennt Techniken um die vorzustellenden Inhalte auditoriumsgerecht aufzuarbeiten und vorzutragen. Somit besitzt er/sie die Kenntnis wissenschaftliche Ergebnisse der Recherche in schriftlicher Form derart zu präsentieren, wie es in wissenschaftlichen Publikationen der Fall ist.

Content

Daher sollen im Rahmen des Seminars „Seminar: Energieinformatik“, unterschiedliche Algorithmen, Simulationen und Modellierungen bzgl. ihrer Vor- und Nachteile in den verschiedenen Bereichen der Netzinfrastruktur untersucht werden.

Workload
4 LP entspricht ca. 120 Stunden
ca. 21 Std. Besuch des Seminars,
ca. 45 Std. Analyse und Bearbeitung des Themas,
ca. 27 Std. Vorbereitung und Erstellung der Präsentation, und
ca. 27 Std. Schreiben der Ausarbeitung.

V Event excerpt: Seminar Human Resource Management (WS 17/18)

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

V Event excerpt: Seminar Management Accounting and Innovation (SS 2017)

Aim
Students
- are largely independently able to identify a distinct topic in Management Accounting,
- are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.
Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.
Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.
Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.
Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: Special Topics in Management Accounting (SS 2017)

Aim
Students
• are largely independently able to identify a distinct topic in Management Accounting,
• are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
• can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in four meetings that are spread throughout the semester.
Meeting 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.
Meeting 2 and 3: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.
Meeting 4: In the third week we are going to present and discuss the final papers.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Will be announced in the course.

Event excerpt: (WS 17/18)

Aim
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
Content
The seminary 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.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
will be announced in the seminary.

Event excerpt:  (WS 17/18)
Aim
Learning to identify, to analyse and to assess business risks; this serves as a basis for strategy and policy design regarding risks and opportunities of an enterprise. Introduction to approaches that allow to consider area-specific risk objectives, risk-bearing capacity and risk acceptance.

Content
1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and policies for the identification, analysis, assessment and management of risks
3. Insurance as an instrument for loss-financing
4. Selected aspects of risk management: e.g. environmental protection, organizational failure and D&O-coverage, development of a risk management culture
5. Organisation of risk management
6. Approaches for determining optimal combinations of risk management measures considering their investment costs and outcomes.

Workload
The overall amount of work necessary for this course is approx. 135 hours (4.5 ECTS-Credits).

Literature


Elective literature:
Additional literature is recommended during the course.
Course: Seminar in Economics A (Master) [T-WIWI-103478]

Responsibility: Johannes Brumm, Jan Kowalski, Kay Mitusch, Ingrid Ott, Clemens Puppe, Johannes Philipp Reiß, Nora Szech, Berthold Wigger

Contained in: [M-WIWI-102971] Seminar

ECTS 3 Language deutsch/englisch Recurrence Jedes Semester Version 1

Events

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Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of
- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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.

Event excerpt: Topics on Political Economics (WS 17/18)

Aim
The student develops an own idea for an economic experiment in this research direction.

Workload
About 90 hours.

Literature
James Heckman (fostering of young children), Ernst Fehr (egalitarianism and fairness), Uri Gneezy (gender differences),
Matthias Sutter (delay of gratification), and Walter Mischel (the famous Marshmallow Experiment).

**Event excerpt: Cooperation seminar: Innovative applications on single board computers as well as their economic relevance (WS 17/18)**

**Content**
Topics of interest include, but are not limited to:

- Smart Home Applications
- Environmental measurements
- Gesture control
- Security systems
Course: Seminar in Economics B (Master) [T-WIWI-103477]

Responsibility: Johannes Brumm, Jan Kowalski, Kay Mütusch, Ingrid Ott, Clemens Puppe, Johannes Philipp Reiß, Nora Szech, Berthold Wigger

Contained in: [M-WIWI-102972] Seminar

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Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of
- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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.

Event excerpt: Topics on Political Economics (WS 17/18)

Aim
The student develops an own idea for an economic experiment in this research direction.

Workload
About 90 hours.

Literature
James Heckman (fostering of young children), Ernst Fehr (egalitarianism and fairness), Uri Gneezy (gender differences),

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
Matthias Sutter (delay of gratification), and Walter Mischel (the famous Marshmallow Experiment).

Event excerpt: Cooperation seminar: Innovative applications on single board computers as well as their economic relevance (WS 17/18)

Content
Topics of interest include, but are not limited to:

- Smart Home Applications
- Environmental measurements
- Gesture control
- Security systems
# Course: Seminar in Informatics A (Master) [T-WIWI-103479]

**Responsibility:** Andreas Oberweis, Harald Sack, Hartmut Schmeck, York Sure-Vetter, Johann Marius Zöllner  
**Contained in:** [M-WIWI-102973] Seminar

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## Events

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<td>Data Science &amp; Real-time Big Data Analytics Seminar (S)</td>
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Economathematics (M.Sc.)

Module Handbook, Date 11/17/2017, Winter term 17/18
Learning Control / Examinations
The non examassessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015)consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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.

Event excerpt: Smart Services and the IoT (WS 17/18)
Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Event excerpt: Developing IT-based Business Models (WS 17/18)
Aim
The Student

- analyzes and develops in small teams a business model from an idea to a complete business plan or
- treats a special topic from the area of Semantic Web in businesses and entrepreneurships.
- learns about basic concepts and problem areas and considers these while building the business plan for a particular business idea.
- understands and considers the viewpoints of different stakeholders in the area of entrepreneurships and their influences on own business idea.
Content
Semantic technologies such as RDF, SPARQL, OWL, and RIF are still standardised only in their first versions. Still, the multitude of integrated technologies provides the basis for development of new applications and creates, with the help of the initial standardisations, a foundation for attracting investors. The potential and future developments in the field are exemplified by the growing popularity and importance of data, being published as Linked Data, as well as by the increase in applications developed outside the scope of research. The seminar “Developing Business Models for the Semantic Web” aims to explore these opportunities for new business models and business ventures.

The seminar takes place on a weekly basis and consists of two main parts. The first part is a series of presentations, held by external experts who share their experience in the area of entrepreneurship. The aim is to engage a wide variety of presenters, including applicants to programs for supporting young business ventures, startup founders, and people in leadership positions in established companies. Further guest lecturers include experts in the field of business and startup development, tax and enterprise law, as well as entrepreneurs, who have sold their startups or had to give up their ideas. The second part consists of the contributions of seminar participants. They are required to develop a business model, starting with the initial idea and building it up to a complete business plan. This development process is accompanied by feedback sessions, pitches, mid-term presentations and a final presentation. The student presentations alternate with presentations given by external experts. Furthermore, besides on the development of a business plan, student can work on a specific topic such as “Analysing Existing Business Models on the Web” or “Using Open Source in Startups”.

The seminar pass can be obtained by submitting a completed seminar thesis (i.e. the business plan or the specific topic) and by regularly attending the seminar presentations.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

V Event excerpt: (SS 2017)

Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:

- Mitchell, T.; Machine Learning

V Event excerpt: Seminar: Energy Informatics (WS 17/18)

Aim

Er/sie ist in der Lage eine Seminararbeit (und später die Bachelor-/Masterarbeit) mit minimalem Einarbeitungsaufwand anzufertigen und dabei Formatvorgaben zu berücksichtigen, wie sie von allen Verlagen bei der Veröffentlichung von Dokumenten vorgegeben werden. Außerdem versteht er/sie das vorgegebene Thema in Form einer wissenschaftlichen Präsentation auszuarbeiten und kennt Techniken um die vorzustellenden Inhalte auditoriumsgerecht aufzuarbeiten und vorzutragen. Somit besitzt er/sie die Kenntnis wissenschaftliche Ergebnisse der Recherche in schriftlicher Form derart zu präsentieren, wie es in wissenschaftlichen Publikationen der Fall ist.

Content
Energieinformatik ist eine junges Forschungsgebiet, welches verschiedene Bereiche ausserhalb der Informatik beinhaltet wie der Wirtschaftswissenschaft, Elektrotechnik und Rechtswissenschaften. Bedingt durch die Energiewende wird vermehrt

Workload
4 LP entspricht ca. 120 Stunden
ca. 21 Std. Besuch des Seminars,
ca. 45 Std. Analyse und Bearbeitung des Themas,
ca. 27 Std. Vorbereitung und Erstellung der Präsentation, und
ca. 27 Std. Schreiben der Ausarbeitung.

V Event excerpt: Seminar Service Science, Management & Engineering (WS 17/18)

Aim
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.

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

Workload
The total workload for this course is approximately 120 hours. For further information see German version.

Literature
The student will receive the necessary literature for his research topic.

V Event excerpt: Applications of Semantic MediaWiki (WS 17/18)

Content
Topics of interest include, but are not limited to:
- Analysis of Medical Processes
- Correlation analysis of medical data
- Visualization of data in SMW
- Sentiment analysis of Twitter data
- Upload Interface for SMW
- Process Matching of process data

V Event excerpt: Cooperation seminar: Innovative applications on single board computers as well as their economic relevance (WS 17/18)

Content
Topics of interest include, but are not limited to:
- Smart Home Applications
Environmental measurements
- Gesture control
- Security systems

**Event excerpt:** (WS 17/18)

**Workload**
Topics of interest include, but are not limited to:

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

**Event excerpt:** (WS 17/18)

**Aim**
Ziel der Vorlesung ist es, Kenntnisse über Grundlagen und weitergehende Methoden und Techniken des Ubiquitous Computing zu vermitteln. Nach Abschluss der Vorlesung können die Studierenden:

- das erlernte Wissen über existierende Ubiquitous Computing Systeme wiedergeben und erörtern.
- die allgemeinen Kenntnisse zu Ubiquitären Systemen bewerten und Aussagen und Gesetzmäßigkeiten auf Sonderfälle übertragen.
- unterschiedliche Methoden zu Design-Prozessen und Nutzerstudien bewerten und beurteilen sowie geeignete Methoden für die Entwicklung neuer Lösungen auswählen.
- selbst neue ubiquitäre Systeme für den Einsatz in Alltags- oder industriellen Prozessumgebungen erfinden, planen, entwerfen und bewerten sowie Aufwände und technische Implikationen bemessen.

**Content**


**Workload**
Der Gesamtarbeitsaufwand für diese Lerneinheit beträgt ca. 150 Stunden (5.0 Credits).

**Aktivität**

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2 x 12 h
24 h 00 min
Prüfung vorbereiten
36 h 00 min
SUMME
150 h 00 min
Arbeitsaufwand für die Lerneinheit "Ubiquitäre Informationstechnologien"
**Course: Seminar in Informatics B (Master) [T-WIWI-103480]**

**Responsibility:** Andreas Oberweis, Harald Sack, Hartmut Schmeck, York Sure-Vetter, Johann Marius Zöllner

**Contained in:** [M-WIWI-102974] Seminar

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### Events

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Economathematics (M.Sc.)  
Module Handbook, Date 11/17/2017, Winter term 17/18
Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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.

Event excerpt: Smart Services and the IoT (WS 17/18)

Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Event excerpt: Developing IT-based Business Models (WS 17/18)

Aim
The Student

- analyzes and develops in small teams a business model from an idea to a complete business plan or
- treats a special topic from the area of Semantic Web in businesses and entreprenurships.
- learns about basic concepts and problem areas and considers these while building the business plan for a particular business idea.
- understands and considers the viewpoints of different stakeholders in the area of entreprenurships and their influences on an own business idea.
Semantic technologies such as RDF, SPARQL, OWL, and RIF are still standardised only in their first versions. Still, the multitude of integrated technologies provides the basis for development of new applications and creates, with the help of the initial standardisations, a foundation for attracting investors. The potential and future developments in the field are exemplified by the growing popularity and importance of data, being published as Linked Data, as well as by the increase in applications developed outside the scope of research. The seminar “Developing Business Models for the Semantic Web” aims to explore these opportunities for new business models and business ventures.

The seminar takes place on a weekly basis and consists of two main parts. The first part is a series of presentations, held by external experts who share their experience in the area of entrepreneurship. The aim is to engage a wide variety of presenters, including applicants to programs for supporting young business ventures, startup founders, and people in leadership positions in established companies. Further guest lecturers include experts in the field of business and startup development, tax and enterprise law, as well as entrepreneurs, who have sold their startups or had to give up their ideas.

The second part consists of the contributions of seminar participants. They are required to develop a business model, starting with the initial idea and building it up to a complete business plan. This development process is accompanied by feedback sessions, pitches, mid-term presentations and a final presentation. The student presentations alternate with presentations given by external experts. Furthermore, besides on the development of a business plan, student can work on a specific topic such as “Analysing Existing Business Models on the Web” or “Using Open Source in Startups”.

The seminar pass can be obtained by submitting a completed seminar thesis (i.e. the business plan or the specific topic) and by regularly attending the seminar presentations.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Event excerpt: (SS 2017)

Content
Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

Literature
Detailed references are indicated together with the respective subjects. For general background information look up the following textbooks:

- Mitchell, T.; Machine Learning

Event excerpt: Seminar: Energy Informatics (WS 17/18)

Aim
Der/die Studierende besitzt einen vertieften Einblick in Themenbereiche der Energieinformatik und hat grundlegende Kenntnisse in den Bereichen der Modellierung, Simulation und Algorithmen in Energienetzen. Ausgehend von einem vorgegebenen Thema kann er/sie mithilfe einer Literaturrecherche relevante Literatur identifizieren, auffinden, bewerten und schließlich auswerten. Er/sie kann das Thema in den Themenkomplex einordnen und in einen Gesamtzusammenhang bringen. Er/sie ist in der Lage eine Seminararbeit (und später die Bachelor-/Masterarbeit) mit minimalem Einarbeitungsaufwand anzufertigen und dabei Formatvorgaben zu berücksichtigen, wie sie von allen Verlagen bei der Veröffentlichung von Dokumenten vorgeben werden. Außerdem versteht er/sie das vorgegebene Thema in Form einer wissenschaftlichen Präsentation auszuarbeiten und kennt Techniken um die vorzustellenden Inhalte auditoriumsgerecht aufzuarbeiten und vorzutragen. Somit besitzt er/sie die Kenntnis wissenschaftliche Ergebnisse der Recherche in schriftlicher Form derart zu präsentieren, wie es in wissenschaftlichen Publikationen der Fall ist.

Content
Energieinformatik ist eine junges Forschungsgebiet, welches verschiedene Bereiche ausserhalb der Informatik beinhaltet wie der Wirtschaftswissenschaft, Elektrotechnik und Rechtswissenschaften. Bedingt durch die Energiewende wird vermehrt

**Workload**

4 LP entspricht ca. 120 Stunden

ca. 21 Std. Besuch des Seminars,

ca. 45 Std. Analyse und Bearbeitung des Themas,

ca. 27 Std. Vorbereitung und Erstellung der Präsentation, und

ca. 27 Std. Schreiben der Ausarbeitung.

---

**Event excerpt: Seminar Service Science, Management & Engineering (WS 17/18)**

**Aim**

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.

**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

**Workload**

The total workload for this course is approximately 120 hours. For further information see German version.

**Literature**

The student will receive the necessary literature for his research topic.

---

**Event excerpt: Applications of Semantic MediaWiki (WS 17/18)**

**Content**

Topics of interest include, but are not limited to:

- Analysis of Medical Processes
- Correlation analysis of medical data
- Visualization of data in SMW
- Sentiment analysis of Twitter data
- Upload Interface for SMW
- Process Matching of process data

---

**Event excerpt: Cooperation seminar: Innovative applications on single board computers as well as their economic relevance (WS 17/18)**

**Content**

Topics of interest include, but are not limited to:

- Smart Home Applications
• Environmental measurements
• Gesture control
• Security systems

Event excerpt: (WS 17/18)

Workload
Topics of interest include, but are not limited to:

• Travel Security
• Geo data
• Linked News
• Social Media
**Course: Seminar in Operations Research A (Master) [T-WIWI-103481]**

**Responsibility:** Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann

**Contained in:** [M-WIWI-102973] Seminar

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**Events**

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<td>Mitarbeiter, Stefan Nickel, Anne Zander</td>
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**Learning Control / Examinations**
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

**Conditions**
None.

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

**Remarks**
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.

**Event excerpt: Seminar: Recent Topics in OR (WS 17/18)**

**Aim**
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.

Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Event excerpt: Seminar: Recent Topics in OR (SS 2017)

Aim
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,
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As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
Course: Seminar in Operations Research B (Master) [T-WIWI-103482]

Responsibility: Stefan Nickel, Oliver Stein, Karl-Heinz Waldmann
Contained in: [M-WIWI-102974] Seminar

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Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of
- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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.

Event excerpt: Seminar: Recent Topics in OR (WS 17/18)

Aim
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,

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
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.

Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Event excerpt: Seminar: Recent Topics in OR (SS 2017)

Aim
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.

Content
The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Dates will be announced on the internet.

Workload
The total workload for this course is approximately 90 hours. For further information see German version.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.
Course: Seminar in Statistics A (Master) [T-WIWI-103483]

**Responsibility:** Oliver Grothe, Melanie Schienle

**Contained in:** [M-WIWI-102971] Seminar

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**Learning Control / Examinations**
The non examassessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

**Conditions**
None.

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

**Remarks**
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.
Course: Seminar in Statistics B (Master) [T-WIWI-103484]

Responsibility: Oliver Grothe, Melanie Schienle
Contained in: [M-WIWI-102972] Seminar

ECTS
Recurrence
Version
3
Jedes Semester
1

Learning Control / Examinations
The non exam assessment (§4(2), 3 SPO 2007) or alternative exam assessment (§ 4(2), 3 SPO 2015) consists of

- a talk about the research topic of the seminar together with discussion,
- a written summary about the major issues of the topic and
- attending the discussions of the seminar

The grade is achieved by the weighted sum of the grades.

Conditions
None.

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

Remarks
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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<tr>
<th>Course: Seminar Mathematics [T-MATH-105686]</th>
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<td>Contained in: [M-MATH-102730] Seminar</td>
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### Course: Service Oriented Computing [T-WIWI-105801]

**Responsibility:** York Sure-Vetter  
**Contained in:** [M-WIWI-101472] Informatics

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### Events

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<td>SS 2017</td>
<td>2511308</td>
<td>Service Oriented Computing</td>
<td>Vorlesung (V)</td>
<td>2</td>
<td>Maria Maleshkova, York Sure-Vetter</td>
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<tr>
<td>SS 2017</td>
<td>2511309</td>
<td>Exercises to Service Oriented Computing</td>
<td>Übung (Ü)</td>
<td>1</td>
<td>Felix Leif Keppmann, Maria Maleshkova, York Sure-Vetter</td>
</tr>
</tbody>
</table>

### Learning Control / Examinations

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

### Conditions

None

### Event excerpt: Service Oriented Computing (SS 2017)

**Aim**

Students will extend their knowledge and proficiency in the area of modern service-oriented technologies. Thereby, they acquire the capability to understand, apply and assess concepts and methods that are of innovative and scientific nature.

**Content**

Building upon basic Web service technologies the lecture introduces selected topics from advanced service computing and service engineering. In particular, focus will be placed on new Web-based architectures and applications leveraging Web 2.0, Cloud Computing, Semantic Web and other emerging technologies.

**Workload**

- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

**Literature**

Literature will be announced in the lecture.
## Course: Simulation I [T-WIWI-102627]

### Responsibility:
Karl-Heinz Waldmann

### Contained in:
- [M-WIWI-101400] Stochastic Methods and Simulation
- [M-WIWI-101454] Stochastic Modelling and Optimization

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### Learning Control / Examinations
The examination Simulation I will be offered latest until winter term 2016/2017 (for beginners). The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

### Conditions
None

### Recommendations
None

### Remarks
The course will be offered in the summer term 2015 and the summer term 2016.
<table>
<thead>
<tr>
<th>Responsibility:</th>
<th>Karl-Heinz Waldmann</th>
</tr>
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| Contained in:  | [M-WIWI-101400] Stochastic Methods and Simulation  
[M-WIWI-101454] Stochastic Modelling and Optimization |

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<td>Jedes Semester</td>
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</table>

**Learning Control / Examinations**
The examination T-WIWI-102703 Simulation II will be offered latest until summer term 2017 (for beginners). The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulations. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by a 2/3 step of a full grade (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

**Conditions**
None

**Recommendations**
Foundations in the field of *Simulation I* [2550662] are desired.

**Remarks**
The course will be offered in the winter term 2015/2016.
Course: Simulation of Stochastic Systems [T-WIWI-106552]

Responsibility: Oliver Grothe, Steffen Rebennack

Contained in: [M-WIWI-103289] Stochastic Optimization

ECTS: 4.5
Recurrence: Jedes Sommersemester
Version: 1

Learning Control / Examinations
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.

Conditions
None.
### Course: Smart Energy Infrastructure [T-WIWI-107464]

**Responsibility:** Armin Ardone, Andrej Marko Pustisek  
**Contained in:** [M-WIWI-101452] Energy Economics and Technology

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**Events**

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<td>WS 17/18</td>
<td>2581023</td>
<td>Vorlesung (V)</td>
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<td>Armin Ardone, Andrej Marko Pustisek</td>
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</table>

**Learning Control / Examinations**

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

**Conditions**

None.

**Remarks**


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### Event excerpt: (WS 17/18)

**Aim**

Der/die Studierende

- kennt die Grundzüge von Infrastruktur im Kontext von Energietransport (insbesondere von Gas- und Stromnetzen sowie Erdgasspeichern) und  
- versteht deren (energie-)wirtschaftliche Bedeutung.

**Workload**

Gesamtauflwand bei 3 Leistungspunkten: ca. 90 Stunden  
Präsenzzeit: 30 Stunden  
Selbststudium: 60 Stunden
Course: Smart Grid Applications [T-WIWI-107504]

Responsibility: Johannes Gärtner, Christof Weinhardt

ECTS 4.5
Recurrence Jedes Wintersemester
Version 1

Learning Control / Examinations
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). The bonus only applies to the first and second exam of the semester in which it was obtained.

Conditions
None

Recommendations
None

Remarks
The lecture will be read for the first time in winter term 2018/19.
Course: Sobolev Spaces [T-MATH-105896]

Responsibility: Andreas Kirsch

Contained in: [M-MATH-102926] Sobolev Spaces

ECTS Version
5 1
Course: Social Choice Theory [T-WIWI-102859]

Responsibility: Clemens Puppe
Contained in: [M-WIWI-101500] Microeconomic Theory
[M-WIWI-101504] Collective Decision Making

ECTS 4.5 Language englisch Recurrence Jedes Sommersemester Version 1

Events

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<td>SS 2017</td>
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<td>Michael Müller,</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td>Clemens Puppe</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
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.

Conditions
None

Event excerpt: Social Choice Theory (SS 2017)

Aim
The student should acquire knowledge of formal theories of collective decision making and learn to apply them to real life situations.

Content
The course provides a comprehensive treatment of preference and judgement aggregation, including proofs of general results that have Arrow’s famous impossibility theorem and Gibbard’s oligarchy theorem as corollaries. The second part of the course is devoted to voting theory. Among other things, we prove the Gibbard-Satterthwaite theorem.

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

Literature
Main texts:


Secondary texts:

Course: Software Quality Management [T-WIWI-102895]

Responsibility: Andreas Oberweis

Contained in: [M-WIWI-101472] Informatics

ECTS 5 Language deutsch Recurrence Jedes Sommersemester Version 1

Events

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<tr>
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<td>Software Quality Management</td>
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<td>Andreas Oberweis</td>
</tr>
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</table>

Learning Control / Examinations

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.

Conditions
None

Remarks
This course was formerly named “Software Technology: Quality Management”.

Event excerpt: Software Quality Management (SS 2017)

Aim

Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the mail models of sofware certification, compare and evaluate these models,
- write scientific theses in the area of software quality management and find own solutions for given problems.

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.

Workload

Lecture 30h
Exercise 15h

Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam 1h

Total: 150h

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

Further literature is given in lectures.
Course: Spatial Economics  [T-WIWI-103107]

Responsibility: Ingrid Ott
Contained in: [M-WIWI-101496] Growth and Agglomeration

ECTS  Language  Recurrence  Version
4.5      englisch  Jedes Wintersemester  1

Events

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<td>Spatial Economics</td>
<td>Vorlesung (V)</td>
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<td>WS 17/18</td>
<td>2561261</td>
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<td>Übung (Ü)</td>
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<td>David Bälz, Ingrid Ott</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None

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. The attendance of the course Introduction to economic policy [2560280] is recommended.

Event excerpt: Spatial Economics (WS 17/18)

Aim
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

Content
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

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

Literature
Steven Brakman, Harry Garretsen, Charles van Marrewijk (2009), The New Introduction to Geographical Economics
Further literature recommendations will be announced in the course of the lecture.
Course: Spatial Stochastics [T-MATH-105867]

Responsibility: Daniel Hug, Günter Last
Contained in: [M-MATH-102903] Spatial Stochastics

ECTS 8 Version 1

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<td>Günter Last</td>
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Conditions
none
Course: Special Functions and Applications in Potential Theory [T-MATH-102274]

Responsibility: Andreas Kirsch

Contained in: [M-MATH-101335] Special Functions and Applications in Potential Theory

ECTS
Version

5
1

Conditions
None
**Course: Special Topics of Efficient Algorithms [T-WIWI-102657]**

**Responsibility:** Hartmut Schmeck  
**Contained in:** [M-WIWI-101472] Informatics  

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<td>Jedes Semester</td>
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</table>

**Learning Control / Examinations**  
The assessment consists of assignments or of a bonus exam (wrt §4 (2), 3 SPO), and a written exam (60 min.) in the week after the end of the lecturing period wrt (§4 (2), 1 SPO). The exam will be offered in every semester and can be repeated on regular examination dates. If the mark obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or the bonus exam will improve the mark by one level (i.e. by 0.3 or 0.4).

**Conditions**  
None

**Remarks**  
This course can be particularly used for recognising the external courses with the topics in the area of algorithms, data-structures and computer infrastructures but are not associated in other courses in this subject area.
**Course: Special Topics of Enterprise Information Systems [T-WIWI-102676]**

**Responsibility:** Andreas Oberweis  
**Contained in:** [M-WIWI-101472] Informatics

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**Events**

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<td>Agnes Koschmider</td>
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</table>

**Learning Control / Examinations**

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

**Conditions**

None
Course: Special Topics of Knowledge Management [T-WWI-102671]

Responsibility: York Sure-Vetter

Contained in: [M-WWI-101472] Informatics

ECTS | Recurrence | Version
--- | --- | ---
5 | Jedes Semester | 1

Learning Control / Examinations
Assessment is provided by a written exam of 60 minutes or an oral exam during the first few weeks after the lecturing period (acc. to §4(2), 1 or 2 SPO). The exam is offered each semester and may be repeated at the regular examination day.

Conditions
None

Remarks
see german version
Course: Special Topics of Numerical Linear Algebra [T-MATH-105891]

Responsibility: Marlis Hochbruck

Contained in: [M-MATH-102920] Special Topics of Numerical Linear Algebra

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</table>

Conditions
none
**Learning Control / Examinations**
The assessment consists of an 1h written exam in the first week after lecture period.

**Conditions**
None

**Remarks**
This course can be used in particular for the acceptance of external courses whose content is in the broader area of software and systems engineering, but cannot assigned to another course of this topic.
Course: Spectral Theory - Exam [T-MATH-103414]

Responsibility: Gerd Herzog, Peer Kunstmann, Christoph Schmoeger, Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-101768] Spectral Theory

ECTS Version
8 1
Course: Statistical Modeling of generalized regression models [T-WIWI-103065]

Responsibility: Wolf-Dieter Heller

Contained in: [M-WIWI-101638] Econometrics and Statistics I
[M-WIWI-101639] Econometrics and Statistics II

ECTS: 4.5
Recurrence: Jedes Wintersemester
Version: 1

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<td>WS 17/18</td>
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<td>Vorlesung (V)</td>
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<td>Wolf-Dieter Heller</td>
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</table>

Learning Control / Examinations
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

Conditions
None

Modeled Conditions
The following conditions must be met:
- The course [T-MATH-105870] Generalized Regression Models must not have been started.

Recommendations
Knowledge of the contents covered by the course "Economics III: Introduction in Econometrics" [2520016]

Event excerpt: (WS 17/18)

Aim
The student
- shows comprehensive knowledge of regression techniques

Workload
The total workload for this course is approximately 135 hours (4.5 credits).
- regular attendance: 30 hours
- self-study: 65 hours
- exam preparation: 40 hours
<table>
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<tr>
<th><strong>Course:</strong> Stein’s Method [T-MATH-105914]</th>
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<tr>
<td><strong>Responsibility:</strong> Matthias Schulte</td>
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<td><strong>Contained in:</strong> [M-MATH-102946] Stein’s Method</td>
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**Conditions**
none
Course: Stochastic Calculus and Finance [T-WIWI-103129]

Responsibility: Mher Safarian

Contained in: [M-WIWI-101639] Econometrics and Statistics II

ECTS 4.5 Language englisch Recurrence Jedes Wintersemester Version 1

Events

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<td>Mher Safarian</td>
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</table>

Learning Control / Examinations

The assessment of this course consists of a written examination (§4(2), 1 SPOs) and of possible additional assignments during the course (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015).

Conditions

None

Remarks

For more information see http://statistik.econ.kit.edu/

Event excerpt: Stochastic Calculus and Finance (WS 17/18)

Aim

After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis will be put on both finance and the theory behind it.

Content

The course will provide rigorous yet focused training in stochastic calculus and finance. The program will cover modern approaches in stochastic calculus and mathematical finance. Topics to be covered:


Stochastic processes (Poisson-process, Brownian motion, martingales), stochastic Integral (Integral, quadratic und co-variation, Ito-formula), stochastic differential equation for price-processes, trading strategies, option pricing(Feynman-Kac), neutral risk rating(equivalent martingale measure, Girsanov theorem), term structure models

Workload

The total workload for this course is approximately 150 hours. For further information see German version.

Literature

To be announced in lecture.

Elective literature:

- An Introduction to Stochastic Integration (Probability and its Applications) by Kai L. Chung , Ruth J. Williams , Birkhaueser,
- Methods of Mathematical Finance by Ioannis Karatzas, Steven E. Shreve, Springer 1998
Course: Stochastic Control [T-MATH-105871]

Responsibility: Nicole Bäuerle

Contained in: [M-MATH-102908] Stochastic Control

ECTS 4

Version 1

Conditions
none
Course: Stochastic Differential Equations [T-MATH-105852]

Responsibility: Roland Schnaubelt, Lutz Weis

Contained in: [M-MATH-102881] Stochastic Differential Equations

ECTS 8  Version 1
## Course: Stochastic Evolution Equations [T-MATH-105910]

**Responsibility:** Lutz Weis  
**Contained in:** [M-MATH-102942] Stochastic Evolution Equations

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**Conditions**
none
Course: Stochastic Geometry [T-MATH-105840]

Responsibility: Daniel Hug, Günter Last

Contained in: [M-MATH-102865] Stochastic Geometry

ECTS 8

Version 1
Course: Strategic Brand Management [T-WIWI-102842]

Responsibility: Joachim Blickhäuser, Martin Klarmann

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<td>SS 2017</td>
<td>2571185</td>
<td>Strategic Brand Management</td>
<td>Block (B)</td>
<td></td>
<td>Joachim Blickhäuser, Martin Klarmann</td>
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</table>

Learning Control / Examinations

Conditions
None

Recommendations
None

Remarks
Please note that only one of the following courses can be chosen in the Marketing Management Module: Marketing Strategy Business Game, Strategic Brand Management, Open Innovation – Concepts, Methods and Best Practices or Business Plan Workshop.
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.

Event excerpt: Strategic Brand Management (SS 2017)

Aim
See German version.

Content

Workload
The total workload for this course is approximately 45.0 hours. For further information see German version.

Literature
### Course: Strategic Management of Information Technology [T-WIWI-102669]

**Responsibility:** Thomas Wolf  
**Contained in:** [M-WIWI-101472] Informatics  
**ECTS:** 5  
**Language:** deutsch  
**Recurrence:** Jedes Sommersemester  
**Version:** 1

#### Events

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<td>SS 2017</td>
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<td>Übung (Ü)</td>
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#### Learning Control / Examinations

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.

#### Conditions

None

---

### Event excerpt: Strategic Management of Information Technology (SS 2017)

**Aim**

Students know the outer frame of IT in an enterprise and know which functions IT has within an enterprise. They understand the organization and the content of these functions.

**Content**

The following topics will be covered: strategic planing of ICT, architecture of ICT, overall planning of ICT, outsourcing, operation and controlling of ICT.

**Literature**

Course: Strategy and Management Theory: Developments and “Classics”
[T-WIWI-106190]

Responsibility: Hagen Lindstädt
Contained in: [M-WIWI-103119] Advanced Topics in Strategy and Management

ECTS 3 Language deutsch Recurrence Unregelmäßig Version 1

Events

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<td>2577922</td>
<td>Strategy and Management Theory: Developments and “Classics”</td>
<td>Seminar (S)</td>
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<td>Alexander Klopfer, Andreas Koeplin, Hagen Lindstädt, Aljoscha von Bismarck</td>
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</tbody>
</table>

Learning Control / Examinations
Non exam assessment (following §4(2) 3 of the examination regulation).

Conditions
None

Recommendations
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Remarks
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.

Event excerpt: Strategy and Management Theory: Developments and “Classics” (WS 17/18)

Aim
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

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.

Workload
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a
### Course: Supply Chain Management in the Process Industry [T-WIWI-102860]

**Responsibility:** Stefan Nickel  
**Contained in:** [M-WIWI-102805] Service Operations

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<td>Supply Chain Management in the Process Industry</td>
<td>Vorlesung / Übung (VÜ)</td>
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<td>Robert Blackburn, Jan Buchmann</td>
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#### Learning Control / Examinations

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation) (individual grading), case study presentation by student teams (team grading) and classroom participation (individual grading). The examination is held in the term of the lecture.

#### Conditions

None

#### Recommendations

Basic knowledge as conveyed in the module Introduction to Operations Research is assumed. Advanced knowledge of Operations Research (e.g., as conveyed in the lectures Facility Location and Strategic SCM, Tactical and operational SCM) is recommended.

#### Remarks

The number of participants is restricted due to the execution of interactive case studies and the resulting examination effort. Due to these capacity restrictions, registration before course start is required according to the information on the course website. The course is planned to be held every winter term. The planned lectures and courses for the next three years are announced online.

### Event excerpt: Supply Chain Management in the Process Industry (WS 17/18)

#### Aim

The student
- knows and classifies state-of-the art approaches for designing, planning and managing global supply chains in the process industry
- distinguishes quality in supply chains and identifies important building blocks, repeating patterns and concepts crucial to supply chain strategy, design and planning,
- explains specific challenges and approaches towards supply chain operations within the process industry with regards to transportation and warehousing, and describes the interdisciplinary linkage of SCM with information systems, performance management, project management, risk management and sustainability management,
- transfers gained knowledge into practice by using SCM case studies and SCM real life project documentations.

#### Content

The course “Supply Chain Management in the Process Industry” covers fundamental concepts in the field of supply chain management with special focus on process industry. Strategic, planning and operational topics within the end-to-end supply chain are examined, covering relevant approaches in design, processes and performance measurement. Additional focus within the course is on showing the interdisciplinary linkages SCM has with information systems, performance management, project management, risk management and sustainability management. The course is enriched by various insights from the world’s leading chemical company BASF, provided by executive management as real life examples and cases.

#### Workload

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

- Various case studies, which will be provided during the course
Course: Tactical and Operational Supply Chain Management [T-WIWI-102714]

Responsibility: Stefan Nickel

Contained in:
- [M-WIWI-101400] Stochastic Methods and Simulation

ECTS: 4.5
Language: deutsch
Recurrence: Jedes Sommersemester
Version: 2

Events

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<td>SS 2017</td>
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<td>Rohrbeck</td>
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</table>

Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.
Prerequisite for admission to examination is the succesful completion of the online assessments.

Conditions
Prerequisite for admission to examination is the succesful completion of the online assessments.

Recommendations
None

Remarks
The lecture is held in every summer term. The planned lectures and courses for the next three years are announced online.

Event excerpt: (SS 2017)

Aim
The student
- gathers expertise in fundamental techniques from procurement and distribution logistics, methods from inventory management and lot sizing,
- acquires the ability to efficiently utilize quantitative models from transportation planning (long-distance and distribution planning), inventory management and lot sizing in production,
- applies the introduced methods in more detail and in industry-relevant case-studies.

Content
The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models). The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

Literature
Elective Literature
- Domschke, Drex: Logistik: Standorte, 4. Auflage, Oldenbourg, 1996
- Love, Morris, Wesołowsky: Facilities Location: Models and Methods, North Holland, 1988
Course: Technological Change in Energy Economics [T-WIWI-102694]

Responsibility: Martin Wietschel

Contained in: [M-WIWI-101452] Energy Economics and Technology

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Learning Control / Examinations
The examination will be offered latest until summer term 2018 (repeaters only).
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation).

Recommendations
None
Course: Theory of Endogenous Growth [T-WIWI-102785]

Responsibility: Ingrid Ott

Contains in:
- [M-WIWI-101478] Innovation and growth
- [M-WIWI-101496] Growth and Agglomeration

**Events**

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<td>Ingrid Ott</td>
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**Learning Control / Examinations**

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.

**Conditions**

None

**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.

**Event excerpt: Theory of endogenous growth (WS 17/18)**

**Aim**

Students shall be given the ability to understand, analyze and evaluate selected models of endogenous growth theory.

**Content**

- Basic models of endogenous growth
- Human capital and economic growth
- Modelling of technological progress
- Diversity Models
- Schumpeterian growth
- Directional technological progress
- Diffusion of technologies

**Workload**

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

**Literature**

Excerpt:

Course: Time Series Analysis [T-MATH-105874]

Responsibility: Norbert Henze, Bernhard Klar
Contained in: [M-MATH-102911] Time Series Analysis

ECTS 4  Version 1

Conditions
none
Course: Topics in Experimental Economics [T-WIWI-102863]

Responsibility: Johannes Philipp Reiß
Contained in: [M-WIWI-101505] Experimental Economics

ECTS 4.5  Recurrence Unregelmäßig  Version 1

Learning Control / Examinations
The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Conditions None

Recommendations
Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Remarks
The course is offered in summer 2020 for the next time, not in summer 2018.
Course: Traveling Waves [T-MATH-105897]

Responsibility: Jens Rottmann-Matthes

Contained in: [M-MATH-102927] Traveling Waves
Course: Valuation [T-WIWI-102621]

Responsibility: Martin Ruckes

Contained in: [M-WIWI-101480] Finance 3
[M-WIWI-101482] Finance 1
[M-WIWI-101483] Finance 2

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Learning Control / Examinations
See German version.

Conditions
None

Recommendations
None

Event excerpt: Valuation (WS 17/18)

Aim
Students are able to

- evaluate complex investment projects by taking a financial view,
- value firms,
- assess the advantageousness of potential merger and acquisitions.

Content
Topics:

- Projections of cash flows
- Estimation of the cost of capital
- Valuation of the firm
- Mergers and acquisitions
- Real options

Literature

Elective Literature
Course: Wavelets [T-MATH-105838]

Responsibility: Andreas Rieder

Contained in: [M-MATH-102895] Wavelets

ECTS 8
Recurrence Unregelmäßig
Version 1

Learning Control / Examinations
Mündliche Prüfung im Umfang von ca. 30 Minuten.

Conditions
none
Course: Web Science [T-WIWI-103112]

Responsibility: York Sure-Vetter

Contained in: [M-WIWI-101472] Informatics

ECTS: 5

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<td>York Sure-Vetter</td>
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<td>Exercises to Web Science</td>
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<td>York Sure-Vetter, Tobias Weller</td>
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Learning Control / Examinations
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.

Conditions
None

Remarks

Event excerpt: Web Science (WS 17/18)

Aim
The students
- look critically into current research topics in the field of Web Science and learn in particular about the topics small-world-problem, network theory, social network analysis, bibliometrics, as well as link analysis and search.
- apply interdisciplinary thinking.
- train the application of technological approaches to social science problems.

Content
This course aims to provide students with a basic knowledge and understanding about the structure and analysis of selected web phenomena and technologies. Topics include the small world problem, network theory, social network analysis, graph search and technologies/standards/architectures.

Workload
- The total workload for this course is approximately 150 hours
- Time of presentness: 45 hours
- Time of preparation and postprocessing: 67.5 hours
- Exam and exam preparation: 37.5 hours

Literature
Course: Workflow-Management [T-WIWI-102662]

Responsibility: Andreas Oberweis
Contained in: [M-WIWI-101472] Informatics

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<td>Andreas Drescher, Andreas Oberweis</td>
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Learning Control / Examinations
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.

Conditions
None

Event excerpt: Workflow-Management (SS 2017)

Aim
Students
- explain the concepts and principles of workflow management concepts and systems and their applications,
- create and evaluatel business process models,
- analyze static and dynamic properties of workflows.

Content
A workflow is that part of a business process which is automatically executed by a computerized system. Workflow management includes the design, modelling, analysis, execution and management of workflows. Workflow management systems are standard software systems for the efficient control of processes in enterprises and organizations. Knowledge in the field of workflow management systems is especially important during the design of systems for process support. The course covers the most important concepts of workflow management. Modelling and design techniques are presented and an overview about current workflow management systems is given. Standards, which have been proposed by the workflow management coalition (WfMC), are discussed. Petri nets are proposed as a formal modelling and analysis tool for business processes. Architecture and functionality of workflow management systems are discussed. The course is a combination of theoretical foundations of workflow management concepts and of practical application knowledge.

Workload
Lecture 30h
Exercise 15h

Preparation of lecture 30h
Preparation of exercises 30h
Exam preparation 44h
Exam 1h

Total: 150h

Literature


Further literature is given in the lecture.
Course: Workshop Business Wargaming – Analyzing Strategic Interactions  
[T-WIWI-106189]  
Responsibility: Hagen Lindstädt  
Contained in: [M-WIWI-103119] Advanced Topics in Strategy and Management  

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Learning Control / Examinations  
Non exam assessment (following §4(2) 3 of the examination regulation).  

Conditions  
None  

Recommendations  
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.  

Remarks  
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.
Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]

Responsibility: Hagen Lindstädt
Contained in: [M-WIWI-103119] Advanced Topics in Strategy and Management

ECTS 3  Language deutsch  Recurrence Unregelmäßig  Version 1

Events

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<td>Thorsten Reitmeyer</td>
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Learning Control / Examinations
Non exam assessment (following §4(2) 3 of the examination regulation).

Conditions
None

Recommendations
Basic knowledge as conveyed in the bachelor module „Strategy and Organization“ is recommended.

Remarks
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.

V Event excerpt: Workshop Current Topics in Strategy and Management (WS 17/18)

Aim
Students
- are able to analyze business strategies and derive recommendations for the management
- learn to express their position through compelling reasoning in structured discussions

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.

Workload
The total workload for this course is approximately 90 hours.
Lecture: 15 hours
Preparation of lecture: 75 hours
Exam preparation: n/a
Studien- und Prüfungsordnung der Universität Karlsruhe (TH) für den Masterstudiengang Wirtschaftsmathematik


Der Rektor hat seine Zustimmung am 28. August 2009 erteilt.

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Die Universität Karlsruhe (TH) hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss der Studierendenausbildung an der Universität Karlsruhe (TH) der Mastergrad stehen soll. Die Universität Karlsruhe (TH) sieht daher die an der Universität Karlsruhe (TH) angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

In dieser Satzung ist nur die weibliche Sprachform gewählt worden. Alle personenbezogenen Aussagen gelten jedoch stets für Frauen und Männer gleichermaßen.

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich, Zweck der Prüfung
(1) Diese Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Wirtschaftsmathematik an der Universität Karlsruhe (TH).
(2) Im Masterstudium sollen die im Bachelorstudium erworbenen wissenschaftlichen Qualifikationen weiter vertieft oder ergänzt werden. Die Studentin soll in der Lage sein, die wissenschaftlichen Erkenntnisse und Methoden selbstständig anzuwenden und ihre Bedeutung und Reichweite für die Lösung komplexer wissenschaftlicher und gesellschaftlicher Problemstellungen zu bewerten.

§ 2 Akademischer Grad
Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science“ (abgekürzt: „M.Sc.“) verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte
(1) Die Regelstudienzeit beträgt vier Semester. Sie umfasst neben den Lehrveranstaltungen Prüfungen und die Masterarbeit.
(2) Die im Studium zu absolvierenden Lehrinhalte sind in Module gegliedert, die jeweils aus einer Lehrveranstaltung oder mehreren, thematisch und zeitlich aufeinander bezogenen Lehrveranstaltungen bestehen. Art, Umfang und Zuordnung der Module zu einem Fach sowie die Möglichkeiten, Module untereinander zu kombinieren, beschreibt der Studienplan. Die Fächer und deren Umfang werden in § 17 definiert.
(4) Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studienleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 120 Leistungspunkte.
(5) Die Verteilung der Leistungspunkte im Studienplan auf die Semester hat in der Regel gleichmäßig zu erfolgen.
(6) Lehrveranstaltungen können auch in englischer Sprache angeboten werden.
§ 4 Aufbau der Prüfungen


(2) Erfolgskontrollen sind:
   1. schriftliche Prüfungen,
   2. mündliche Prüfungen oder
   3. Erfolgskontrollen anderer Art.

Erfolgskontrollen anderer Art sind z.B. Vorträge, Übungsscheine, Projekte, schriftliche Arbeiten, Berichte, Seminararbeiten und Klausuren, sofern sie nicht als schriftliche oder mündliche Prüfung in der Modul- oder Lehrveranstaltungsbeschreibung im Studienplan ausgewiesen sind.

(3) In der Regel sind mindestens 50 % einer Modulprüfung in Form von schriftlichen oder mündlichen Prüfungen (Absatz 2, Nr. 1 und 2) abzulegen, die restlichen Prüfungen erfolgen durch Erfolgskontrollen anderer Art (Absatz 2, Nr. 3). Hiervon ausgenommen sind Seminarmodule.

§ 5 Anmeldung und Zulassung zu den Prüfungen

(1) Um an den Modulprüfungen teilnehmen zu können, muss sich die Studentin schriftlich oder per Online-Anmeldung beim Studienbüro anmelden. Hierbei sind die gemäß dem Studienplan für die jeweilige Modulprüfung notwendigen Studienleistungen nachzuweisen. Darüber hinaus muss sich die Studentin für jede einzelne Modulteilprüfung, die in Form einer schriftlichen oder mündlichen Prüfung (§ 4 Abs. 2, Nr. 1 und 2) durchgeführt wird, beim Studienbüro anmelden. Dies gilt auch für die Anmeldung zur Masterarbeit.

(2) Um zu schriftlichen und/oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) in einem bestimmten Modul zugelassen zu werden, muss die Studentin vor der ersten schriftlichen oder mündlichen Prüfung in diesem Modul beim Studienbüro eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach, wenn diese Wahlmöglichkeit besteht, abgeben.

(3) Die Zulassung darf nur abgelehnt werden, wenn die Studentin in einem mit der Wirtschaftsmathematik oder den Wirtschaftswissenschaften vergleichbaren oder einem verwandten Studiengang bereits eine Diplomvorerkundung, Diplomprüfung, Bachelor- oder Masterprüfung endgültig nicht bestanden hat, sich in einem Prüfungsverfahren befindet oder den Prüfungsanspruch in einem solchen Studiengang verloren hat. In Zweifelsfällen entscheidet der Prüfungsausschuss.

§ 6 Durchführung von Prüfungen und Erfolgskontrollen

(1) Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach, durchgeführt.

(2) Die Art der Erfolgskontrolle (§ 4 Abs. 2, Nr. 1 bis 3) der einzelnen Lehrveranstaltungen wird von der Prüferin der betreffenden Lehrveranstaltung in Bezug auf die Lehrinhalte der Lehrveranstaltung und die Lehrziele des Moduls festgelegt. Die Prüferin, die Art der Erfolgskontrollen, deren Häufigkeit, Reihenfolge und Gewichtung und die Bildung der Lehrveranstaltungsnote müssen mindestens sechs Wochen vor Semesterbeginn bekannt gegeben werden. Im Einvernehmen zwischen Prüferin und Studentin kann die Art der Erfolgskontrolle auch nachträglich geändert werden. Dabei ist jedoch § 4 Abs. 3 zu berücksichtigen.

(3) Eine schriftlich durchzuführende Prüfung kann auch mündlich, eine mündlich durchzuführende Prüfung kann auch schriftlich abgenommen werden. Diese Änderung muss mindestens sechs Wochen vor der Prüfung bekannt gegeben werden.

(4) Weist eine Studentin nach, dass sie wegen länger andauernder oder ständig körperlicher Behinderung nicht in der Lage ist, die Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen
Form abzulegen, kann der zuständige Prüfungsausschuss – in dringenden Angelegenheiten, deren Erledigung nicht bis zu einer Sitzung des Ausschusses aufgeschoben werden kann, dessen Vorsitzende – gestatten, Erfolgskontrollen in einer anderen Form zu erbringen. Auf begründeten Antrag kann der Prüfungsausschuss auch in anderen Ausnahmefällen gestatten, Erfolgskontrollen in einer anderen Form zu erbringen.

(5) Bei Lehrveranstaltungen in englischer Sprache können mit Zustimmung der Studentin die entsprechenden Erfolgskontrollen in englischer Sprache abgenommen werden.


(7) Mündliche Prüfungen (§ 4 Abs. 2, Nr. 2) sind von mehreren Prüferinnen (Kollegialprüfung) oder von einer Prüferin in Gegenwart einer Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. Vor der Festsetzung der Note hört die Prüferin die anderen an der Kollegialprüfung mitwirkenden Prüferinnen an. Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 45 Minuten pro Studentin.


(9) Studentinnen, die sich in einem späteren Prüfungszeitraum der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen als Zuhörerinnen bei mündlichen Prüfungen zugelassen. Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse. Aus wichtigen Gründen oder auf Antrag der zu prüfenden Studentin ist die Zulassung zu versagen.


(11) Schriftliche Arbeiten im Rahmen einer Erfolgskontrolle anderer Art haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer verändert oder mit Abänderungen entnommen wurde.“ Trägt die Arbeit diese Erklärung nicht, wird diese Arbeit nicht angenommen. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

(12) Bei mündlich durchgeführten Erfolgskontrollen anderer Art muss in der Regel neben der Prüferin eine Beisitzende anwesend sein, die zusätzlich zur Prüferin die Protokolle zeichnet.

§ 7 Bewertung von Prüfungen und Erfolgskontrollen

(1) Das Ergebnis einer Erfolgskontrolle wird von den jeweiligen Prüferinnen in Form einer Note festgesetzt.

(2) Im Masterzeugnis dürfen nur folgende Noten verwendet werden:

| 1 = sehr gut (very good) | = eine hervorragende Leistung, |
| 2 = gut (good)          | = eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt, |
| 3 = befriedigend (satisfactory) | = eine Leistung, die durchschnittlichen Anforderungen entspricht, |
Für die Masterarbeit und die Modulteilprüfungen sind zur differenzierten Bewertung nur folgende Noten zugelassen:

1. 1.0, 1.3 = sehr gut
2. 1.7, 2.0, 2.3 = gut
3. 2.7, 3.0, 3.3 = befriedigend
4. 3.7, 4.0 = ausreichend
5. 4.7, 5.0 = nicht ausreichend

Diese Noten müssen in den Protokollen und in den Anlagen (Transcript of Records und Diploma Supplement) verwendet werden.

(3) Für Erfolgskontrollen anderer Art kann im Studienplan die Benotung mit „bestanden“ (passed) oder „nicht bestanden“ (failed) vorgesehen werden.

(4) Bei der Bildung der gewichteten Durchschnitte der Modulnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.


(6) Erfolgskontrollen anderer Art dürfen in Modulteilprüfungen oder Modulprüfungen nur eingezeichnet werden, wenn die Benotung nicht nach Absatz 3 erfolgt ist. Die zu dokumentierenden Erfolgskontrollen und die daran geknüpften Bedingungen werden im Studienplan festgelegt.

(7) Eine Modulteilprüfung ist bestanden, wenn die Note mindestens „ausreichend“ (4.0) ist.


(9) Die Ergebnisse der Masterarbeit, der Modulprüfungen bzw. der Modulteilprüfungen, der Erfolgskontrollen anderer Art sowie die erworbenen Leistungspunkte werden durch das Studienbüro der Universität erfasst.

(10) Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein. Eine Fachprüfung ist bestanden, wenn die für das Fach erforderliche Anzahl von Leistungspunkten nachgewiesen wird.

(11) Die Gesamtnote der Masterprüfung und die Modulnoten lauten:

<table>
<thead>
<tr>
<th>bis</th>
<th>von</th>
<th>1.5, 4.0</th>
<th>sehr gut, ausreichend</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>2.5</td>
<td>1.6, 3.5</td>
<td>gut, befriedigend</td>
</tr>
<tr>
<td>2.5</td>
<td>4.0</td>
<td>3.6</td>
<td>ausreichend</td>
</tr>
</tbody>
</table>
Zusätzlich zu den Noten nach Absatz 2 werden ECTS-Noten für Fachprüfungen, Modulprüfungen und für die Masterprüfung nach folgender Skala vergeben:

<table>
<thead>
<tr>
<th>ECTS-Note</th>
<th>Quote, Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>gehört zu den besten 10 % der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>B</td>
<td>gehört zu den nächsten 25 % der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>C</td>
<td>gehört zu den nächsten 30 % der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>D</td>
<td>gehört zu den nächsten 25 % der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>E</td>
<td>gehört zu den letzten 10 % der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>FX</td>
<td>nicht bestanden (failed) - es sind Verbesserungen erforderlich, bevor die Leistungen anerkannt werden,</td>
</tr>
<tr>
<td>F</td>
<td>nicht bestanden (failed) - es sind erhebliche Verbesserungen erforderlich.</td>
</tr>
</tbody>
</table>


§ 8 Erlöschen des Prüfungsanspruchs, Wiederholung von Prüfungen und Erfolgskontrollen

(1) Studentinnen können eine nicht bestandene schriftliche Prüfung (§ 4 Abs. 2, Nr. 1) einmal wiederholen. Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend“ bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend“ (4.0) sein.

(2) Studentinnen können eine nicht bestandene mündliche Prüfung (§ 4 Abs. 2, Nr. 2) einmal wiederholen.

(3) Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen. Fehlversuche an anderen Hochschulen sind anzurechnen.

(4) Die Wiederholung einer Erfolgskontrolle anderer Art (§ 4 Abs. 2, Nr. 3) wird im Studienplan geregelt.


(6) Die Wiederholung einer bestandenen Erfolgskontrolle ist nicht zulässig.
Eine Fachprüfung ist endgültig nicht bestanden, wenn mindestens ein Modul des Faches endgültig nicht bestanden ist.


§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß


(2) Eine Modulprüfung gilt als mit „nicht ausreichend“ bewertet, wenn die Studentin einen Prüfungstermin ohne triftigen Grund versäumt oder wenn sie nach Beginn der Prüfung ohne triftigen Grund von der Prüfung zurücktritt. Dasselbe gilt, wenn die Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, die Studentin hat die Fristüberschreitung nicht zu vertreten.


(4) Versucht die Studentin das Ergebnis seiner Modulprüfung durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Modulprüfung als mit „nicht ausreichend“ (5.0) bewertet.


(7) Näheres regelt die Allgemeine Satzung der Universität Karlsruhe (TH) zur Redlichkeit bei Prüfungen und Praktika (‘Verhaltensordnung’).

§ 10 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten


§ 11 Masterarbeit

(1) Die Masterarbeit soll zeigen, dass die Studentin in der Lage ist, ein Problem aus ihrem Fach selbstständig und in begrenzter Zeit nach wissenschaftlichen Methoden, die dem Stand der Forschung entsprechen, zu bearbeiten. Die Masterarbeit kann auf Deutsch oder Englisch geschrieben werden.

(2) Zum Modul Masterarbeit wird zugelassen, wer mindestens 70 Leistungspunkte gesammelt hat.


(5) Bei der Abgabe der Masterarbeit hat die Studentin schriftlich zu versichern, dass sie die Arbeit selbstständig verfasst hat und keine anderen als die von ihr angegebenen Quellen und Hilfsmittel benutzt hat, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung der Universität Karlsruhe (TH) zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet hat. Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. Bei Abgabe einer unwahren Versicherung wird die Masterarbeit mit „nicht ausreichend“ (5.0) bewertet.


§ 12 Berufspraktikum


(2) Die Studentin setzt sich in eigener Verantwortung mit geeigneten privaten bzw. öffentlichen Einrichtungen in Verbindung, an denen das Praktikum abgeleistet werden kann. Die Studentin wird dabei von einer Prüferin nach § 15 Abs. 2 und einer Ansprechpartnerin der betroffenen Einrichtung betreut.

(3) Am Ende des Berufspraktikums ist der Prüferin ein kurzer Bericht abzugeben und eine Kurzpräsentation über die Erfahrungen im Berufspraktikum zu halten.

(4) Das Berufspraktikum ist abgeschlossen, wenn eine mindestens sechswöchige Tätigkeit nachgewiesen wird, der Bericht abgegeben und die Kurzpräsentation gehalten wurde. Das Berufspraktikum geht nicht in die Gesamtnote ein. Ein Berufspraktikum kann als Zusatzleistung im Sinne von § 13 Abs. 1 oder im Rahmen des Wahlpflichtfachs gemäß § 17 Abs. 4 erbracht werden.

§ 13 Zusatzleistungen, Zusatzmodule, Schlüsselqualifikationen


(2) Die Studentin hat bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.


(4) Neben den verpflichtenden fachwissenschaftlichen Modulen sind Module zu den überfachlichen Schlüsselqualifikationen im Umfang von 3 bis 4 Leistungspunkten Bestandteil eines Masterstudiums. Im Studienplan werden Empfehlungen ausgesprochen, welche Module im Rahmen des Angebots zur Vermittlung der additiven Schlüsselqualifikationen belegt werden sollen.
§ 14 Prüfungsausschuss


(2) Die Vorsitzende, ihre Stellvertreterin, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreterinnen werden von den jeweiligen Fakultätsräten bestellt, die Mitglieder der Gruppe der akademischen Mitarbeiterinnen nach § 10 Abs. 1, Satz 2, Nr. 2 LHG und die Vertreter der Studentinnen auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. Die Vorsitzende und deren Stellvertreterin müssen Hochschullehrerin sein. Die Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr.

(3) Der Prüfungsausschuss ist zuständig für die Organisation der Modulprüfungen und die Durchführung der ihm durch diese Studien- und Prüfungsordnung zugewiesenen Aufgaben. Er achtet auf die Einhaltung der Bestimmungen dieser Studien- und Prüfungsordnung und fällt die Entscheidung in Prüfungsangelegenheiten. Er entscheidet über die Anrechnung von Studienzeiten, Studienleistungen und Modulprüfungen und übernimmt die Gleichwertigkeitsfeststellung. Er berichtet der jeweiligen Fakultät regelmäßig über die Entwicklung der Prüfungs- und Studienzeiten, einschließlich der Bearbeitungszeiten für die Masterarbeiten und die Verteilung der Gesamtnoten. Er gibt Anregungen zur Reform der Studien- und Prüfungsordnung und der Modulbeschreibungen.

(4) Der Prüfungsausschuss kann die Erledigung seiner Aufgaben für alle Regelfälle auf die Vorsitzende des Prüfungsausschusses übertragen.


(6) In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses eine fachlich zuständige und von der betroffenen Fakultät zu nennende Hochschullehrerin oder Privatdozentin hinzuzuziehen. Sie hat in diesem Punkt Stimmsrecht.

(7) Belastende Entscheidungen des Prüfungsausschusses sind der Studentin schriftlich mitzuteilen. Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung schriftlich oder zur Niederschrift beim Rektorat der Universität Karlsruhe (TH) einzureichen.

§ 15 Prüferinnen und Beisitzende

(1) Der Prüfungsausschuss bestellt die Prüferinnen und die Beisitzenden. Er kann die Bestellung der Vorsitzenden übertragen.

(2) Prüferinnen sind Hochschullehrerinnen und habilitierte Mitglieder sowie akademischen Mitarbeiterinnen, denen die Prüfungsbefugnis übertragen wurde. Zur Prüferin und Beisitzenden darf nur bestellt werden, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

(3) Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zu Prüferinnen bestellt werden, wenn die jeweilige Fakultät ihnen eine diesbezügliche Prüfungsbefugnis erteilt hat.
§ 16 Anrechnung von Studienzeiten, Anerkennung von Studienleistungen und Modulprüfungen


(2) Werden Leistungen angerechnet, können die Noten – soweit die Notensysteme vergleichbar sind – übernommen werden und in die Berechnung der Modulnoten und der Gesamtnote einbezogen werden. Liegen keine Noten vor, muss die Leistung nicht anerkannt werden. Die Studentin hat die für die Anrechnung erforderlichen Unterlagen vorzulegen.

(3) Bei der Anrechnung von Studienzeiten und der Anerkennung von Studienleistungen und Modulprüfungen, die außerhalb der Bundesrepublik erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

(4) Absatz 1 gilt auch für Studienzeiten, Studienleistungen und Modulprüfungen, die in staatlich anerkannten Fernstudien- und an anderen Bildungseinrichtungen, insbesondere an staatlichen oder staatlich anerkannten Berufskademien erworben wurden.


(6) Zuständig für die Anrechnungen ist der Prüfungsausschuss. Vor Feststellungen über die Gleichwertigkeit sind die zuständigen Fachvertreterinnen zu hören. Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

II. Masterprüfung

§ 17 Umfang und Art der Masterprüfung

(1) Die Masterprüfung besteht aus den Prüfungen nach Absatz 2, 3 und 4 sowie der Masterarbeit nach Absatz 6.

(2) Es sind Prüfungen aus folgenden Gebieten durch den Nachweis von Leistungspunkten in jeweils einem oder mehreren Modulen abzulegen:
   Fach Mathematik:
   1. Stochastik: im Umfang von 8 Leistungspunkten,
   2. Angewandte und Numerische Mathematik/Optimierung: im Umfang von 8 Leistungspunkten,

Fach Wirtschaftswissenschaften:
4. Finance - Risikomanagement - Managerial Economics: im Umfang von 18 Leistungspunkten,

Die Module, die ihnen zugeordneten Leistungspunkte und die Zuordnung der Module zu den Gebieten und Fächern sind im Studienplan festgelegt. Zur entsprechenden Modulprüfung kann nur zugelassen werden, wer die Anforderungen nach § 5 erfüllt.

(3) Es sind zwei Seminarmodule über je 3 Leistungspunkte nachzuweisen. Dabei muss je ein Seminarmodul aus den beiden beteiligten Fakultäten bestanden werden.

(4) Es sind weiterhin 12 Leistungspunkte zu erbringen, wobei mindestens 8 Leistungspunkte aus den obigen Gebieten 1.-5. oder dem Berufspraktikum kommen müssen und 3 bis 4 Leistungspunkte aus Modulen zu Schlüsselqualifikationen nach § 13 Abs. 4.

(5) Im Studienplan oder Modulhandbuch können darüber hinaus inhaltliche Schwerpunkte definiert werden, denen Module zugeordnet werden können.

(6) Als weitere Prüfungsleistung ist eine Masterarbeit gemäß § 11 anzufertigen.

§ 18 Bestehen der Masterprüfung, Bildung der Gesamtnote

(1) Die Masterprüfung ist bestanden, wenn alle in § 17 genannten Prüfungsleistungen minderstens mit „ausreichend“ bewertet wurden.

(2) Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden alle Prüfungsleistungen nach § 17 mit ihren Leistungspunkten gewichtet.

(3) Hat die Studentin die Masterarbeit mit der Note 1.0 und die Masterprüfung mit einem Durchschnitt von 1.0 abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen. Mit einer Masterarbeit mit der Note 1.0 und bis zu einem Durchschnitt von 1.3 kann auf Antrag an den Prüfungsausschuss das Prädikat „mit Auszeichnung“ (with distinction) verliehen werden.

§ 19 Masterzeugnis, Masterurkunde, Transcript of Records und Diploma Supplement


(2) Das Zeugnis enthält die in den Fachprüfungen, den zugeordneten Modulprüfungen und der Masterarbeit erzielten Noten, deren zugeordnete Leistungspunkte und ECTS-Noten und die Gesamtnote und die ihr entsprechende ECTS-Note. Das Zeugnis ist von den Dekaninnen der beteiligten Fakultäten und von der Vorsitzenden des Prüfungsausschusses zu unterzeichnen.


(4) Die Abschrift der Studiendaten (Transcript of Records) enthält in strukturierter Form alle von der Studentin erbrachten Prüfungsleistungen. Sie beinhaltet alle Fächer, Fachnoten und ihre

(5) Die Masterurkunde, das Masterzeugnis und das Diploma Supplement einschließlich des Transcript of Records werden vom Studienbüro der Universität ausgestellt.

III. Schlussbestimmungen

§ 20 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen

(1) Der Bescheid über die endgültig nicht bestandene Masterprüfung wird der Studentin durch den Prüfungsausschuss in schriftlicher Form erteilt. Der Bescheid ist mit einer Rechtsbehelfsbelehrung zu versehen.

(2) Hat die Studentin die Masterprüfung endgültig nicht bestanden, wird ihr auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Prüfungsleistungen und deren Noten sowie die zur Prüfung noch fehlenden Prüfungsleistungen enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 21 Ungültigkeit der Masterprüfung, Entziehung des Mastergrades

(1) Hat die Studentin bei einer Prüfungsleistung getäuscht und wird diese Tatsache nach der Aushändigung des Zeugnisses bekannt, so können die Noten der Modulprüfungen, bei deren Erbringung die Studentin getäuscht hat, berichtigt werden. Gegebenenfalls kann die Modulprüfung für „nicht ausreichend“ (5.0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(2) Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass die Studentin darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat die Studentin die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend“ (5.0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(3) Vor einer Entscheidung des Prüfungsausschusses ist der Studentin Gelegenheit zur Äußerung zu geben.

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Mit dem unrichtigen Zeugnis ist auch die Masterurkunde einzuziehen, wenn die Masterprüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.


(6) Die Aberkennung des akademischen Grades richtet sich nach den gesetzlichen Vorschriften.

§ 22 Einsicht in die Prüfungsakten

(1) Nach Abschluss der Masterprüfung wird der Studentin auf Antrag innerhalb eines Jahres Einsicht in ihre Masterarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.
(2) Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) Die Prüferin bestimmt Ort und Zeit der Einsichtnahme.

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 23 In-Kraft-Treten

(1) Diese Studien- und Prüfungsordnung tritt am 1. Oktober 2009 in Kraft.


Karlsruhe, den 28. August 2009

Professor Dr. sc. tech. Horst Hippler
(Rektor)
Studien- und Prüfungsordnung
des Karlsruher Instituts für Technologie (KIT) für den Masterstudiengang
Wirtschaftsmathematik

vom 17.12.2015


Der Präsident hat seine Zustimmung gemäß § 20 Absatz 2 KITG iVm. § 32 Absatz 3 Satz 1 LHG am 17. Dezember 2015 erteilt.

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Präambel

Das KIT hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss des Studiums am KIT der Mastergrad stehen soll. Das KIT sieht daher die am KIT angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich
Diese Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Wirtschaftsmathematik am KIT.

§ 2 Ziel des Studiums, akademischer Grad
(1) Im konsekutiven Masterstudium sollen die im Bachelorstudium erworbenen wissenschaftlichen Qualifikationen weiter vertieft, verbreitert, erweitert oder ergänzt werden. Ziel des Studiums ist die Fähigkeit, die wissenschaftlichen Erkenntnisse und Methoden selbstständig anzuwenden und ihre Bedeutung und Reichweite für die Lösung komplexer wissenschaftlicher und gesellschaftlicher Problemstellungen zu bewerten.

(2) Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science (M.Sc.)“ für den Masterstudiengang Wirtschaftsmathematik verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte
(1) Die Regelstudienzeit beträgt vier Semester.


(4) Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studien- und Prüfungsleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 120 Leistungspunkte.

(5) Lehrveranstaltungen können nach vorheriger Ankündigung auch in englischer Sprache angeboten werden.

§ 4 Modulprüfungen, Studien- und Prüfungsleistungen

Erfolgskontrollen gliedern sich in Studien- oder Prüfungsleistungen.

(2) Prüfungsleistungen sind:
1. schriftliche Prüfungen,
2. mündliche Prüfungen oder
3. Prüfungsleistungen anderer Art.

(3) Studienleistungen sind schriftliche, mündliche oder praktische Leistungen, die von den Studierenden in der Regel lehrveranstaltungs begleitend erbracht werden. Die Masterprüfung darf nicht mit einer Studienleistung abgeschlossen werden.

(4) Von den Modulprüfungen sollen mindestens 70 % benotet sein.

(5) Bei sich ergänzenden Inhalten können die Modulprüfungen mehrerer Module durch eine auch modulübergreifende Prüfungsleistung (Absatz 2 Nr.1 bis 3) ersetzt werden.

§ 5 Anmeldung und Zulassung zu den Modulprüfungen und Lehrveranstaltungen

(1) Um an den Modulprüfungen teilnehmen zu können, müssen sich die Studierenden online im Studierendenportal zu den jeweiligen Erfolgskontrollen anmelden. In Ausnahmefällen kann eine Anmeldung schriftlich im Studierendenservice oder in einer anderen, vom Studierendenservice autorisierten Einrichtung erfolgen. Für die Erfolgskontrollen können durch die Prüfenden Anmeldefristen festgelegt werden. Die Anmeldung der Masterarbeit ist im Modulhandbuch geregelt.


(3) Zu einer Erfolgskontrolle ist zuzulassen, wer
1. in den Masterstudiengang Wirtschaftsmathematik am KIT eingeschrieben ist; die Zulassung beurlaubter Studierender ist auf Prüfungsleistungen beschränkt; und
2. nachweist, dass er die im Modulhandbuch für die Zulassung zu einer Erfolgskontrolle festgelegten Voraussetzungen erfüllt und
3. nachweist, dass er in dem Masterstudiengang Wirtschaftsmathematik den Prüfungsanspruch nicht verloren hat.

(4) Nach Maßgabe von § 30 Abs. 5 LHG kann die Zulassung zu einzelnen Pflichtveranstaltungen beschränkt werden. Der/die Prüfende entscheidet über die Auswahl unter den Studierenden, die sich rechtzeitig bis zu dem von dem/der Prüfenden festgesetzten Termin angemeldet haben unter Berücksichtigung der Studienfortschritte dieser Studierenden und unter Beachtung von § 13 Abs. 1 Satz 1 und 2, sofern ein Abbau des Überhangs durch andere oder zusätzliche Veranstaltungen nicht möglich ist. Für den Fall gleichen Studienfortschritts sind durch die KIT-Fakultäten weitere Kriterien festzulegen. Das Ergebnis wird den Studierenden rechtzeitig bekannt gegeben.


§ 6 Durchführung von Erfolgskontrollen

(1) Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach, durchgeführt.

(2) Die Art der Erfolgskontrolle (§ 4 Abs. 2 Nr. 1 bis 3, Abs. 3) wird von der/dem Prüfenden der betreffenden Lehrveranstaltung in Bezug auf die Lehrinhalte der Lehrveranstaltung und die Lernziele des Moduls festgelegt. Die Art der Erfolgskontrolle, ihre Häufigkeit, Reihenfolge und Gewichtung sowie gegebenenfalls die Bildung der Modulnote müssen mindestens sechs Wo-
chen vor Vorlesungsbeginn im Modulhandbuch bekannt gemacht werden. Im Einvernehmen von Prüfendem und Studierender bzw. Studierendem können die Art der Prüfungsleistung sowie die Prüfungssprache auch nachträglich geändert werden; im ersten Fall ist jedoch § 4 Abs. 4 zu berücksichtigen. Bei der Prüfungsorganisation sind die Belange Studierender mit Behinderung oder chronischer Erkrankung gemäß § 13 Abs. 1 zu berücksichtigen. § 13 Abs. 1 Satz 3 und 4 gelten entsprechend.

(3) Bei unvertretbar hohem Prüfungsaufwand kann eine schriftlich durchzuführende Prüfungsleistung auch mündlich, oder eine mündlich durchzuführende Prüfungsleistung auch schriftlich abgenommen werden. Diese Änderung muss mindestens sechs Wochen vor der Prüfungsleistung bekannt gegeben werden.

(4) Bei Lehrveranstaltungen in englischer Sprache (§ 3 Abs. 6) können die entsprechenden Erfolgskontrollen in dieser Sprache abgenommen werden. § 6 Abs. 2 gilt entsprechend.


(6) *Mündliche Prüfungen* (§ 4 Abs. 2 Nr. 2) sind von mehreren Prüfenden (Kollegialprüfung) oder von einer/einem Prüfenden in Gegenwart einer oder eines Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. Vor der Festsetzung der Note hört die/der Prüfende die anderen an der Kollegialprüfung mitwirkenden Prüfenden an. Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 60 Minuten pro Studierenden.

Die wesentlichen Gegenstände und Ergebnisse der *mündlichen Prüfung* sind in einem Protokoll festzuhalten. Das Ergebnis der Prüfung ist den Studierenden im Anschluss an die mündliche Prüfung bekannt zu geben.

Studierende, die sich in einem späteren Semester der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen und nach Zustimmung des Prüflings als Zuhörerinnen und Zuhörer bei mündlichen Prüfungen zugelassen. Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse.

(7) *Für Prüfungsleistungen anderer Art* (§ 4 Abs. 2 Nr. 3) sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Prüfungsleistung dem/der Studierenden zurechenbar ist. Die wesentlichen Gegenstände und Ergebnisse der Erfolgskontrolle sind in einem Protokoll festzuhalten.

Bei *mündlich* durchgeführten *Prüfungsleistungen anderer Art* muss neben der/dem Prüfenden ein/e Beisitzende/r anwesend sein, die/der zusätzlich zum/r Prüfenden das Protokoll zeichnet.

*Schriftliche Arbeiten* im Rahmen einer *Prüfungsleistung anderer Art* haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.“ Trägt die Arbeit diese Erklärung nicht, wird sie nicht angenommen. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

**§ 6 a Erfolgskontrollen im Antwort-Wahl-Verfahren**

Das Modulhandbuch regelt, ob und in welchem Umfang Erfolgskontrollen im Wege des *Antwort-Wahl-Verfahrens* abgelegt werden können.
§ 6 b Computergestützte Erfolgskontrollen


(2) Vor der computergestützten Erfolgskontrolle hat die/der Prüfende sicherzustellen, dass die elektronischen Daten eindeutig identifiziert und unverwechselbar und dauerhaft den Studierenden zugeordnet werden können. Der störungsfreie Verlauf einer computergestützten Erfolgskontrolle ist durch entsprechende technische Betreuung zu gewährleisten, insbesondere ist die Erfolgskontrolle in Anwesenheit einer fachlich sachkundigen Person durchzuführen. Alle Prüfungsaufgaben müssen während der gesamten Bearbeitungszeit zur Bearbeitung zur Verfügung stehen.

(3) Im Übrigen gelten für die Durchführung von computergestützten Erfolgskontrollen die §§ 6 bzw. 6 a.

§ 7 Bewertung von Studien- und Prüfungsleistungen

(1) Das Ergebnis einer Prüfungsleistung wird von den jeweiligen Prüfenden in Form einer Note festgesetzt.

(2) Folgende Noten sollen verwendet werden:

- sehr gut (very good): hervorragende Leistung,
- gut (good): eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
- befriedigend (satisfactory): eine Leistung, die durchschnittlichen Anforderungen entspricht,
- ausreichend (sufficient): eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
- nicht ausreichend (failed): eine Leistung, die wegen erheblicher Mängel nicht den Anforderungen genügt.

Zur differenzierten Bewertung einzelner Prüfungsleistungen sind nur folgende Noten zugelassen:

- 1,0; 1,3: sehr gut
- 1,7; 2,0; 2,3: gut
- 2,7; 3,0; 3,3: befriedigend
- 3,7; 4,0: ausreichend
- 5,0: nicht ausreichend

(3) Studienleistungen werden mit „bestanden“ oder mit „nicht bestanden“ gewertet.

(4) Bei der Bildung der gewichteten Durchschnitte der Modulnoten, der Fachnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

(5) Jedes Modul und jede Erfolgskontrolle darf in demselben Studiengang nur einmal gewertet werden.

(6) Eine Prüfungsleistung ist bestanden, wenn die Note mindestens „ausreichend“ (4,0) ist.

(8) Die Ergebnisse der Erfolgskontrollen sowie die erworbenen Leistungspunkte werden durch den Studierendenservice des KIT verwaltet.

(9) Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein.

(10) Die Gesamtnote der Masterprüfung, die Fachnoten und die Modulnoten lauten:

\[
\begin{align*}
\text{bis} & \quad 1,5 & = & \text{sehr gut} \\
\text{von} & \quad 1,6 & \text{bis} & \quad 2,5 & = & \text{gut} \\
\text{von} & \quad 2,6 & \text{bis} & \quad 3,5 & = & \text{befriedigend} \\
\text{von} & \quad 3,6 & \text{bis} & \quad 4,0 & = & \text{ausreichend}
\end{align*}
\]

§ 8 Wiederholung von Erfolgskontrollen, endgültiges Nichtbestehen

(1) Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Absatz 2 Nr. 1) einmal wiederholen. Wird eine schriftliche Prüfungspassage mit „nicht ausreichend“ (5,0) bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend“ (4,0) sein.

(2) Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Absatz 2 Nr. 2) einmal wiederholen.

(3) Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen.

(4) Prüfungsleistungen anderer Art (§ 4 Absatz 2 Nr. 3) können einmal wiederholt werden.

(5) Studienleistungen können mehrfach wiederholt werden.

(6) Die Prüfungsleistung ist endgültig nicht bestanden, wenn die mündliche Nachprüfung im Sinne des Absatzes 1 mit „nicht ausreichend“ (5,0) bewertet wurde. Die Prüfungsleistung ist ferner endgültig nicht bestanden, wenn die mündliche Prüfung im Sinne des Absatzes 2 oder die Prüfungsleistung anderer Art gemäß Absatz 4 zweimal mit „nicht bestanden“ bewertet wurde.

(7) Das Modul ist endgültig nicht bestanden, wenn eine für sein Bestehen erforderliche Prüfungsleistung endgültig nicht bestanden ist.

(8) Eine zweite Wiederholung derselben Prüfungsleistung gemäß § 4 Abs. 2 ist nur in Ausnahmefällen auf Antrag des/des Studierenden zulässig („Antrag auf Zweitwiederholung“). Der Antrag ist schriftlich beim Prüfungsausschuss in der Regel bis zwei Monate nach Bekanntgabe der Note zu stellen.


(9) Die Wiederholung einer bestandenen Prüfungsleistung ist nicht zulässig.
Die Masterarbeit kann bei einer Bewertung mit „nicht ausreichend“ (5,0) einmal wiederholt werden. Eine zweite Wiederholung der Masterarbeit ist ausgeschlossen.

§ 9 Verlust des Prüfungsanspruchs


§ 10 Abmeldung; Versäumnis, Rücktritt

(1) Studierende können ihre Anmeldung zu schriftlichen Prüfungen ohne Angabe von Gründen bis zur Ausgabe der Prüfungsaufgaben widerrufen (Abmeldung). Eine Abmeldung kann online im Studierendenportal bis 24:00 Uhr des Vortages der Prüfung oder in begründeten Ausnahmefällen beim Studierendenservice innerhalb der Geschäftszeiten erfolgen. Erfolgt die Abmeldung gegenüber dem/der Prüfenden hat diese/r Sorge zu tragen, dass die Abmeldung im Campus Management System verbucht wird.

(2) Bei mündlichen Prüfungen muss die Abmeldung spätestens drei Werktagen vor dem betreffenden Prüfungstermin gegenüber dem/der Prüfenden erklärt werden. Der Rücktritt von einer mündlichen Prüfung weniger als drei Werktagen vor dem betreffenden Prüfungstermin ist nur unter den Voraussetzungen des Absatzes 5 möglich. Der Rücktritt von mündlichen Nachprüfungen im Sinne von § 8 Abs. 1 ist grundsätzlich nur unter den Voraussetzungen von Absatz 5 möglich.

(3) Die Abmeldung von Prüfungsleistungen anderer Art sowie von Studienleistungen ist im Modulhandbuch geregelt.

(4) Eine Erfolgskontrolle gilt als mit „nicht ausreichend“ (5,0) bewertet, wenn die Studierenden einen Prüfungstermin ohne triftigen Grund versäumen oder wenn sie nach Beginn der Erfolgskontrolle ohne triftigen Grund von dieser zurücktreten. Dasselbe gilt, wenn die Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der/die Studierende hat die Fristüberschreitung nicht zu vertreten.


§ 11 Täuschung, Ordnungsverstoß

(1) Versuchen Studierende das Ergebnis ihrer Erfolgskontrolle durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Erfolgskontrolle als mit „nicht ausreichend“ (5,0) bewertet.


(3) Näheres regelt die Allgemeine Satzung des KIT zur Redlichkeit bei Prüfungen und Praktika in der jeweils gültigen Fassung.
§ 12 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten


(3) Der Prüfungsausschuss entscheidet auf Antrag über die flexible Handhabung von Prüfungsfritten entsprechend den Bestimmungen des Landeshochschulgesetzes, wenn Studierende Familienpflichten wahrzunehmen haben. Absatz 2 Satz 4 bis 6 gelten entsprechend.

§ 13 Studierende mit Behinderung oder chronischer Erkrankung


(2) Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Zeit oder Form abzulegen, kann der Prüfungsausschuss gestatten, die Erfolgskontrollen in einem anderen Zeitraum oder einer anderen Form zu erbringen. Insbesondere ist behinderten Studierenden zu gestatten, notwendige Hilfsmittel zu benutzen.

(3) Weisen Studierende eine Behinderung oder chronische Erkrankung nach und folgt daraus, dass sie nicht in der Lage sind, die Lehrveranstaltungen regelmäßig zu besuchen oder die gemäß § 19 erforderlichen Studien- und Prüfungsleistungen zu erbringen, kann der Prüfungsausschuss auf Antrag gestatten, dass einzelne Studien- und Prüfungsleistungen nach Ablauf der in dieser Studien- und Prüfungsordnung vorgesehenen Fristen absolviert werden können.

§ 14 Modul Masterarbeit

(1) Voraussetzung für die Zulassung zum Modul Masterarbeit ist, dass die/der Studierende Modulprüfungen im Umfang von 70 LP erfolgreich abgelegt hat. Über Ausnahmen entscheidet der Prüfungsausschuss auf Antrag der/des Studierenden.

Thema, Aufgabenstellung und Umfang der Masterarbeit sind von dem Betreuer bzw. der Betreuerin so zu begrenzen, dass sie mit dem in Absatz 4 festgelegten Arbeitsaufwand bearbeitet werden kann.


Bei der Abgabe der Masterarbeit haben die Studierenden schriftlich zu versichern, dass sie die Arbeit selbstständig verfasst und keine anderen als die angegebenen Quellen und Hilfsmittel benutzt haben, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet haben. Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. Die Erklärung kann wie folgt lauten: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig verfasst, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde sowie die Satzung des KIT zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet zu haben.“ Bei Abgabe einer unwahren Versicherung wird die Masterarbeit mit „nicht ausreichend“ (5,0) bewertet.

Der Zeitpunkt der Abgabe der Masterarbeit ist durch den/die Prüfende/n beim Prüfungsausschuss aktenkundig zu machen. Der Zeitpunkt der Abgabe der Masterarbeit ist durch den/die Prüfende/n beim Prüfungsausschuss aktenkundig zu machen. Das Thema kann nur einmal und nur innerhalb des ersten Monats der Bearbeitungszeit zurückgegeben werden. Macht der oder die Studierende einen triftigen Grund geltend, kann der Prüfungsausschuss die in Absatz 4 festgelegte Bearbeitungszeit auf Antrag der oder des Studierenden um höchstens drei Monate verlängern. Wird die Masterarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ (5,0) bewertet, es sei denn, dass die Studierenden dieses Versäumnis nicht zu vertreten haben.

§ 15 Zusatzleistungen

(2) Die Studierenden haben bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

§ 16 Prüfungsausschuss
(1) Für den Masterstudiengang Wirtschaftsmathematik wird ein Prüfungsausschuss gebildet. Er besteht aus sechs stimmberichtigen Mitgliedern, die jeweils zur Hälfte von der Fakultät für Mathematik und der Fakultät für Wirtschaftswissenschaften bestellt werden: vier Hochschullehrer/innen / leitenden Wissenschaftler/innen gemäß § 14 Abs. 3 Ziff. 1 KITG / Privatdozentinnen bzw. -dozenten, zwei akademischen Mitarbeiterinnen und Mitarbeitern nach § 52 LHG / wissenschaftlichen Mitarbeiter/innen gemäß § 14 Abs. 3 Ziff. 2 KITG und einer bzw. einem Studierenden mit beratender Stimme. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.


(4) Der Prüfungsausschuss kann die Erledigung seiner Aufgaben für alle Regelfälle auf die/den Vorsitzende/n des Prüfungsausschusses übertragen. In dringenden Angelegenheiten, deren Erledigung nicht bis zu der nächsten Sitzung des Prüfungsausschusses warten kann, entscheidet die/den Vorsitzende des Prüfungsausschusses.


(6) In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen KIT-Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses eine fachlich zuständige und von der betroffenen KIT-Fakultät zu nennende prüfungs- berechtigte Person hinzuzuziehen.

§ 17 Prüfende und Beisitzende

(1) Der Prüfungsausschuss bestellt die Prüfenden. Er kann die Bestellung der/dem Vorsitzenden übertragen.

(2) Prüfende sind Hochschullehrer/innen sowie leitende Wissenschaftler/innen gemäß § 14 Abs. 3 Ziff. 1 KITG, habilitierte Mitglieder und akademische Mitarbeiter/innen gemäß § 52 LHG, welche der KIT-Fakultät für Mathematik oder der KIT-Fakultät für Wirtschaftswissenschaften angehören und denen die Prüfungsbefugnis übertragen wurde; desgleichen kann wissenschaftlichen Mitarbeitern gemäß § 14 Abs. 3 Ziff. 2 KITG die Prüfungsbefugnis übertragen werden. Bestellt werden darf nur, wer mindestens die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat.

(3) Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zu Prüfenden bestellt werden, sofern die KIT-Fakultät für Mathematik oder die KIT-Fakultät für Wirtschaftswissenschaften eine Prüfungsbefugnis erteilt hat und sie die gemäß Absatz 2 Satz 2 vorausgesetzte Qualifikation nachweisen können.

(4) Die Beisitzenden werden durch die Prüfenden benannt. Zu Beisitzenden darf nur bestellt werden, wer einen akademischen Abschluss in einem Masterstudiengang der Wirtschaftsmathematik oder einen gleichwertigen akademischen Abschluss erworben hat.

§ 18 Anerkennung von Studien- und Prüfungsleistungen, Studienzeiten

(1) Studien- und Prüfungsleistungen sowie Studienzeiten, die in Studiengängen an staatlichen oder staatlich anerkannten Hochschulen und Berufsakademien der Bundesrepublik Deutschland oder an ausländischen staatlichen oder staatlich anerkannten Hochschulen erbracht wurden, werden auf Antrag der Studierenden anerkannt, sofern hinsichtlich der erworbenen Kompetenzen kein wesentlicher Unterschied zu den Leistungen oder Abschlüssen besteht, die ersetzt werden sollen. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studienleistung (Anerkennung) werden die Grundsätze des ECTS herangezogen.

(2) Die Studierenden haben die für die Anerkennung erforderlichen Unterlagen vorzulegen. Studierende, die neu in den Masterstudiengang Wirtschaftsmathematik immatrikuliert wurden, haben den Antrag mit den für die Anerkennung erforderlichen Unterlagen innerhalb eines Semesters nach Immatrikulation zu stellen. Bei Unterlagen, die nicht in deutscher oder englischer Sprache vorliegen, kann eine amtlich beglaubigte Übersetzung verlangt werden. Die Beweislast dafür, dass der Antrag die Voraussetzungen für die Anerkennung nicht erfüllt, liegt beim Prüfungsausschuss.

(3) Werden Leistungen angerechnet, die nicht am KIT erbracht wurden, werden sie im Zeugnis als „anerkannt“ ausgewiesen. Liegen Noten vor, werden die Noten, soweit die Notensysteme vergleichbar sind, übernommen und in die Berechnung der Modulnoten und der Gesamtnote einbezogen. Sind die Notensysteme nicht vergleichbar, können die Noten umgerechnet werden. Liegen keine Noten vor, wird der Vermerk „bestanden“ aufgenommen.

(4) Bei der Anerkennung von Studien- und Prüfungsleistungen, die außerhalb der Bundesrepublik Deutschland erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

(5) Außerhalb des Hochschulsystems erworbene Kenntnisse und Fähigkeiten werden angerechnet, wenn sie nach Inhalt und Niveau den Studien- und Prüfungsleistungen gleichwertig sind, die

Economathematics (M.Sc.)
Module Handbook, Date 11/17/2017, Winter term 17/18
ersetzt werden sollen und die Institution, in der die Kenntnisse und Fähigkeiten erworben wurden, ein genormtes Qualitätssicherungssystem hat. Die Anrechnung kann in Teilen versagt werden, wenn mehr als 50 Prozent des Hochschulstudiums ersetzt werden soll.


II. Masterprüfung

§ 19 Umfang und Art der Masterprüfung

(1) Die Masterprüfung besteht aus den Modulprüfungen nach Absatz 2 und 3 sowie dem Modul Masterarbeit (§ 14).

(2) Es sind Modulprüfungen in folgenden Pflichtfächern abzulegen:

1. Fach: "Mathematische Methoden": Modul(e) im Umfang von 36 LP, wovon mindestens 8 LP aus Modulen der Stochastik und weitere 8 LP aus Modulen der Analysis oder Angewandter und Numerischer Mathematik, Optimierung stammen müssen.

2. Fach: "Finance - Risk Management - Managerial Economics": Modul(e) im Umfang von 18 LP.

3. Fach: "Operations Management - Datenanalyse - Informatik": Modul(e) im Umfang von 18 LP.

4. Fach: „Wirtschaftswissenschaftliches Seminar“: Modul(e) im Umfang von 3 LP.

5. Fach: „Mathematisches Seminar“: Modul(e) im Umfang von 3 LP.

Die Festlegung der zur Auswahl stehenden Module und deren Fachzuordnung werden im Modulhandbuch getroffen.

(3) Im Wahlpflichtfach sind Modulprüfungen im Umfang von 12 LP abzulegen. Die Festlegung der zur Auswahl stehenden Module wird im Modulhandbuch getroffen.

§ 20 Bestehen der Masterprüfung, Bildung der Gesamtnote

(1) Die Masterprüfung ist bestanden, wenn alle in § 19 genannten Modulprüfungen mindestens mit „ausreichend“ bewertet wurden.

(2) Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt der Fachnoten der Fächer 1 – 4 gemäß § 19 Abs. 2, dem Wahlpflichtfach gemäß § 19 Abs. 3 und dem Modul Masterarbeit.

(3) Haben Studierende die Masterarbeit mit der Note 1,0 und die Masterprüfung mit einem Durchschnitt von 1,2 oder besser abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen.

§ 21 Masterzeugnis, Masterurkunde, Diploma Supplement und Transcript of Records


(3) Mit dem Zeugnis erhalten die Studierenden ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS Users’ Guide entspricht, sowie ein Transcript of Records in deutscher und englischer Sprache.


III. Schlussbestimmungen

§ 22 Bescheinigung von Prüfungsleistungen
Haben Studierende die Masterprüfung endgültig nicht bestanden, wird ihnen auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Studien- und Prüfungsleistungen und deren Noten enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 23 Aberkennung des Mastergrades
(1) Haben Studierende bei einer Prüfungsleistung getäuscht und wird diese Tatsache nach der Aushändigung des Zeugnisses bekannt, so können die Noten der Modulprüfungen, bei denen getäuscht wurde, berichtigt werden. Gegebenenfalls kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(2) Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass die/der Studierende darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat die/der Studierende die Zulassung vorsätzlich zu Unrecht erworben, so kann die Modulprüfung für „nicht ausreichend“ (5,0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(3) Vor einer Entscheidung des Prüfungsausschusses ist Gelegenheit zur Äußerung zu geben.

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Mit dem unrichtigen Zeugnis ist auch die Masterurkunde einzuziehen, wenn die Masterprüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.

§ 24 Einsicht in die Prüfungsakten

(1) Nach Abschluss der Masterprüfung wird den Studierenden auf Antrag innerhalb eines Jahres Einsicht in das Prüfungsexemplar ihrer Masterarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.

(2) Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) Der/die Prüfende bestimmt Ort und Zeit der Einsichtnahme.

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 25 Inkrafttreten, Übergangsvorschriften

(1) Diese Studien- und Prüfungsordnung tritt am 01. April 2016 in Kraft und gilt
1. für Studierende, die ihr Studium im Masterstudiengang Wirtschaftsmathematik am KIT im ersten Fachsemester aufnehmen, sowie
2. für Studierende, die ihr Studium im Masterstudiengang Wirtschaftsmathematik am KIT in einem höheren Fachsemester aufnehmen, sofern dieses Fachsemester nicht über dem Fachsemester liegt, das der erste Jahrgang nach Ziff. 1 erreicht.

1. Studierende, die ihr Studium im Masterstudiengang Wirtschaftsmathematik am KIT zuletzt im Wintersemester 2015/16 aufgenommen haben, sowie
2. für Studierende, die ihr Studium im Masterstudiengang Wirtschaftsmathematik am KIT ab dem Sommersemester 2016 in einem höheren Fachsemester aufnehmen, sofern das Fachsemester über dem liegt, das der erste Jahrgang nach Absatz 1 Ziff. 1 erreicht hat. Im Übrigen tritt sie außer Kraft.


Karlsruhe, den 17. Dezember 2015

Professor Dr.-Ing. Holger Hanselka
(Präsident)
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