Module Handbook
Information Engineering and Management M.Sc.

SPO 2015
Winter term 2021/22
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KIT DEPARTMENT OF ECONOMICS AND MANAGEMENT / KIT DEPARTMENT OF INFORMATICS

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1 General information

Welcome to the new module handbook of your study program! We are delighted that you have decided to study at the KIT Department of Economics and Management and wish you a good start into the new semester! In the following we would like to give you a short introduction to the most important terms and rules that are important in connection with the choice of modules, courses and examinations.

1.1 Structural elements

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

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

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

1.2 Begin and completion of a module

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

1.3 Module versions

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

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

1.4 General and partial examinations

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

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

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

1.5 Types of exams

Exams are split into written exams, oral exams and alternative exam assessments. Exams are always graded. Non exam assessments can be repeated several times and are not graded.

Caution: exam type dependent on further pandemic developments

Due to the current situation, online formats are also available for examinations that are typically offered as **presence examinations**, depending on the circumstances.

All assessments that are announced in the modules as a written exam (written exam/sP according to SPO § 4 Abs. 2, Pkt. 1) can therefore also be offered as an alternative exam assessment/PLaA (according to SPO § 4 Abs. 2, Pkt. 3) depending on further pandemic developments. And vice versa. As alternative examination formats, **a) online examinations with video supervision** (sP) and optionally a face-to-face examination in the same examination period are offered. Or **b)** the **Online Open Book exam** (PLaA) format.

This option applies to all modules and assessments listed in the module handbook, regardless of whether or not corresponding references are already made to them there. It is also at the discretion of the responsible examiners whether they allow a 'free shot' for their examination when determining the type of examination.

1.6 Repeating exams

Principally, a failed written exam, oral exam or alternative exam assessment can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. A request for a second repetition has to be made in written form to the examination committee two months after loosing the examination claim. A counseling interview is mandatory.

For further information see http://www.wiwi.kit.edu/hinweiseZweitwdh.php.

1.7 Examiners

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

1.8 Additional accomplishments

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

1.9 Further information

For current information about studying at the KIT Department of Economics and Management, please visit our website www.wiwi.kit.edu as well as Instagram, LinkedIn, and YouTube. Please also see current notices and announcements for students at: https://www.wiwi.kit.edu/studium.php.

Information around the legal and official framework of the study program can be found in the respective study and examination regulations of your study program. These are available under the Official Announcements of KIT (http://www.sle.kit.edu/amtlicheBekanntmachungen.php).

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).

1.10 Contact persons

for Bachelor students

> **Personal consultation:** KIT Department of Informatics, Informatics Study Program Service
> Informatics Building 50.34, EG, Rooms 001.2/.3
> bachelor@wirtschaftsinformatik.kit.edu

for master students

> **Personal consultation:** KIT Department of Economics and Management, Examination Office
> Gebäude am Kronenplatz Building 05.20, 3rd floor, Room 3C-05
> master@wirtschaftsinformatik.kit.edu

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2 The Master's degree program in Information Engineering and Management

2.1 Qualification objectives of the Master's program in Information Engineering and Management

Graduates of the interdisciplinary, four-semester Master's program in Information Engineering and Management have an advanced and in-depth research-based knowledge in the fields of informatics, economics and law as well as subject-independent competences that can be applied across multiple disciplines.

By combining their knowledge and competences, they are in a position to independently acknowledge economic and IT opportunities and development potentials for innovative change of structures and processes and implement them within the applicable legal framework. They are able to analyze, structure and describe complex, field-related problems and challenges.

They know how to identify advantages and disadvantages of existing procedures, models, technologies and approaches, compare alternatives, evaluate critically and apply the findings to new application areas.

If necessary, they are also in a position to combine different approaches, adapt them accordingly or even independently develop and apply new and innovative solutions.

They know how to critically interpret, validate and illustrate the achieved results.

Their decisions are made independently based on scientific facts under consideration of social and ethical aspects.

The graduates can communicate with expert representatives on a scientific level and even assume prominent responsibility in a team. Karlsruhe's Infonomics experts are characterized by their interdisciplinary methodological skills and innovative abilities.

Their qualifications are perfectly ideal particularly for interdisciplinary occupations in the fields of Information and Communication Technology (ICT), controlling, consulting, management and organization, for starting and management of firms as well as a downstream scientific career (PhD).

2.2 Structure of the Master's degree program in Information Engineering and Management SPO 2015

The Master's degree program in **Information Engineering and Management** has 4 terms. The terms 1 to 3 of the program are method-oriented and provide the students with state-of-the-art knowledge in informatics, business administration, operations research, economics, statistics and law. The interdisciplinary approach is especially emphasized in the interdisciplinary seminar.

It is recommended to study the courses in the following sequence:

- The (mandatory) modules in business administration and operations research should be studied in the first two terms of the program.
- The interdisciplinary seminar module should be taken until the end of the third term of the program.
- The (elective) modules from business administration, economics, operations research, and statistics, from informatics, and from law should be studied in the first three terms of the program.
- The 4-th term is reserved for the Master Thesis in which the student proves his ability for independent scientific research in informatics, the economic sciences, and law.

Figure 2 shows a summary of this recommendation with the structure of the disciplines and with credit points allocated to the modules of the program.

Term	Credits	Informatics				Economics and Management				Law		Research Course	Master Thesis
		Electives				Compulsory		Electives		Electives			
1	27	INFO 8 CP	INFO 8 CP			BUS 10 CP	OR 5 CP	BUS 9 CP		Law 9 CP			
2	30,5			INFO 8 CP							Law 9 CP		
3	32,5				INFO 9 CP				BUS/ECON/ OR/STAT 9 CP			2 Seminars 3 CP + 3 CP	
4	30												Master Thesis 30 CP
	120												

Figure 2: Structure of the Master's degree program in Information Engineering and Management SPO 2015 (Recommendation)

3 Field of study structure

Mandatory	
Master Thesis	30 CR
Informatics	33 CR
Economics and Management	33 CR
Law	18 CR
Research Course	6 CR

3.1 Master Thesis	Credits 30

Mandatory		
M-WIWI-101656	Module Master Thesis	30 CR

3.2 Informatics

Credits
33

Election block: Informatics (at least 33 credits)		
M-INFO-101199	Advanced Algorithms: Design and Analysis	9 CR
M-INFO-101200	Advanced Algorithms: Engineering and Applications	9 CR
M-INFO-100795	Algorithm Engineering	5 CR
M-INFO-100031	Algorithms for Routing	5 CR
M-INFO-100797	Algorithms in Cellular Automata	5 CR
M-INFO-102094	Algorithms for Visualization of Graphs	5 CR
M-INFO-101173	Algorithms II	6 CR
M-INFO-102110	Computational Geometry	6 CR
M-INFO-101237	Algorithmic Methods for Hard Optimization Problems	5 CR
M-INFO-102400	Algorithmic Methods for Network Analysis	5 CR
M-INFO-101256	Theory and Practice of Data Warehousing and Mining	9 CR
M-INFO-103294	Wearable Robotic Technologies	4 CR
M-WIWI-105366	Artificial Intelligence	9 CR
M-INFO-104447	Automated Planning and Scheduling	5 CR
M-INFO-100826	Automated Visual Inspection and Image Processing	6 CR
M-INFO-101251	Autonomous Robotics	9 CR
M-WIWI-104403	Critical Digital Infrastructures	9 CR
M-INFO-105799	Data Science I neu	5 CR
M-INFO-105801	Data Science II neu	3 CR
M-INFO-100780	Deployment of Database Systems	5 CR
M-INFO-105724	Database as a Service neu	5 CR
M-INFO-101662	Practical Course: Database Systems	4 CR
M-INFO-104045	Data Privacy: From Anonymization to Access Control	3 CR
M-INFO-104460	Deep Learning and Neural Networks	6 CR
M-INFO-102978	Digital Circuits Design	6 CR
M-INFO-101210	Dynamic IT-Infrastructures	9 CR
M-INFO-100736	Introduction to Video Analysis	3 CR
M-WIWI-101477	Development of Business Information Systems	9 CR
M-INFO-100799	Formal Systems	6 CR
M-INFO-100744	Formal Systems II: Application	5 CR
M-INFO-100841	Formal Systems II: Theory	5 CR
M-INFO-101198	Advanced Topics in Cryptography	9 CR
M-INFO-101205	Future Networking	8 CR
M-INFO-100730	Geometric Optimization	3 CR
M-WIWI-104520	Human Factors in Security and Privacy	9 CR
M-INFO-101208	Innovative Concepts of Data and Information Management	8 CR
M-WIWI-101456	Intelligent Systems and Services	9 CR
M-INFO-100819	Cognitive Systems	6 CR
M-INFO-101178	Communication and Database Systems	8 CR
M-INFO-101575	Computational Complexity Theory, with a View Towards Cryptography	6 CR
M-INFO-100728	Context Sensitive Systems	5 CR
M-INFO-101239	Machine Vision	9 CR
M-WIWI-103356	Machine Learning	9 CR
M-INFO-105778	Machine Learning - Foundations and Algorithms neu	5 CR
M-INFO-100729	Human Computer Interaction	6 CR
M-INFO-104061	Microservice-Based Web Applications	8 CR
M-INFO-100785	Mobile Communication	4 CR
M-INFO-100828	Models of Parallel Processing	5 CR
M-INFO-100825	Pattern Recognition	3 CR
M-INFO-101206	Networking	8 CR

M-INFO-101204	Networking Labs	9 CR
M-INFO-100812	Meshes and Point Clouds	3 CR
M-INFO-100782	Network Security: Architectures and Protocols	4 CR
M-INFO-101207	Networking Security - Theory and Praxis	9 CR
M-INFO-100796	Parallel Algorithms	5 CR
M-INFO-102072	Laboratory Course Algorithm Engineering	6 CR
M-INFO-102807	Practical Course: Analysis of Complex Data Sets	4 CR
M-INFO-105632	Practical Course: Data Science	6 CR
M-INFO-101666	Practical Course: Geometric Modeling	3 CR
M-INFO-103302	Lab: Graph Visualization in Practice	5 CR
M-INFO-103128	Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data	4 CR
M-INFO-103235	Practical Course: Smart Data Analytics	6 CR
M-INFO-100794	Randomized Algorithms	5 CR
M-INFO-100893	Robotics I - Introduction to Robotics	6 CR
M-INFO-105328	Seminar: Computer Science TECO	3 CR
M-INFO-101202	Software Methods	9 CR
M-INFO-101201	Software Systems	9 CR
M-INFO-100806	Language Technology and Compiler	8 CR
M-INFO-100801	Telematics	6 CR
M-INFO-100789	Ubiquitous Computing	5 CR
M-WIWI-101458	Ubiquitous Computing	9 CR
M-INFO-101864	Subdivision Algorithms	5 CR
M-WIWI-105368	Web and Data Science	9 CR
M-WIWI-101455	Web Data Management	9 CR
M-INFO-101203	Wireless Networking	8 CR

3.3 Economics and Management	Credits
	33

Mandatory		
M-WIWI-101443	Information Engineering and Management	10 CR
M-WIWI-103243	Optimization under Uncertainty in Information Engineering and Management	5 CR
Election block: Elective Modules in Economics and Management (9 credits)		
M-WIWI-101637	Analytics and Statistics	9 CR
M-WIWI-101453	Applied Strategic Decisions	9 CR
M-WIWI-101410	Business & Service Engineering	9 CR
M-WIWI-101504	Collective Decision Making	9 CR
M-WIWI-101498	Management Accounting	9 CR
M-WIWI-101510	Cross-Functional Management Accounting	9 CR
M-WIWI-103117	Data Science: Data-Driven Information Systems	9 CR
M-WIWI-103118	Data Science: Data-Driven User Modeling	9 CR
M-WIWI-101647	Data Science: Evidence-based Marketing	9 CR
M-WIWI-105661	Data Science: Intelligent, Adaptive, and Learning Information Services	9 CR
M-WIWI-105032	Data Science for Finance	9 CR
M-WIWI-104080	Designing Interactive Information Systems	9 CR
M-WIWI-102808	Digital Service Systems in Industry	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-101409	Electronic Markets	9 CR
M-WIWI-101451	Energy Economics and Energy Markets	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101488	Entrepreneurship (EnTechnon)	9 CR
M-WIWI-101505	Experimental Economics	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-101471	Industrial Production II	9 CR
M-WIWI-101412	Industrial Production III	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-101478	Innovation and Growth	9 CR
M-WIWI-101507	Innovation Management	9 CR
M-WIWI-101514	Innovation Economics	9 CR
M-WIWI-101446	Market Engineering	9 CR
M-WIWI-105312	Marketing and Sales Management	9 CR
M-WIWI-101473	Mathematical Programming	9 CR
M-WIWI-101500	Microeconomic Theory	9 CR
M-WIWI-101406	Network Economics	9 CR
M-WIWI-101638	Econometrics and Statistics I	9 CR
M-WIWI-101639	Econometrics and Statistics II	9 CR
M-WIWI-101502	Economic Theory and its Application in Finance	9 CR
M-WIWI-102832	Operations Research in Supply Chain Management	9 CR
M-WIWI-101506	Service Analytics	9 CR
M-WIWI-101503	Service Design Thinking	9 CR
M-WIWI-101448	Service Management	9 CR
M-WIWI-102754	Service Economics and Management	9 CR
M-WIWI-102805	Service Operations	9 CR
M-WIWI-102806	Service Innovation, Design & Engineering	9 CR
M-WIWI-103289	Stochastic Optimization	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-101468	Environmental Economics	9 CR
M-WIWI-101485	Transport Infrastructure Policy and Regional Development	9 CR

M-WIWI-101511	Advanced Topics in Public Finance	9 CR
M-WIWI-101496	Growth and Agglomeration	9 CR
Election block: Elective Modules in Business Administration (9 credits)		
M-WIWI-101410	Business & Service Engineering	9 CR
M-WIWI-101498	Management Accounting	9 CR
M-WIWI-101510	Cross-Functional Management Accounting	9 CR
M-WIWI-101470	Data Science: Advanced CRM	9 CR
M-WIWI-103117	Data Science: Data-Driven Information Systems	9 CR
M-WIWI-103118	Data Science: Data-Driven User Modeling	9 CR
M-WIWI-101647	Data Science: Evidence-based Marketing	9 CR
M-WIWI-104080	Designing Interactive Information Systems	9 CR
M-WIWI-102808	Digital Service Systems in Industry	9 CR
M-WIWI-103720	eEnergy: Markets, Services and Systems	9 CR
M-WIWI-101409	Electronic Markets	9 CR
M-WIWI-101451	Energy Economics and Energy Markets	9 CR
M-WIWI-101452	Energy Economics and Technology	9 CR
M-WIWI-101488	Entrepreneurship (EnTechnon)	9 CR
M-WIWI-101482	Finance 1	9 CR
M-WIWI-101483	Finance 2	9 CR
M-WIWI-101480	Finance 3	9 CR
M-WIWI-101471	Industrial Production II	9 CR
M-WIWI-101412	Industrial Production III	9 CR
M-WIWI-104068	Information Systems in Organizations	9 CR
M-WIWI-101507	Innovation Management	9 CR
M-WIWI-103247	Intelligent Risk and Investment Advisory	9 CR
M-WIWI-101446	Market Engineering	9 CR
M-WIWI-105312	Marketing and Sales Management	9 CR
M-WIWI-101506	Service Analytics	9 CR
M-WIWI-101503	Service Design Thinking	9 CR
M-WIWI-102754	Service Economics and Management	9 CR
M-WIWI-102806	Service Innovation, Design & Engineering	9 CR
M-WIWI-101448	Service Management	9 CR
M-WIWI-103119	Advanced Topics in Strategy and Management	9 CR
M-WIWI-105659	Advanced Machine Learning and Data Science	9 CR

3.4 Law

Credits
18

Election block: Law (18 credits)		
M-INFO-101215	Intellectual Property Law	9 CR
M-INFO-101216	Private Business Law	9 CR
M-INFO-101217	Public Business Law	9 CR

3.5 Research Course

Credits
6

Election block: Research Courses Choose (2 out of 3 Modules) (2 items)		
M-INFO-101218	Seminar Module Law	3 CR
M-INFO-102822	Seminar Module Informatics	3 CR
M-WIWI-102736	Seminar Module Economic Sciences	3 CR

4 Modules

M 4.1 Module: Advanced Algorithms: Design and Analysis [M-INFO-101199]

Responsible:	Prof. Dr. Dorothea Wagner
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	2

Election block: Design and Analysis / Engineering and Applications (at least 1 item as well as at least 9 credits)			
T-INFO-101334	Algorithms in Cellular Automata	5 CR	Worsch
T-INFO-101331	Randomized Algorithms	5 CR	Worsch
T-INFO-101333	Parallel Algorithms	5 CR	Sanders
T-INFO-103334	Algorithmic Methods for Hard Optimization Problems	5 CR	Wagner
T-INFO-104390	Algorithms for Visualization of Graphs	5 CR	Wagner
T-INFO-104374	Laboratory Course Algorithm Engineering	6 CR	Sanders, Ueckerdt, Wagner
T-INFO-101332	Algorithm Engineering	5 CR	Sanders, Wagner
T-INFO-100002	Algorithms for Routing	5 CR	Wagner

Competence Goal

The student

- knows advanced methodical approaches with respect to the design and analysis of algorithms,
- can comment on theoretical aspects of algorithmics in a qualified and well-structured manner,
- identifies algorithmic problems from different areas and can formulate these formally,
- can analyze and judge the computational complexity of algorithmic problems from different areas,
- can recognize and design suitable algorithmic techniques to solve algorithmic problems.

Content

This module conveys profound knowledge concerning theoretical aspects of algorithmics. Its focus is on the design and analysis of advanced algorithms, particularly, on algorithms for graphs, randomized algorithms, parallel algorithms and algorithms for NP-hard problems.

Workload

approx. 270h

M   4.2 Module: Advanced Algorithms: Engineering and Applications [M-INFO-101200]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	2

Election block: Engineering and Applications / Design and Analysis (at least 1 item as well as at least 9 credits)			
T-INFO-100002	Algorithms for Routing	5 CR	Wagner
T-INFO-101332	Algorithm Engineering	5 CR	Sanders, Wagner
T-INFO-101333	Parallel Algorithms	5 CR	Sanders
T-INFO-103334	Algorithmic Methods for Hard Optimization Problems	5 CR	Wagner
T-INFO-104374	Laboratory Course Algorithm Engineering	6 CR	Sanders, Ueckerdt, Wagner
T-INFO-104390	Algorithms for Visualization of Graphs	5 CR	Wagner
T-INFO-101331	Randomized Algorithms	5 CR	Worsch

Competence Goal
The Student

- knows advanced methodical approaches concerning the design of algorithms and their applications,
- can comment on the practical aspects of algorithmics in a qualified and well-structured manner,
- identifies algorithmic problems from different areas of application and can formulate these formally,
- can judge the computational complexity of algorithmic problems,
- recognizes suitable algorithmic techniques for solving these problems and can transfer and apply knowledge of these techniques to new problems,
- can implement solutions based on algorithmic techniques for practical problems and can evaluate these

Prerequisites
None

Content
This module conveys profound knowledge concerning practical aspects of algorithmics and covers applications of algorithms for practical problems. Its focus is on the design, the practical implementation and the evaluation of algorithms, particularly, algorithms for graphs, parallel algorithms, algorithms for NP-hard problems, optimization algorithms inspired by nature, as well as algorithms from various areas of application.

Workload
270h

M	**4.3 Module: Advanced Machine Learning and Data Science [M-WIWI-105659]**

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

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

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

Competence Certificate

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

Competence Goal

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

Prerequisites

see T-WIWI-106193 "Advanced Machine Learning and Data Science".

Content

The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning.

Recommendation

None

Workload

Total effort for 9 credit points: approx. 270 hours. The total workload for this module is approx. 270 hours (9 credit points). The total number of hours results from the effort for attending the internship events and the independent creation of the software solution, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M   4.4 Module: Advanced Topics in Cryptography [M-INFO-101198]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: Informatics

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

Election block: Advanced Topics in Cryptography (at least 1 item as well as at least 9 credits)			
T-INFO-101373	Selected Topics in Cryptography	3 CR	Müller-Quade
T-INFO-101260	Asymmetric Encryption Schemes	3 CR	Müller-Quade
T-INFO-101259	Provable Security in Cryptography	3 CR	Hofheinz
T-INFO-101280	Digital Signatures	3 CR	Hofheinz
T-INFO-101279	Cryptographic Voting Schemes	3 CR	Müller-Quade
T-INFO-101360	Signals and Codes	3 CR	Müller-Quade
T-INFO-101390	Symmetric Encryption	3 CR	Müller-Quade

Competence Goal
The student

- will be familiar with the theoretical foundations and the basic mechanisms of computer security and cryptography.
- can understand and explain the methods of computer security and cryptography,
- will be able to read and understand the latest scientific papers,
- will be able to critically assess appropriate security solutions, and identify weaknesses / threats,
- can design an own security solution to a given problem, (eg. later in the a master's thesis).

Prerequisites
None

Content
The module is intended to provide depth theoretical and practical aspects of IT security and cryptography.

- Development of safety goals and classification of threats.
- Formal description of authentication systems.
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective methods / avoidance strategies
- Overview of opportunities for side channel attacks
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications.
- The current research issues from some of the following areas are covered:
    - Block ciphers, hash functions,
    - Public-key encryption, digital signature, key exchange.
    - Basic security protocols such as fair coin toss over the phone, Byzantine Agreement, Dutch Flower Auctions, Zero Knowledge.
    - Threat models and security definitions.
    - Modular design and protocol composition.
    - Security definitions of simulatability.
    - Universal Composability.
    - Deniability as an additional safety feature.
    - Electronic Voting.

M 4.5 Module: Advanced Topics in Public Finance [M-WIWI-101511]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Election block: Electives (between 1 and 2 items)			
T-WIWI-108711	Basics of German Company Tax Law and Tax Planning	4,5 CR	Gutekunst, Wigger
T-WIWI-102740	Public Management	4,5 CR	Wigger
Election block: Supplementary Courses (between 0 and 1 items)			
T-WIWI-111304	Fundamentals of National and International Group Taxation	4,5 CR	Wigger
T-WIWI-102739	Public Revenues	4,5 CR	Wigger

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

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

Competence Goal
The student

- understands the theory and politics of taxation
- has knowledge in the area of public debt.
- understands efficiency problems of public organizations.
- is able to work on fiscal problems.

Prerequisites
At least one of the courses "Public Management" or "Basics of German Company Tax Law and Tax Planning" is mandatory in the module and must be successfully examined.

Content
As a branch of Economics, Public Finance is concerned with the theory and policy of the public sector and its interrelations with the private sector. It analyzes the economic role of the state from a normative as well as from a positive point of view. The normative view examines efficiency- and equity-oriented motives for government intervention and develops fiscal policy guidelines. The positive view explains the actual behavior of economic agents in public sector affairs.

In the course of the lectures within this module the students achieve knowledge in the areas of public revenues, national and international law of taxation and theory of public sector organizations.

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

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

Students who successfully passed the exam in „Public Management" before the introduction of the module "Advanced Topics in Public Finance" in winter term 2014/15 are allowed to take both courses "Public Revenues" and "Specific Aspects in Taxation".

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

M 4.6 Module: Advanced Topics in Strategy and Management [M-WIWI-103119]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	1

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-106188	Workshop Current Topics in Strategy and Management	3 CR	Lindstädt
T-WIWI-106189	Workshop Business Wargaming – Analyzing Strategic Interactions	3 CR	Lindstädt
T-WIWI-106190	Strategy and Management Theory: Developments and "Classics"	3 CR	Lindstädt

Competence Certificate

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

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

Competence Goal

Students

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

Prerequisites

None

Content

The module is divided into three main topics:

The students

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

Recommendation

None

Annotation

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

Every course of this module will be at least offered every second term. Thus, it will be possible to complete the module within two terms.

M   4.7 Module: Algorithm Engineering [M-INFO-100795]

Responsible: Prof. Dr. Peter Sanders
                   Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101332	Algorithm Engineering	5 CR	Sanders, Wagner

M	4.8 Module: Algorithmic Methods for Hard Optimization Problems [M-INFO-101237]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

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

Competence Goal

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

Content

There are many practical problems that cannot be solved optimally - some not at all and some not in a resonable amount of time. An example is the "bin packing problem" where a collection of

objects must be packed using a possibly small number of bins. Moreover, problems sometimes arise where knowledge about the future (or even about the present) is incomplete, but a decision

is required neverthelss ("online problems"). Regarding bin packing, for example, there must be a point in time when you close the bins and send them away. Even if there are some more objects arriving later.

M 4.9 Module: Algorithmic Methods for Network Analysis [M-INFO-102400]

Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-104759	Algorithmic Methods for Network Analysis	5 CR	Ueckerdt, Wagner

Workload
150 h

M 4.10 Module: Algorithms for Routing [M-INFO-100031]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-100002	Algorithms for Routing	5 CR	Wagner

4 MODULES

Module: Algorithms for Visualization of Graphs [M-INFO-102094]

M	4.11 Module: Algorithms for Visualization of Graphs [M-INFO-102094]

Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-104390	Algorithms for Visualization of Graphs	5 CR	Wagner

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Module: Algorithms II [M-INFO-101173]

M 4.12 Module: Algorithms II [M-INFO-101173]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-102020	Algorithms II	6 CR	Sanders

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M   4.13 Module: Algorithms in Cellular Automata [M-INFO-100797]

Responsible: Thomas Worsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101334	Algorithms in Cellular Automata	5 CR	Worsch

M 4.14 Module: Analytics and Statistics [M-WIWI-101637]

Responsible:	Prof. Dr. Oliver Grothe
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)

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

Mandatory			
T-WIWI-103123	Advanced Statistics	4,5 CR	Grothe
Election block: Supplementary Courses (between 4,5 and 5 credits)			
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe

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

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

Competence Goal
A Student

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

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

Content

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

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

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

M 4.15 Module: Applied Strategic Decisions [M-WIWI-101453]

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

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

Mandatory		
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Election block: Supplementary Courses (between 4,5 and 5 credits)		
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102640	Market Engineering: Information in Institutions	4,5 CR	Weinhardt
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken

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

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

Competence Goal
Students

- can model and analyze complex situations of strategic interaction using advanced game theoretic concepts;
- are provided with essential and advanced game theoretic solution concepts on a rigorous level and can apply them to understand real-life problems;
- learn about the experimental method, ranging from designing an economic experiment to data analysis.

Prerequisites
The course "Advanced Game Theory" is obligatory. Exception: The course "Introduction to Game Theory" was completed. Even those who have already successfully proven "Advanced Game Theory" in another master module can take the module. In this case you can choose freely from the rest of the offer. However, this choice can only be made by the examination office of the Department of Economics and Management.

Content
The module provides solid skills in game theory and offers a broad range of game theoretic applications. To improve the understanding of theoretical concepts, it pays attention to empirical evidence as well.

Recommendation
Basic knowledge in game theory is assumed.

Annotation
The course *Predictive Mechanism and Market Design* is not offered each year.

Workload
The total workload for this module is approximately 270 hours. The exact distribution is made according to the credit points of the courses of the module.

M 4.16 Module: Artificial Intelligence [M-WIWI-105366]

Responsible:	Michael Färber
Organisation:	KIT Department of Economics and Management
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	1

Election block: Compulsory Elective Courses (at least 2 items)			
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

Competence Certificate

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

Competence Goal

The student

- understands the koncepts behind Semantic Web and Linked Data technologies
- develops ontologies to be employed in semantic web-based applications and chooses suitable representation languages,
- is familiar with approaches in the area of knowledge representation and modelling,
- is able to transfer the methods and technologies of semantic web technologies to new application sectors,
- evaluates the potential of semantic web for new application sectors,
- understands the challenges in the areas of Data and system integration on the web is able to develop solutions.
- know the basics of machine learning, data mining and knowledge discovery
- can design, train and evaluate systems that are capable of learning
- carry out knowledge discovery projects, taking into account algorithms, representations and applications.

Prerequisites

None

Content

The focus of the module is on Semantic Web Technologies as well as machine learning and data mining methods for knowledge acquisition from large databases.

The goal of the semantic web is the meaning (semantics) of data on the web for intelligent systems, e.g. in e-commerce and to make Internet portals usable. The representation of knowledge in the form of RDF and ontologies, the provision of data as Linked Data, as well as the request of data using SPARQL. In this lecture the basics of knowledge representation and processing for the corresponding technologies and application examples are presented.

The lecture "Knowledge Discovery" gives an overview of approaches of machine learning and data mining for knowledge extraction from large data sets. These are examined especially with regard to algorithms, applicability to different data representations and the use in real application scenarios.

Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.

The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.

Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Workload

The total workload for this module is approximately 270 hours.

M 4.17 Module: Automated Planning and Scheduling [M-INFO-104447]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-109085	Automated Planning and Scheduling	5 CR	Sanders

M 4.18 Module: Automated Visual Inspection and Image Processing [M-INFO-100826]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101363	Automated Visual Inspection and Image Processing	6 CR	Beyerer

M   4.19 Module: Autonomous Robotics [M-INFO-101251]

Responsible: Prof. Dr.-Ing. Rüdiger Dillmann
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Once	2 terms	4	3

Election block: Autonomous Robotics (at least 1 item as well as at least 9 credits)		
T-INFO-101351	Biologically Inspired Robots	3 CR	Dillmann, Rönnau
T-INFO-109931	Robotics III - Sensors and Perception in Robotics	3 CR	Asfour
T-INFO-105723	Robotics II: Humanoid Robotics	3 CR	Asfour

Prerequisites
None

M 4.20 Module: Business & Service Engineering [M-WIWI-101410]

Responsible: Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

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

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 5

Election block: Compulsory Elective Courses (9 credits)		
T-WIWI-102639	Business Models in the Internet: Planning and Implementation	4,5 CR	Weinhardt
T-WIWI-102848	Personalization and Services	4,5 CR	Sonnenbichler
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz
T-WIWI-102641	Service Innovation	4,5 CR	Satzger
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate

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

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

Competence Goal

The student should

- learn to develop and implement new markets with regards to the technological progresses of information and communication technology and the increasing economic networking
- learn to restructure and develop new business processes in markets under those conditions
- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services.
- improve his statistics skills and apply them to appropriate cases
- learn to elaborate solutions in a team

Prerequisites

None

Content

This module addresses the challenges of creating new kinds of products, processes, services, and markets from a service perspective in the context of new developed information and communication technologies and the globalization process. The module describes service competition as a business strategy in the long term that leads to the design of business processes, business models, forms of organization, markets, and competition. This will be shown by actual examples from personalized services, recommender services and social networks.

Recommendation

None

Annotation

All practical Seminars offered at the IM can be chosen for *Special Topics in Information Systems*. Please update yourself on www.iism.kit.edu/im/lehre .

Workload

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

M 4.21 Module: Cognitive Systems [M-INFO-100819]

Responsible: Prof. Dr. Gerhard Neumann
Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101356	Cognitive Systems	6 CR	Neumann, Waibel

M 4.22 Module: Collective Decision Making [M-WIWI-101504]

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

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

Election block: Compulsory Elective Courses ()		
T-WIWI-102740	Public Management	4,5 CR	Wigger
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe

Competence Certificate

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

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

Competence Goal

Students

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

Prerequisites

None

Content

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

Workload

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

M   4.23 Module: Communication and Database Systems [M-INFO-101178]

Responsible: Prof. Dr.-Ing. Klemens Böhm
                   Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
8	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101497	Database Systems	4 CR	Böhm
T-INFO-102015	Introduction in Computer Networks	4 CR	Zitterbart

Competence Goal

The students will

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

Content

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

Workload

approx. 240 h

M   4.24 Module: Computational Complexity Theory, with a View Towards Cryptography [M-INFO-101575]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-103014	Computational Complexity Theory, with a View Towards Cryptography	6 CR	Hofheinz, Müller-Quade

M 4.25 Module: Computational Geometry [M-INFO-102110]

Responsible: Jun.-Prof. Dr. Thomas Bläsius
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Irregular	1 term	German	4	2

Mandatory			
T-INFO-104429	Computational Geometry	6 CR	Wagner

M 4.26 Module: Context Sensitive Systems [M-INFO-100728]

Responsible:	Prof. Dr.-Ing. Michael Beigl
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	2

Mandatory			
T-INFO-107499	Context Sensitive Systems	5 CR	Beigl

M   4.27 Module: Critical Digital Infrastructures [M-WIWI-104403]

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

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

Mandatory			
T-WIWI-109248	Critical Information Infrastructures	4,5 CR	Sunyaev
Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-109246	Digital Health	4,5 CR	Sunyaev
T-WIWI-110144	Emerging Trends in Digital Health	4,5 CR	Sunyaev
T-WIWI-110143	Emerging Trends in Internet Technologies	4,5 CR	Sunyaev
T-WIWI-109249	Sociotechnical Information Systems Development	4,5 CR	Sunyaev
T-WIWI-111126	Advanced Lab Blockchain Hackathon (Master)	4,5 CR	Sunyaev
T-WIWI-109251	Selected Issues in Critical Information Infrastructures	4,5 CR	Sunyaev

Competence Certificate

The assessment is carried out as partial exams according to § 4 paragraph 2 Nr. 1 – Nr. 3 SPO of the examination regulation of the core course and further single courses of this module, whose sum of credits must meet 9 credits.

The learning control is described in each course. The overall score of the module is made up of the sub-scores weighted with creditpoints and is cut off after the first comma point.

Competence Goal

The students ...

- have foundational knowledge about the design and operation of critical digital infrastructures
- have in-depth methodological knowledge in design science research and related scientific domains
- can distinguish between the challenges and opportunities of critical digital infrastructures in different domains
- can evaluate and improve sociotechnical systems
- combine theoretical and practical contents of the courses in the module to solve existing problems in the domain of critical digital infrastructures

Prerequisites

None

Content

Critical digital infrastructures are sociotechnical systems comprising essential software components and information systems with pivotal impact on individuals, organizations, governments, economies, and society. Critical information infrastructures require careful design, development, and evaluation to ensure reliable, secure, and purposeful operation. This module features a strong focus on different subject areas, including, but not limited to, internet technologies, health care, and information privacy. The lectures in the module introduce students to a domain relevant to critical digital infrastructures and the labs allow to gain hands-on experience in this interesting domain.

Recommendation

The courses in the module may be held in English. Participants should be well versed in written and spoken English.

The courses can be visited independently. Participants can start the module in the winter as well as in the summer term.

Programming skills may be required in some courses.

Experience in writing scientific papers is helpful but not required.

Annotation

This new module can be chosen from summer term 2018.

Workload

30 hours per ECTS

Total workload for 9 ECTS: approx. 270 hours

The exact allocation is made according to the credit points of the courses.

M 4.28 Module: Cross-Functional Management Accounting [M-WIWI-101510]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

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

Mandatory			
T-WIWI-102885	Advanced Management Accounting	4,5 CR	Wouters
Election block: Supplementary Courses (4,5 credits)			
T-WIWI-110179	Advanced Management Accounting 2	4,5 CR	Wouters
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102835	Marketing Strategy Business Game	1,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-108651	Extraordinary additional course in the module Cross-Functional Management Accounting	4,5 CR	Wouters

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

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

Prerequisites
The course "Advanced Management Accounting" is compulsory.

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

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

Recommendation
None

Annotation
The module "Cross-functional Management Accounting" always includes the compulsory course "Advanced Management Accounting." Students look at the interface between management accounting and another field in management. Students build the module by adding a course from the specified list. Students can also suggest another suitable course for this module for evaluation by the coordinator.

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

M	4.29 Module: Data Privacy: From Anonymization to Access Control [M-INFO-104045]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-108377	Data Privacy: From Anonymization to Access Control	3 CR	Böhm

M 4.30 Module: Data Science for Finance [M-WIWI-105032]

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

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

Mandatory			
T-WIWI-102878	Computational Risk and Asset Management	4,5 CR	Ulrich
T-WIWI-110213	Python for Computational Risk and Asset Management	4,5 CR	Ulrich

Competence Certificate

The module examination takes the form of an alternative exam assessment.

The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Competence Goal

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

Content

The course covers several topics, among them:

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

Recommendation

Basic knowledge of capital markt theory.

Workload

The total workload for this module is 270 hours (9 credit points).The total number of hours resulting from income from studying online video, answering quizzes, studying Ipython notebooks, active and interactive "Python Data Sessions" and reading literature you have heard.

M 4.31 Module: Data Science I [M-INFO-105799]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each winter term	1 term	German	4	2

Mandatory			
T-INFO-111622	Data Science I	5 CR	Böhm, Fouché

Competence Goal

At the end of this course, participants should have a good understanding of the data-science process, i.e., the process of generating practical insights from large data sets, and of the different steps of this process. They should be able to explain and compare approaches for the analysis and management of large data sets in terms of their effectiveness and applicability. Participants should understand which problems are currently open in the field of Data Science and have gained insights into the current state of the art.

Content

This lecture replaces the lecture „Big Data Analytics I". Our intention is to devote more attention to the Data Science process and to explicitly address the steps of this process. – Techniques for analyzing large data sets are attracting great interest among users. The spectrum is broad and includes classic industries such as banks and insurance companies, but also newer players, such as Internet companies, social media, natural sciences and engineering. In all cases, the desire is to extract interesting patterns from very large data sets with as little effort as possible, and to monitor the behavior or systems. This lecture deals with the steps to extract knowledge from data, ranging from techniques to preprocess data to fundamental models to extract knowledge from data, e.g., in the form of statistics, association rules, clusters or systematic predictions.

M	**4.32 Module: Data Science II [M-INFO-105801]**

Responsible: Prof. Dr.-Ing. Klemens Böhm
Dr.-Ing. Edouard Fouché
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-111626	Data Science II	3 CR	Böhm, Fouché

M 4.33 Module: Data Science: Advanced CRM [M-WIWI-101470]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	6

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-109921	Advanced Machine Learning	4,5 CR	Geyer-Schulz, Nazemi
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-111267	Intelligent Agent Architectures	4,5 CR	Geyer-Schulz
T-WIWI-110915	Intelligent Agents and Decision Theory	4,5 CR	Geyer-Schulz
T-WIWI-102848	Personalization and Services	4,5 CR	Sonnenbichler
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz

Competence Certificate

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

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

Competence Goal

The student

- understand service competition as a sustainable competitive strategy and understand the effects of service competition on the design of markets, products, processes and services,
- models, analyzes and optimizes the structure and dynamics of complex business applications,
- develops and realizes personalized services, especially in the field of recommendation services,
- analyzes social networks and knows their application field in CRM,
- works in teams.

Prerequisites

None

Content

Building on the basics of CRM from the Bachelor's degree program, the module "Data Science: Advanced CRM" is focusing on the use of information technology and its related economic issues in the CRM environment.The course "Intelligent CRM Architectures" deals with the design of modern intelligent systems. The focus is on the software architecture and design patterns that are relevant to learning systems. It also covers important aspects of machine learning that complete the picture of an intelligent system. Examples of presented systems are "Taste Map"-architectures, "Counting Services", as well as architectures of "Business Games".The impact of management decisions in complex systems are considered in the course "Business dynamics". The understanding, modeling and simulation of complex systems allows the analysis, the goal-oriented design and the optimization of markets, business processes and regulations throughout the company.Specific problems of intelligent systems are covered in the courses "Personalization and Services", "Recommender Systems", "Service Analytics" and "Social Network Analysis in CRM". The content includes procedures and methods to create user-oriented services. The measurement and monitoring of service systems, the design of personalized offers, and the generation of recommendations based on the collected data of products and customers are discussed. The importance of user modeling and -recognition, data security and privacy are adressed as well.

Recommendation

None

Annotation

The module is replaced by M-WIWI-105661 "Data Science: Intelligent, adaptive, and learning information services" starting summer term 2021.

Workload

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

M   4.34 Module: Data Science: Data-Driven Information Systems [M-WIWI-103117]

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

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

Election block: Compulsory Elective Courses ()			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-106187	Business Data Strategy	4,5 CR	Weinhardt
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-110918	Introduction to Bayesian Statistics for Analyzing Data	3 CR	Scheibehenne
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-106207	Practical Seminar: Data-Driven Information Systems	4,5 CR	Mädche, Satzger, Setzer, Weinhardt

Competence Certificate

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

Competence Goal

The student

- understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems and is capable of comparing and assessing strategic alternatives
- has the core skills to design, model, and control complex, inter-organisational analytical, processes, including various business functions as well as customers and markets
- understands the usage of performance indicators for a variety of controlling and management issues and is able to define models for generating the relevant performance indicators under considerations of data availability
- distinguishes different analytics methods and concepts and learn when to apply to better understand and anticipate business relationships and developments of industrial and in particular service companies to derive fact- and data- founded managerial actions and strategies.
- knows how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in decision support or business intelligence systems and analytical processes as a whole.

Prerequisites

None.

Content

The amount of business-related data availabe in modern enterprise information systems grows exponentially, and the various data sources are more and more integrated, transformed, and analyzed jointly to gain valuable business insights, pro-actively control and manage business processes, to leverage planning and decision making, and to provide appropriate, potentially novel services to customers based on relationships and developments observed in the data.

Also, data sources are more and more connected and single business unit that used to operate on separate data pools are now becoming highly integrated, providing tremendeous business opportunities but also challenges regarding how the data should be represented, integrated, preprocessed, transformed, and finally used in analytics planning and decision processes.

The courses of this module equip the students with core skills to understands the strategic role of integrating, transforming, and analyzing large and complex enterprise data in modern business information systems. Students will be capable to designing, comparing, and evaluating strategic alternatives. Also, students will learn how to design, model, and control complex analytical processes, including various business functions of industrial and service companies including customers and markets. Students learn core skills to understand fundamental strategies for integrating analytic models and operative controlling mechanisms while ensuring the technical feasibility of the resulting information systems..

Furthermore, the student can distinguish different methods and concepts in the realm of data science and learns when to apply. She/he will know the means of characterizing and analyzing hetergeneous, high-dimensional data available data in data warehouses and external data sources to gain additional insights valuable for enterprise planning and decision making. Also, the students know how to capture uncertainty in the data and how to appropriately consider and visualize uncertainty in business information and business intelligence systems.

The module offers the opportunity to apply and deepen this knowledge in a seminar and hands-on tutorials that are offered with all lectures.

Texteintrag

Recommendation

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

Annotation

The course „Business Data Strategy" can be chosen from winter term 2016 on.

M 4.35 Module: Data Science: Data-Driven User Modeling [M-WIWI-103118]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	6

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-109863	Business Data Analytics: Application and Tools	4,5 CR	Weinhardt
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-102899	Modeling and Analyzing Consumer Behavior with R	4,5 CR	Dorner, Weinhardt
T-WIWI-111385	Responsible Artificial Intelligence	4,5 CR	Weinhardt
T-WIWI-108765	Practical Seminar: Advanced Analytics	4,5 CR	Weinhardt

Competence Certificate
The assessment is carried out as partial exams of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

Competence Goal
Students of this module

- learn methods for planning empirical studies, in particular laboratory experiments,
- acquire theoretical knowledge and practical skills in analysing empirical data,
- familiarize with different ways of modelling user behaviour, are able to critically discuss, and to evaluate them

Prerequisites
None

Content
Understanding and supporting user interactions with applications better plays an increasingly large role in the design of business applications. This applies both to interfaces for customers and to internal information systems. The data that is generated during user interactions can be channelled straight into business processes, for instance by analysing and decomposing purchase decisions, and by feeding this data into product design processes.

The Crowd Analytics section considers the analysis of data from online platforms, particularly of those following crowd- or peer-to-peer based business models. This includes platforms like Airbnb, Kickstarter and Amazon Mechanical Turk.

Theoretical models of user (decision) behaviour help analyzing the empirically observed user behaviour in a systematic fashion. Testing these models and their predictions in controlled experiments (primarily in the lab) in turn helps refine theory and to generate practically relevant design recommendations. Analyses are carried out using advanced analytic methods.

Students learn fundamental theoretical models for user behaviour in systems and apply them to cases. Students are also taught methods and skills for conceptualizing and planning empirical studies and for analyzing the resulting data.

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

M	**4.36 Module: Data Science: Evidence-based Marketing [M-WIWI-101647]**

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

Credits	**Grading scale**	**Recurrence**	**Duration**	**Language**	**Level**	**Version**
9	Grade to a tenth	Each term	2 terms	German	4	5

Election block: Compulsory Elective Courses (9 credits)		
T-WIWI-103139	Marketing Analytics	4,5 CR	Klarmann
T-WIWI-107720	Market Research	4,5 CR	Klarmann

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

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

Competence Goal
Students

- possess advanced knowledge of relevant market research contents
- know many different qualitative and quantitative methods for measuring customer behavior, preparation of strategic decisions, making causal deductions, usage of social media data and sales forecasting
- possess the statistical skills required for working in marketing research

Prerequisites
Keine.

Content
This module provides in-depth knowledge of relevant quantitative and qualitative methods used in market research.Students can attend the following courses:

- The course "Market Research" provides contents of practical relevance for measuring customer attitudes and customer behavior. The participants learn using statistical methods for strategic decision-making in marketing. Students who are interested in writing their master thesis at the Marketing & Sales Research Group are required to take this course.
- The course "Marketing Analytics" is based on "Market Research" and teaches advanced statistical methods for analyzing relevant marketing and market research questions. Please note that a successful completion of "Market Research" is a prerequisite for the completion of "Marketing Analytics".

Recommendation
None

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

M 4.37 Module: Data Science: Intelligent, Adaptive, and Learning Information Services [M-WIWI-105661]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)

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

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-109921	Advanced Machine Learning	4,5 CR	Geyer-Schulz, Nazemi
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-111267	Intelligent Agent Architectures	4,5 CR	Geyer-Schulz
T-WIWI-110915	Intelligent Agents and Decision Theory	4,5 CR	Geyer-Schulz
T-WIWI-102848	Personalization and Services	4,5 CR	Sonnenbichler
T-WIWI-102847	Recommender Systems	4,5 CR	Geyer-Schulz

Competence Certificate

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

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

Competence Goal

The student

- models, analyzes and optimizes the structure and dynamics of complex economic changes.
- designs and develops intelligent, adaptive or learning agents as essential elements of information services.
- knows the essential learning methods for this and can apply them (also on modern architectures) in a targeted manner.
- develops and implements personalized services, especially in the area of recommender systems.
- develops solutions in teams.

Prerequisites

None

Content

The Intelligent Architectures course addresses how to design modern agent-based systems. The focus here is on software architecture and design patterns relevant to learning systems. In addition, important machine learning methods that complete the intelligent system are discussed. Examples of systems presented include key-map architectures and genetic methods.

The impact of management decisions in complex systems is considered in Business Dynamics. Understanding, modeling, and simulating complex systems enables analysis, purposeful design, and optimization of markets, business processes, regulations, and entire enterprises.

Special problems of intelligent systems are covered in Personalization and Services and Recommendersystems. The content includes approaches and methods to design user-oriented services. The measurement and monitoring of service systems is discussed, the design of personalized offers is discussed and the generation of recommendations based on collected data from products and customers is shown. The importance of user modeling and recognition is addressed, as well as data security and privacy.

Recommendation

None

Annotation

The module replaces from summer semester 2021 M-WIWI-101470 "Data Science: Advanced CRM".

Workload

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

M   4.38 Module: Database as a Service [M-INFO-105724]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-111400	Database as a Service	5 CR	Böhm

Competence Goal

At the end of the lecture the participants shall be able to explain what is specific to database functionality in the cloud, and what the advantages and disadvantages are. They shall have understood how cloud-enabled database technology differs from conventional technology of this kind, but also where the commonalities reside. Participants shall be able to explain the core ideas and approaches that define cloud-enabled database technology and discern them from each other.

Content

We currently witness owners of large data sets, be they big organizations, be they startups, to rent database functionality to a significant extent, rather than providing it themselves. The total costs of ownership just happen to be much lower in many cases. This lecture features database technology that facilitates exactly this. This concerns you if you want to make use of such services at some time in the future, but is also is of interest if you will have to do with 'conventional' database technology.

According to my perspective, the following features of "cloud-enabled" database technology are key, and the lecture will cover them:

- Fully automated tuning of individual database – the option to interact with a database administrator does not exist any more!
- Approximate query results suddenly are attractive. The monetary costs of evaluating a query are commensurate with the necessary effort – on the other side, high fixed costs that typically occur with owner-operated databases do not incur any more.
- Multi-tenancy. I.e., how to ensure tenants that are completely independent from each other to have a DBMS for their applications available, not only without interfering with each other, but also with performance guarantees for each tenant individually?
- Secure storage. Administering data and evaluating queries shall take place in the cloud. At the same time, the cloud provider must not be allowed to see the data. Both objectives in full beauty currently are incompatible – we will discuss possible compromises.

In this setting, conventional, established concepts like distributed transactions and distributed data management and query processing play an important role as well, and the lecture will address them equally.

Literature

Will be made available in the lecture. The following books cover foundations and specifics of at least some chapters of the lecture:

- Database Systems Implementation, by Hector Garcia-Molina, Jeff Ullman, and Jennifer Widom.
- Concurrency Control and Recovery in Database Systems, by Philip A. Bernstein, Vassos Hadzilacos, and Nathan Goodman.
- Principles of Distributed Database Systems Tamer Özsu, Patrick Valduriez

M 4.39 Module: Deep Learning and Neural Networks [M-INFO-104460]

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-109124	Deep Learning and Neural Networks	6 CR	Waibel

M	**4.40 Module: Deployment of Database Systems [M-INFO-100780]**

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101317	Deployment of Database Systems	5 CR	Böhm

M 4.41 Module: Designing Interactive Information Systems [M-WIWI-104080]

Responsible: Prof. Dr. Alexander Mädche
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)
Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	3

Mandatory			
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
Election block: Supplementary Courses (at most 4,5 credits)			
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche

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

Competence Goal
The student

- has a comprehensive understanding of conceptual and theoretical foundations of interactive systems
- knows design processes for interactive systems
- is aware of the most important techniques and tools for designing interactive systems and knows how to apply them to real-world problems
- is able to apply design principles for the design of most important classes of interactive systems,
- creates new solutions of interactive systems teams

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

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

With the continuous growing capabilities of computers, the design of the interaction between human and computer becomes even more important. This module focuses on design processes and principles for interactive systems. The contents of the module abstract from the technical implementation details and focus on foundational concepts, theories, practices and methods for the design of interactive systems. The students get the necessary knowledge to guide the successful implementation of interactive systems in business and private life.

Each lecture in the module is accompanied with a capstone project that is carried out with an industry partner.

Annotation
See http://issd.iism.kit.edu/305.php for further information.

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

M	4.42 Module: Development of Business Information Systems [M-WIWI-101477]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	5

Election block: Compulsory Elective Courses (between 1 and 2 items)			
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-102895	Software Quality Management	4,5 CR	Oberweis
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-110346	Supplement Enterprise Information Systems	4,5 CR	Oberweis
T-WIWI-102667	Management of IT-Projects	4,5 CR	Schätzle
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-102669	Strategic Management of Information Technology	4,5 CR	Wolf

Competence Certificate

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

Competence Goal

Students

- describe the structure and the components of enterprise information systems,
- explain functionality and architecture of the enterprise information system components ,
- choose and apply relevant components to solve given problems in a methodic approach,
- describe roles, activities and products in the field of software engineering management,
- compare process and quality models and choose an appropriate model in a concrete situation,
- write scientific theses in the areas of enterprise information system components and software engineering management and find own solutions for given problems and research questions.

Prerequisites

The course *Datenbanksysteme und XML* or the course *Software Quality Management* must be examined.

Content

An enterprise information system contains the complete application software to store and process data and information in an organisation including design and management of databases, workflow management and strategic information planning.

Due to global networking and geographical distribution of enterprises as well as the increasing acceptation of eCommerce the application of distributed information systems becomes particular important.

This module teaches concepts and methods for design and application of information systems.

Annotation

The course T-WIWI-102759 "Requirements Analysis and Requirements Management" will no longer be offered in the module as of winter semester 2018/2019.

Workload

See German version

M 4.43 Module: Digital Circuits Design [M-INFO-102978]

Responsible: Prof. Dr.-Ing. Uwe Hanebeck
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-103469	Digital Circuits Design	6 CR	Karl

M 4.44 Module: Digital Service Systems in Industry [M-WIWI-102808]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	6

Election block: Compulsory Elective Courses (9 credits)		
T-WIWI-102872	Challenges in Supply Chain Management	4,5 CR	Mohr
T-WIWI-110280	Digital Services: Business Models and Transformation	4,5 CR	Satzger
T-WIWI-107043	Liberalised Power Markets	3 CR	Fichtner
T-WIWI-106200	Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-106563	Practical Seminar Digital Service Systems	4,5 CR	Mädche, Satzger

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

Competence Goal
Students

- understand the basics of the management of digital services applied on an industrial context
- gain an industry-specific insight into the importance and most relevant characteristics of information systems as key components of the digitalization of business processes, products and services
- are able to transfer and apply the models and methods introduced on practical scenarios and simulations.
- understand the control and optimization methods in the sector of service management and are able to apply them properly.

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

Content
This module aims at deepening the fundamental knowledge of digital service management in the industrial context. Various mechanisms and methods to shape and control connected digital service systems in different industries are discussed and demonstrated with real life application cases.

Recommendation
None

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

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

M 4.45 Module: Dynamic IT-Infrastructures [M-INFO-101210]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	2

Election block: Dynamic IT-Infrastructures (at least 1 item as well as at least 9 credits)			
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl
T-INFO-101276	Data and Storage Management	4 CR	Neumair
T-INFO-101284	Integrated Network and Systems Management	4 CR	Neumair
T-INFO-101298	Distributed Computing	4 CR	Streit
T-INFO-101345	Parallel Computer Systems and Parallel Programming	4 CR	Streit
T-INFO-106061	Access Control Systems: Foundations and Practice	5 CR	Hartenstein

Competence Goal

The students will get to know established as well as novel concepts for the design, implementation, operation and management of dynamic IT infrastructures (Web, Grid, Cloud, Internet):

- Getting to know established and novel concepts for IT infrastructures
- Application of methods for the evaluation and analysis of dynamic IT infrastructures
- Assessment of tools, protocols and procedures for the operation and management of dynamic IT infrastructures
- Assessment of the strengths and weaknesses of IT infrastructures
- Insight into the practical operation of dynamic IT infrastructures using the example of the operation within the Steinbuch Centre for Computing (SCC)

Prerequisites

None

Content

This module covers various aspects of dynamic IT infrastructures such as layout, design, concept, development, operation and performance evaluation as well as optimization. These topics are considered from a theoretical-analytical approach as well as from the perspective of the practical experiences of day-to-day use. Being a modern IT service provider, the *Steinbuch Centre for Computing (SCC)* serves as object of study, since it combines both aspects in real life.

M   4.46 Module: Econometrics and Statistics I [M-WIWI-101638]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	5

Mandatory			
T-WIWI-111388	Applied Econometrics	4,5 CR	Schienle
Election block: Supplementary Courses (between 4,5 and 5 credits)			
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle

Competence Certificate

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

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

Competence Goal

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

Prerequisites

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

Content

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

Workload

The total workload for this module is approximately 270 hours.

M   4.47 Module: Econometrics and Statistics II [M-WIWI-101639]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)

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

Election block: Compulsory Elective Courses (between 9 and 10 credits)		
T-WIWI-103064	Financial Econometrics	4,5 CR	Schienle
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-103126	Non- and Semiparametrics	4,5 CR	Schienle
T-WIWI-103127	Panel Data	4,5 CR	Heller
T-WIWI-103128	Portfolio and Asset Liability Management	4,5 CR	Safarian
T-WIWI-110868	Predictive Modeling	4,5 CR	Krüger
T-WIWI-111387	Probabilistic Time Series Forecasting Challenge	4,5 CR	Krüger
T-WIWI-103065	Statistical Modeling of Generalized Regression Models	4,5 CR	Heller
T-WIWI-103129	Stochastic Calculus and Finance	4,5 CR	Safarian
T-WIWI-110939	Financial Econometrics II	4,5 CR	Schienle

Competence Certificate

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

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

Competence Goal

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

Prerequisites

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

Content

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

Workload

The total workload for this module is approximately 270 hours.

M 4.48 Module: Economic Theory and its Application in Finance [M-WIWI-101502]

Responsible:	Prof. Dr. Kay Mitusch
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)

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

Election block: Compulsory Elective Courses (1 item)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
Election block: Supplementary Courses (1 item)			
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes

Competence Certificate

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

Competence Goal

The students

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

Prerequisites

One of the courses T-WIWI-102861 "Advanced Game Theory" and T-WIWI-102609 "Advanced Topics in Economic Theory" is compulsary.

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.

M	**4.49 Module: eEnergy: Markets, Services and Systems [M-WIWI-103720]**

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

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

Election block: Compulsory Elective Courses (at least 9 credits)		
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

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

Competence Goal
The student

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

Prerequisites
None.

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

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

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

M   4.50 Module: Electronic Markets [M-WIWI-101409]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)
Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	6

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-102762	Business Dynamics	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-102640	Market Engineering: Information in Institutions	4,5 CR	Weinhardt
T-WIWI-105946	Price Management	4,5 CR	Geyer-Schulz, Glenn
T-WIWI-102713	Telecommunication and Internet Economics	4,5 CR	Mitusch

Competence Certificate

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

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

Competence Goal

The student

- knows coordination and motivation methods and analyzes them regarding their efficiency,
- classifies markets and describes the roles of the participants in a formal way,
- knows the conditions for market failure and knows and develops countermeasures,
- knows institutions and market mechanisms, their fundamental theories and empirical research results,
- knows the design criteria of market mechanisms and a systematical approach for creating new markets,
- models, analyzes and optimizes the structure and dynamics of complex business applications.

Prerequisites

None

Content

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

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

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

Topics include:

- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control

Recommendation

None

Workload

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

M 4.51 Module: Energy Economics and Energy Markets [M-WIWI-101451]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Mandatory			
T-WIWI-107043	Liberalised Power Markets	3 CR	Fichtner
Election block: Supplementary Courses (at least 6 credits)			
T-WIWI-102691	Energy Trade and Risk Management	3 CR	N.N.
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-108016	Simulation Game in Energy Economics	3 CR	Genoese
T-WIWI-107446	Quantitative Methods in Energy Economics	3 CR	Plötz
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitusch

Competence Certificate

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

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

Competence Goal

The student

- gains detailed knowledge about the new requirements of liberalised energy markets,
- describes the planning tasks on the different energy markets,
- knows solution approaches to respective planning tasks.

Prerequisites

The lecture Liberalised Power Markets has to be examined.

Content

Liberalised Power Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power
Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management
Simulation Game in Energy Economics: Simulation of the German electricity system

Recommendation

The courses are conceived in a way that they can be attended independently from each other. Therefore, it is possible to start the module in winter and summer term.

Workload

The total workload for this module is approximately 270 hours.

M   4.52 Module: Energy Economics and Technology [M-WIWI-101452]

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

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

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-102793	Efficient Energy Systems and Electric Mobility	3,5 CR	Jochem
T-WIWI-102650	Energy and Environment	4,5 CR	Karl
T-WIWI-102830	Energy Systems Analysis	3 CR	Ardone, Fichtner
T-WIWI-107464	Smart Energy Infrastructure	3 CR	Ardone, Pustisek
T-WIWI-102695	Heat Economy	3 CR	Fichtner

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

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

Competence Goal
The student

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

Prerequisites
None

Content
Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
Energy and Environment: 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.

M 4.53 Module: Entrepreneurship (EnTechnon) [M-WIWI-101488]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)
                     Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	10

Election block: Mandatory part (1 item)			
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
Election block: Compulsory Elective Courses (1 item)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-102894	Entrepreneurship Research	3 CR	Terzidis
T-WIWI-102833	Entrepreneurial Leadership & Innovation Management	3 CR	Terzidis
T-WIWI-102865	Business Planning	3 CR	Terzidis
T-WIWI-110374	Firm creation in IT security	3 CR	Terzidis
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-109064	Joint Entrepreneurship Summer School	6 CR	Terzidis
T-WIWI-111561	Startup Experience	6 CR	Terzidis
Election block: Supplementary Courses (1 item)			
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-102833	Entrepreneurial Leadership & Innovation Management	3 CR	Terzidis
T-WIWI-102894	Entrepreneurship Research	3 CR	Terzidis
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-102639	Business Models in the Internet: Planning and Implementation	4,5 CR	Weinhardt
T-WIWI-102865	Business Planning	3 CR	Terzidis
T-WIWI-110374	Firm creation in IT security	3 CR	Terzidis
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-109064	Joint Entrepreneurship Summer School	6 CR	Terzidis
T-WIWI-102612	Managing New Technologies	3 CR	Reiß
T-WIWI-102853	Roadmapping	3 CR	Koch
T-WIWI-111561	Startup Experience	6 CR	Terzidis

Competence Certificate
See German version.

Competence Goal
Students are familiar with the basics and contents of entrepreneurship and ideally are able to start a company during or after their studies. The courses are therefore structured sequentially in modules, although in principle they can also be attended in parallel. In this way, the skills are taught to generate business ideas, to develop inventions into innovations, to write business plans for start-ups and to successfully establish a company. In the lecture, the basics of entrepreneurship will be developed, in the seminars, individual contents will be deepened. The overall learning objective is to enable students to develop and implement business ideas.

Prerequisites
None

Content

The lectures form the basis of the module and give an overview of the overall topic. The seminars deepen the phases of the foundation processes, in particular the identification of opportunities, the development of a value proposition (especially based on inventions and technical innovations), the design of a business model, business planning, the management of a start-up, the implementation of a vision as well as the acquisition on resources and the handling of risks. The lecture Entrepreneurship provides an overarching and connecting framework for this.

Recommendation

None

Workload

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

M **4.54 Module: Environmental Economics [M-WIWI-101468]**

Responsible:	Prof. Dr. Kay Mitusch
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	2

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-102650	Energy and Environment	4,5 CR	Karl
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102615	Environmental Economics and Sustainability	3 CR	Walz
T-WIWI-102616	Environmental and Resource Policy	4 CR	Walz
T-BGU-111102	Environmental Law	3 CR	

Competence Certificate

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

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

Competence Goal

The students

- understand the treatment of non-market resources as well as future resource shortages
- are able to model markets of energy and environmental goods
- are able to assess the results of government intervention
- know legal basics and are able to evaluate conflicts with regard to legal situation

Prerequisites

None

Content

Environmental degradation and increasing resource use are global challenges, which have to be tackled on a worldwide level. The module addresses these challenges from the perspective of economics, and imparts the fundamental knowledge of environmental and sustainability economics, and environmental and resource policy to the students. Additional courses address environmental law, environmental pressure, and applications to the transport sector.

Recommendation

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

Workload

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

M 4.55 Module: Experimental Economics [M-WIWI-101505]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Election block: Compulsory Elective Courses (2 items)			
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken
T-WIWI-102862	Predictive Mechanism and Market Design	4,5 CR	Reiß
T-WIWI-102863	Topics in Experimental Economics	4,5 CR	Reiß

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

Competence Goal
Students

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

Prerequisites
None.

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

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

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

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

M   4.56 Module: Finance 1 [M-WIWI-101482]

Responsible: Prof. Dr. Martin Ruckes
                    Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)
                    Economics and Management (Elective Modules in Business Administration)

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

Election block: Compulsory Elective Courses (9 credits)		
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg

Competence Certificate

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

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

Competence Goal

The student

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

Prerequisites

None

Content

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

Workload

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

M 4.57 Module: Finance 2 [M-WIWI-101483]

Responsible:	Prof. Dr. Martin Ruckes
	Prof. Dr. Marliese Uhrig-Homburg
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	6

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102644	Fixed Income Securities	4,5 CR	Uhrig-Homburg
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102626	Business Strategies of Banks	3 CR	Müller
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-102645	Credit Risk	4,5 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technoloy Change	1,5 CR	Ruckes
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-110933	Web App Programming for Finance	4,5 CR	Thimme

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

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

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

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

Content
The module Finance 2 is based on the module Finance 1. The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

Annotation
The courses *eFinance: Information Engineering and Management for Securities Trading* [2540454] and *Financial Analysis* [2530205] can be chosen from summer term 2015 on.

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

M 4.58 Module: Finance 3 [M-WIWI-101480]

Responsible:	Prof. Dr. Martin Ruckes
	Prof. Dr. Marliese Uhrig-Homburg
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	6

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-110513	Advanced Empirical Asset Pricing	4,5 CR	Thimme
T-WIWI-102647	Asset Pricing	4,5 CR	Ruckes, Uhrig-Homburg
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-110995	Bond Markets	4,5 CR	Uhrig-Homburg
T-WIWI-110997	Bond Markets - Models & Derivatives	3 CR	Uhrig-Homburg
T-WIWI-110996	Bond Markets - Tools & Applications	1,5 CR	Uhrig-Homburg
T-WIWI-102622	Corporate Financial Policy	4,5 CR	Ruckes
T-WIWI-109050	Corporate Risk Management	4,5 CR	Ruckes
T-WIWI-102643	Derivatives	4,5 CR	Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-102644	Fixed Income Securities	4,5 CR	Uhrig-Homburg
T-WIWI-102900	Financial Analysis	4,5 CR	Luedecke
T-WIWI-102623	Financial Intermediation	4,5 CR	Ruckes
T-WIWI-102626	Business Strategies of Banks	3 CR	Müller
T-WIWI-102646	International Finance	3 CR	Uhrig-Homburg
T-WIWI-102645	Credit Risk	4,5 CR	Uhrig-Homburg
T-WIWI-110511	Strategic Finance and Technoloy Change	1,5 CR	Ruckes
T-WIWI-102621	Valuation	4,5 CR	Ruckes
T-WIWI-110933	Web App Programming for Finance	4,5 CR	Thimme

Competence Certificate

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

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

Competence Goal

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

Prerequisites

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

Content

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

Workload

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

M 4.59 Module: Formal Systems [M-INFO-100799]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101336	Formal Systems	6 CR	Beckert

M   4.60 Module: Formal Systems II: Application [M-INFO-100744]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101281	Formal Systems II: Application	5 CR	Beckert

M   4.61 Module: Formal Systems II: Theory [M-INFO-100841]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101378	Formal Systems II: Theory	5 CR	Beckert

M   4.62 Module: Future Networking [M-INFO-101205]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
8	Grade to a tenth	Each term	1 term	4	3

Election block: Future Networking (at least 1 item as well as at least 8 credits)			
T-INFO-101321	Next Generation Internet	4 CR	Bless, Zitterbart
T-INFO-101322	Mobile Communication	4 CR	Waldhorst, Zitterbart
T-INFO-101337	Internet of Everything	4 CR	Zitterbart
T-INFO-101338	Telematics	6 CR	Zitterbart

Competence Goal

Each student should be able

- to learn and use the concepts and principals of future network design
- to identify the flaws and benefits of future communication systems
- to judge the performance of protocols, future networks and architectures
- master advanced protocols, architectures and algorithms of future communication systems

Content

This module details selected aspects of future communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.

M 4.63 Module: Geometric Optimization [M-INFO-100730]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-101267	Geometric Optimzation	3 CR	Prautzsch

M 4.64 Module: Growth and Agglomeration [M-WIWI-101496]

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

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

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-103107	Spatial Economics	4,5 CR	Ott
T-WIWI-111318	Growth and Development	4,5 CR	Ott

Competence Certificate

The assessment is carried out as partial written exams (see the lectures descriptions).

The overall grade for the module is the average of the grades for each course weighted by the credits.

Competence Goal

The student

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

Prerequisites

None

Content

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

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

Recommendation

Attendance of the course *Introduction Economic Policy* [2560280] is recommended.

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

Workload

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

M   4.65 Module: Human Computer Interaction [M-INFO-100729]

Responsible:	Prof. Dr.-Ing. Michael Beigl
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101266	Human-Machine-Interaction	6 CR	Beigl
T-INFO-106257	Human-Machine-Interaction Pass	0 CR	Beigl

M	**4.66 Module: Human Factors in Security and Privacy [M-WIWI-104520]**

Responsible:	Prof. Dr. Melanie Volkamer
Organisation:	KIT Department of Economics and Management
Part of:	Informatics

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

Mandatory			
T-WIWI-109270	Human Factors in Security and Privacy	4,5 CR	Volkamer
T-WIWI-108439	Advanced Lab Security, Usability and Society	4,5 CR	Volkamer

Competence Certificate

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

Competence Goal

Students …

- know why many existing security and privacy mechanisms are not usable and why many awareness/education/training approaches are not effective
- can explain for concrete examples why these are not usable / not effective including why people are likely to face problems with these
- can explain what mental models are, why they are important and how they can be identified
- know how to conduct a cognitive walkthrough to identify problems with existing mechanisms and approaches
- know how to conduct semi-structured interviews
- know how user studies in the security context differ from those conducted in other contexts
- can explain the process of human centered security / privacy by design
- know the advantages and disadvantages of various graphical password schemes
- know concepts such as just in time and place security interventions

Prerequisites

None

Content

The history of information security and privacy has taught us that it takes more than technological innovation to develop effective security and privacy mechanisms: Many aspects of information security and privacy actually depend on both technical and human factors. As a result of focusing on the technical factors, we are seeing a persistent gap between theoretical security and actual security in real world which becomes an increasing problem in the age of digitalization. The gap is mainly caused by strong and actually unrealistic assumptions regarding the users' knowledge and behavior.

Human factors in security and privacy research addresses several types of security and privacy mechanisms, e.g., authentication mechanisms including text and graphical passwords, security and privacy indicators (such as the icons in the address bar of nowadays web browsers) and security and privacy interventions like warning messages, permission dialogs and security and privacy policies as well as corresponding configuration interfaces. Besides security and privacy mechanisms, human factors in security and privacy researchers deal with security and privacy awareness, education, and training approaches.

'Human factors in security & privacy' research areas are:

- identifying users' mental models using techniques such as (semi-)structured interviews or focus groups,
- evaluating existing approaches regarding their effectiveness in supporting their users in making secure decisions / informed decisions in the context of privacy using techniques such as cognitive walkthroughs, lab user studies or even field studies,
- proposing improved / new approaches and evaluating their effectiveness using the so called human-centered security / privacy by design approach.

This module discusses the various problems of existing security and privacy mechanisms and security and privacy awareness/education/training approaches. The lecture addresses relevant psychological and sociological aspects which are important to know and to consider when developing more usable security/privacy mechanisms and more effective awareness/education/training approaches. The human centered security and privacy by design approach is introduced. Furthermore, some of the methodologies used in this area are explained and a subset of them is applied. Finally, positive examples, such as graphical passwords, are introduced and discussed. Note,the main part of the exercise is replicating an interview based study. The main focus of the lab will be to replicate a quantitative based user study.

Annotation

This new module can be chosen from winter term 2018/2019.

Workload

The total workload for this module is approximately 270 hours.

M 4.67 Module: Industrial Production II [M-WIWI-101471]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	1 term	German/English	4	2

Mandatory			
T-WIWI-102631	Planning and Management of Industrial Plants	5,5 CR	Schultmann
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann, Wiens
T-WIWI-102828	Supply Chain Management in the Automotive Industry	3,5 CR	Heupel, Lang
T-WIWI-103134	Project Management	3,5 CR	Schultmann
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-102882	International Management in Engineering and Production	3,5 CR	Sasse
T-WIWI-110512	Life Cycle Assessment	3,5 CR	Schultmann

Competence Certificate

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Planning and Managing of Industrial Plants* [2581952] and one further single course of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal

- Students shall be able to describe the tasks of tactical production management with special attention drawn upon industrial plants.
- Students shall understand the relevant tasks in plant management (projection, realisation and supervising tools for industrial plants).
- Students shall be able to describe the special need of a techno-economic approach to solve problems in the field of tactical production management.
- Students shall be proficient in using selected techno-economic methods like investment and cost estimates, plant layout, capacity planning, evaluation principles of production techniques, production systems as well as methods to design and optimize production systems.
- Students shall be able to evaluate techno-economical approaches in planning tactical production management with respect to their efficiency, accuracy and relevance for industrial use.

Prerequisites

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

Content

- Planning and Management of Industrial Plants: Basics, circulation flow starting from projecting to techno-economic evaluation, construction and operating up to plant dismantling.

Annotation

Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.

Workload

Total effort will account to 270 hours (9 credit points) and can be allocated according to the credit point rating. Therefore, a course with 3.5 credits requires an effort of approximately 105h and a course with 5.5 credits 165h.

The total effort for each course consists of attending lectures and tutorials, examination times and the time an average student needs to prepare himself in order to pass the exam with an average grade.

M 4.68 Module: Industrial Production III [M-WIWI-101412]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German/English	4	2

Mandatory			
T-WIWI-102632	Production and Logistics Management	5,5 CR	Glöser-Chahoud, Schultmann
Election block: Supplementary Courses from Module Industrial Production II (at most 1 item)			
T-WIWI-102634	Emissions into the Environment	3,5 CR	Karl
T-WIWI-102882	International Management in Engineering and Production	3,5 CR	Sasse
T-WIWI-110512	Life Cycle Assessment	3,5 CR	Schultmann
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102763	Supply Chain Management with Advanced Planning Systems	3,5 CR	Bosch, Göbelt
T-WIWI-102826	Risk Management in Industrial Supply Networks	3,5 CR	Schultmann, Wiens
T-WIWI-102828	Supply Chain Management in the Automotive Industry	3,5 CR	Heupel, Lang
T-WIWI-103134	Project Management	3,5 CR	Schultmann

Competence Certificate

The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course *Production and Logistics Management* [2581954] and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal

- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the mail goals and set-up of software supporting tools in production and logistics management (i.e. APS, PPS-, ERP- and SCM Systems).
- Students discuss the scope of these software tools and their general disadvantages.

Prerequisites

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

Content

- Planning tasks and exemplary methods of production planning and control in supply chain management.
- Supporting software tools in production and logistics management (APS, PPS- and ERP Systems).
- Project management in the field of production and supply chain management.

Annotation

Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production II.

Workload

The total amount of work for this module is approx. 270 hours (9 credits). The allocation is made according to the credit points of the courses of the module.

The total number of hours per course results from the effort required to attend the lectures and exercises, as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

| M | 4.69 Module: Information Engineering and Management [M-WIWI-101443] |

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

Organisation: KIT Department of Economics and Management

Part of: Economics and Management (mandatory)

Credits	Grading scale	Recurrence	Duration	Level	Version
10	Grade to a tenth	Each term	2 terms	4	3

Mandatory			
T-WIWI-110373	Advanced Information Systems	5 CR	Mädche, Weinhardt
T-WIWI-102886	Business Administration in Information Engineering and Management	5 CR	Geyer-Schulz

Competence Certificate

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

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

Competence Goal

The student

- understands and analyzes the central role of information as an economic good, a production factor, and a competitive factor,
- identifies, evaluates, prices, and markets information goods,
- evaluates informations flows and the value of information in an interdisciplinary context,
- works out solutions in teams,
- transfers models from Business Administration to situations in business whose basic conditions are changed due to the implementation of information and communication technology,
- applies methods from Business Administration (Decision theory, game theory, operations research, etc.) to questions of Information Engineering and Management,
- analyzes the potential to automize the decision making process in businesses by data bases,
- describes the process to extract relevant data for decision making from operational accounting systems.

Content

The module Information Engineering and Management comprises the lectures Advanced Information Systems and Business Administration in Information Engineering and Management.

In the lecture Advanced Information Systems, a clear distinction of information as a production, competitive, and economic good is introduced. The central role of information is explained through the concept of the information lifecycle. The single phases from extraction/generation through storage transformation and evaluation until the marketing and usage of information are analyzed from the business administration perspective and the microeconomic perspective. The state of the art of economic theory is presented throughout the different phases of the information lifecycle. The lecture is complemented by accompanying exercise courses.

In the lecture Business Administration in Information Engineering and Management, classical Business Administration is applied to businesses in an information- and communicationtechnological environment. The process to extract relevant data for decision making from operational accounting systems receives special attention. In order to do so, topics such as activity-based costing and transaction costs models are addressed. The automization of the decision making process in businesses by data bases is another focus of the module. To solve such issues within a company, relevant methods such as decision theory and game theory are lectured. Finally, complex business relevant questions in a dynamically changing environment are adressed by presenting models and methods from system dynamics.

M 4.70 Module: Information Systems in Organizations [M-WIWI-104068]

Responsible:	Prof. Dr. Alexander Mädche
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

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

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-110851	Designing Interactive Systems	4,5 CR	Mädche
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche

Competence Certificate

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

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

Competence Goal

The student

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

Prerequisites

None

Content

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

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

Annotation

New module starting summer term 2018.

Workload

The total workload for this module is approximately 270 hours.

M 4.71 Module: Innovation and Growth [M-WIWI-101478]

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

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

Election block: Compulsory Elective Courses (between 9 and 10 credits)		
T-WIWI-109194	Dynamic Macroeconomics	4,5 CR	Brumm
T-WIWI-102840	Innovation Theory and Policy	4,5 CR	Ott
T-WIWI-111318	Growth and Development	4,5 CR	Ott

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

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

Competence Goal
Students shall be given the ability to

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

Prerequisites
None

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

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

Workload
Total expenditure of time for 9 credits: 270 hours

Attendance time per lecture: 3x14h

Preparation and wrap-up time per lecture: 3x14h

Rest: Exam Preparation

The exact distribution is subject to the credits of the courses of the module.

M 4.72 Module: Innovation Economics [M-WIWI-101514]

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

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

Election block: Compulsory Elective Courses (between 9 and 10 credits)			
T-WIWI-102840	Innovation Theory and Policy	4,5 CR	Ott
T-WIWI-102906	Methods in Economic Dynamics	1,5 CR	Ott
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
T-WIWI-102789	Seminar in Economic Policy	3 CR	Ott

Competence Certificate

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

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

Competence Goal

Students shall be given the ability to

- understand the important role of innovation for economic growth and welfare
- understand the relevance of alternative incentive mechanisms for the emergence and dissemination of innovations
- know basic terms of product and innovation concepts
- know fundamental concepts of innovation management
- work with fundamental theoretical innovation models and to implement them in appropriate computer algebra systems
- query appropriate data sources and to analyse and visualise them using statistical methods

Prerequisites

None

Content

The module provides students with knowledge about implications of technological and organizational changes.

Addressed economic issues are incentives for developing innovations, diffusion processes, and associated effects. In this context the module analyses appropriate policies in the presence of market failures to take corrective action on the market process and thus to increase the dynamic efficiency of economies.

Furthermore, the module offers the possibility to learn about different aspects of theoretical modelling of innovation-based growth as a part of the seminar and the methods-workshop. This includes the implementation of formal models in computer algebra systems as well as recording, processing and econometric analysis of related data from relational databases (concerning for example patents or trademarks). Moreover, methods of network theory are applied.

Finally, the module emphasises the business perspective: Issues of all stages of innovation processes will be discussed, from innovation strategies up to the market commercialisation.

Recommendation

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantiative-mathematical methods.

Workload

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

M 4.73 Module: Innovation Management [M-WIWI-101507]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)
Economics and Management (Elective Modules in Business Administration)

Credits 9	Grading scale Grade to a tenth	Recurrence Each term	Duration 1 term	Language German/English	Level 4	Version 7

Mandatory			
T-WIWI-102893	Innovation Management: Concepts, Strategies and Methods	3 CR	Weissenberger-Eibl
Election block: Compulsory Elective Courses (1 item)			
T-WIWI-102873	Current Issues in Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-110867	The negotiation of open innovation	3 CR	Beyer
T-WIWI-108875	Digital Transformation and Business Models	3 CR	Koch
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-108774	Analyzing and Evaluating Innovation Processes	3 CR	Beyer
T-WIWI-110234	Innovation Processes Live	3 CR	Beyer
T-WIWI-110263	Methods in Innovation Management	3 CR	Koch
T-WIWI-102853	Roadmapping	3 CR	Koch
T-WIWI-110987	Seminar Methods along the Innovation process	3 CR	Beyer
T-WIWI-110986	Strategic Foresight China	3 CR	Weissenberger-Eibl
T-WIWI-109932	A Closer Look at Social Innovation	3 CR	Beyer
T-WIWI-102858	Technology Assessment	3 CR	Koch
T-WIWI-102854	Technologies for Innovation Management	3 CR	Koch
Election block: Supplementary Courses (1 item)			
T-WIWI-102873	Current Issues in Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-102866	Design Thinking	3 CR	Terzidis
T-WIWI-110867	The negotiation of open innovation	3 CR	Beyer
T-WIWI-108875	Digital Transformation and Business Models	3 CR	Koch
T-WIWI-102833	Entrepreneurial Leadership & Innovation Management	3 CR	Terzidis
T-WIWI-102864	Entrepreneurship	3 CR	Terzidis
T-WIWI-102852	Case Studies Seminar: Innovation Management	3 CR	Weissenberger-Eibl
T-WIWI-108774	Analyzing and Evaluating Innovation Processes	3 CR	Beyer
T-WIWI-110234	Innovation Processes Live	3 CR	Beyer
T-WIWI-110263	Methods in Innovation Management	3 CR	Koch
T-WIWI-102853	Roadmapping	3 CR	Koch
T-WIWI-110987	Seminar Methods along the Innovation process	3 CR	Beyer
T-WIWI-110986	Strategic Foresight China	3 CR	Weissenberger-Eibl
T-WIWI-109932	A Closer Look at Social Innovation	3 CR	Beyer
T-WIWI-102854	Technologies for Innovation Management	3 CR	Koch
T-WIWI-102858	Technology Assessment	3 CR	Koch

Competence Certificate
See German version.

Competence Goal

Students develop a comprehensive understanding of the innovation process and its conditionality. There is an additional focus on the concepts and processes which are of particular relevance with regard to shaping the entire process. Various strategies and methods are then taught based on this.

After completing the module, students should have developed a systemic understanding of the innovation process and be able to shape this by developing and applying suitable methods.

Prerequisites

The lecture "Innovation Management: Concepts, Strategies and Methods" and one of the seminars of the chair for Innovation and Technology Management are compulsory. The third course can be chosen from the courses of the module.

Content

The Innovation Management: Concepts, Strategies and Methods lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.

Recommendation

None

Workload

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

M   4.74 Module: Innovative Concepts of Data and Information Management [M-INFO-101208]

Responsible:	Prof. Dr.-Ing. Klemens Böhm
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
8	Grade to a tenth	Each term	1 term	4	5

Election block: Innovative Concepts of Data and Information Management (at least 1 item as well as at least 8 credits)			
T-INFO-101317	Deployment of Database Systems	5 CR	Böhm
T-INFO-101975	Consulting in Practice	1,5 CR	Böhm
T-INFO-101976	Project Management in Practice	1,5 CR	Böhm
T-INFO-101977	Selling IT-Solutions Professionally	1,5 CR	Böhm
T-INFO-108377	Data Privacy: From Anonymization to Access Control	3 CR	Böhm
T-INFO-111400	Database as a Service	5 CR	Böhm
T-INFO-111622	Data Science I	5 CR	Böhm, Fouché
T-INFO-111626	Data Science II	3 CR	Böhm, Fouché

Competence Certificate
Siehe Teilleistung.

Competence Goal
The students

- know the research area of information systems in its various facets and are able to do scientific work in this area,
- are able to develop complex information systems on their own,
- are able to structure and manage complex projects in the field of information systems with unpredictable difficulties,
- are able to explain and to discuss complex aspects of the topics covered by this module with both experts and informed outsiders.

Prerequisites
None

Content
This module aims at exposing students to modern information management, both, in 'breadth´ and 'depth´. We achieve 'breadth´ by means of a close inspection and comparison of different systems and their respective aims. We achieve 'depth´ by means of an extensive examination of the underlying concepts and design alternatives, their assessment as well as by discussing applications.

Annotation
The courses of this module are offered irregularly. Nonetheless, it is guaranteed that the module can be passed anytime.

M   4.75 Module: Intellectual Property Law [M-INFO-101215]

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

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

Election block: Intellectual Property Law (at least 1 item as well as at least 9 credits)		
T-INFO-101308	Copyright	3 CR	Dreier
T-INFO-101313	Trademark and Unfair Competition Law	3 CR	Matz
T-INFO-101307	Internet Law	3 CR	Dreier
T-INFO-108462	Selected Legal Issues of Internet Law	3 CR	Dreier
T-INFO-111403	Seminar: Patent Law	3 CR	Dammler

Prerequisites
None

M 4.76 Module: Intelligent Risk and Investment Advisory [M-WIWI-103247]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	English	4	3

Election block: Wahlpflichtangebot (9 credits)		
T-WIWI-106442	Building Intelligent and Robo-Adviced Portfolios	9 CR	Ulrich
T-WIWI-107032	Computational Risk and Asset Management I	4,5 CR	Ulrich
T-WIWI-106494	Computational Risk and Asset Management II	4,5 CR	Ulrich
T-WIWI-106193	Engineering FinTech Solutions	9 CR	Ulrich

Competence Certificate

The module will be cancelled for the winter semester 2019/2020.

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

Competence Goal

Students 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.

Prerequisites

None.

Content

The lecture "Building Intelligent and Robo-Adviced Portfolios" offers an application-oriented introduction to intelligent and automated portfolio management.

The lectures "Computational Risk and Asset Management" offer an application-oriented introduction to financial market modeling with modern statistical concepts. The acquired knowledge is helpful for quantitative industry internships and jobs, as well as for further quantitative and/or data analysis oriented lectures/seminars/final papers at FBV and other KIT institutes. In terms of content, the student learns to analyse fundamental problems of financial market modelling, such as the prediction of returns, risk distributions and risk premiums, using probabilistic concepts and to solve them independently using modern software. The intuitive and at the same time rigorous interaction of statistical modelling on the one hand and the application to new financial market problems on the other hand characterizes the teaching philosophy of the course. All necessary statistical and financial specific concepts are discussed in the lectures. The students are given numerous possibilities to solve current financial problems independently with modern software. The learning of the programming language Python is part of the teaching program.

Within the scope of the lecture "Engineering FinTech Solutions" students get the opportunity to solve a subproblem from a larger FinTech problem independently and at the same time with close mentoring - by employee and professor of the C-RAM research group. The student is introduced to the problem to be solved on the basis of his very own level of knowledge and equipped with the necessary aids. Students are given the opportunity to combine new research approaches from the field of risk and investment management with modern information technology in order to independently master a step towards prototype development. Depending on the topic, students work alone or in teams. As part of the close mentoring approach, teams will meet weekly to discuss their progress and open questions with course students and the professor.

Recommendation

None

Annotation

See respective lecture

Workload
The total workload for this module is approximately 270 hours. For further information, see respective lecture.

M   4.77 Module: Intelligent Systems and Services [M-WIWI-101456]

Responsible:	Michael Färber
Organisation:	KIT Department of Economics and Management
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Election block: Compulsory Elective Courses (between 9 and 10 credits)			
T-WIWI-102661	Database Systems and XML	4,5 CR	Oberweis
T-WIWI-106423	Information Service Engineering	4,5 CR	Sack
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer

Competence Certificate

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

Algorithms for Internet Applications [T-WIWI-102658]: The examination will be offered latest until summer term 2017 (repeaters only).

Competence Goal

Students

- know the different machine learning procedures for the supervised as well as the unsupervised learning,
- identify the pros and cons of the different learning methods,
- apply the discussed network learning methods in specific scenarios,
- compare the practicality of methods and algorithms with alternative approaches.

Prerequisites

None

Content

In the broader sense learning systems are understood as biological organisms and artificial systems which are able to change their behavior by processing outside influences. Network leaning methods based on symbolic, statistic and neuronal approaches are the focus of Computer Sciences.

In this module the most important network learning methods are introduced and their applicability is discussed with regard to different information sources such as data texts and images considering especially procedures for knowledge acquirement via data and text mining, natural analogue procedures as well as the application of organic learning procedures within the finance sector.

Annotation

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

M   4.78 Module: Introduction to Video Analysis [M-INFO-100736]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101273	Introduction to Video Analysis	3 CR	Beyerer

M	**4.79 Module: Lab: Graph Visualization in Practice [M-INFO-103302]**

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Irregular	1 term	German	4	1

Mandatory			
T-INFO-106580	Lab: Graph Visualization in Practice	5 CR	Wagner

M   4.80 Module: Laboratory Course Algorithm Engineering [M-INFO-102072]

Responsible: Prof. Dr. Peter Sanders
                   Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-104374	Laboratory Course Algorithm Engineering	6 CR	Sanders, Ueckerdt, Wagner

M	**4.81 Module: Language Technology and Compiler [M-INFO-100806]**

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
8	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101343	Language Technology and Compiler	8 CR	Snelting

M 4.82 Module: Machine Learning [M-WIWI-103356]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	2

Election block: Compulsory Elective Courses (between 9 and 10 credits)			
T-WIWI-106340	Machine Learning 1 - Basic Methods	4,5 CR	Zöllner
T-WIWI-106341	Machine Learning 2 – Advanced Methods	4,5 CR	Zöllner
T-WIWI-109985	Project Lab Cognitive Automobiles and Robots	4,5 CR	Zöllner
T-WIWI-109983	Project Lab Machine Learning	4,5 CR	Zöllner

Competence Certificate

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

Competence Goal

- 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.

Prerequisites

None

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 1" covers both symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as subsymbolic techniques such as neural networks, support vector machines, genetics Algorithms and reinforcement learning. The lecture introduces the basic principles as well as fundamental structures of learning systems and the learning theory and examines the previously developed algorithms. The design and operation of learning systems is presented and explained in some examples, especially in the fields of robotics, autonomous mobile systems and image processing.

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

The total workload for this module is approximately 270 hours.

M 4.83 Module: Machine Learning - Foundations and Algorithms [M-INFO-105778]

Responsible: Prof. Dr. Gerhard Neumann
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-111558	Machine Learning - Foundations and Algorithms	5 CR	Neumann

M	**4.84 Module: Machine Vision [M-INFO-101239]**

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	1 term	4	6

Election block: Optional Courses (at least 1 item as well as at least 3 credits)			
T-INFO-101273	Introduction to Video Analysis	3 CR	Beyerer
T-INFO-101363	Automated Visual Inspection and Image Processing	6 CR	Beyerer
T-INFO-111491	Deep Learning for Computer Vision I: Basics	3 CR	Stiefelhagen
Election block: Optional Courses (at least 1 item as well as at least 6 credits)			
T-INFO-101362	Pattern Recognition	3 CR	Beyerer
T-INFO-101347	Computer Vision for Human-Computer Interaction	6 CR	Stiefelhagen
T-INFO-101297	Biometric Systems for Person Identification	3 CR	Stiefelhagen
T-INFO-105943	Practical Course Computer Vision for Human-Computer Interaction	6 CR	Stiefelhagen
T-INFO-111491	Deep Learning for Computer Vision I: Basics	3 CR	Stiefelhagen

M	4.85 Module: Management Accounting [M-WIWI-101498]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

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

Mandatory			
T-WIWI-102800	Management Accounting 1	4,5 CR	Wouters
T-WIWI-102801	Management Accounting 2	4,5 CR	Wouters

Competence Certificate

The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately.

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

Competence Goal

Students

- are familiar with various management accounting methods,

- can apply these methods for cost estimation, profitability analysis, and product costing,

- are able to analyze short-term and long-decisions with these methods,

- have the capacity to devise instruments for organizational control.

Prerequisites

None

Content

The module consists of two courses "Management Accounting 1" and "Management Accounting 2". The emphasis is on structured learning of management accounting techniques.

Annotation

The following courses are part of this module:

- The course Management Accounting 1, which is offered in every sommer semester
- The course Management Accounting 2, which is offered in every winter semester

Workload

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

M	**4.86 Module: Market Engineering [M-WIWI-101446]**

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Mandatory			
T-WIWI-102640	Market Engineering: Information in Institutions	4,5 CR	Weinhardt
Election block: Supplementary Courses (4,5 credits)			
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-108880	Blockchains & Cryptofinance	4,5 CR	Schuster, Uhrig-Homburg
T-WIWI-110797	eFinance: Information Systems for Securities Trading	4,5 CR	Weinhardt
T-WIWI-107501	Energy Market Engineering	4,5 CR	Weinhardt
T-WIWI-107503	Energy Networks and Regulation	4,5 CR	Weinhardt
T-WIWI-102614	Experimental Economics	4,5 CR	Weinhardt
T-WIWI-111109	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	4,5 CR	Weinhardt
T-WIWI-107504	Smart Grid Applications	4,5 CR	Weinhardt

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

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

Competence Goal
The students

- know the design criterias of market mechanisms and the systematic approach to create new markets,
- understand the basics of the mechanism design and auction theory,
- analyze and evaluate existing markets regarding the missing incentives and the optimal solution of a given market mechanism, respectively,
- develop solutions in teams.

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

Content
This module explains the dependencies between the design von markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. the approaches for a systematic analysis are explained in the mandatory course *Market Engineering* [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Recommendation
None

Annotation
The course "Computational Economics" [2590458] will not be offered any more in this module from winter term 2015/2016 on. The examination will be offered latest until summer term 2016 (repeaters only).

Workload

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

M 4.87 Module: Marketing and Sales Management [M-WIWI-105312]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each summer term	1 term	German/English	4	5

Election block: Compulsory Elective Courses (at least 1 item)		
T-WIWI-111099	Judgment and Decision Making	4,5 CR	Scheibehenne
T-WIWI-107720	Market Research	4,5 CR	Klarmann
T-WIWI-109864	Product and Innovation Management	3 CR	Klarmann
Election block: Supplementary Courses (at most 1 item)		
T-WIWI-106981	Digital Marketing and Sales in B2B	1,5 CR	Klarmann, Konhäuser
T-WIWI-110985	International Business Development and Sales	6 CR	Casenave , Klarmann, Terzidis
T-WIWI-102835	Marketing Strategy Business Game	1,5 CR	Klarmann
T-WIWI-102891	Price Negotiation and Sales Presentations	1,5 CR	Klarmann, Schröder
T-WIWI-111246	Pricing Excellence	1,5 CR	Bill, Klarmann

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

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

Competence Goal
Students

- have an advanced knowledge about central marketing contents

- have a fundamental understanding of the marketing instruments

- know and understand several strategic concepts and how to implement them

- are able to implement their extensive marketing knowledge in a practical context

- know several qualitative and quantitative approaches to prepare decisions in Marketing

- have the theoretical knowledge to write a master thesis in Marketing

- have the theoretical knowledge to work in/together with the Marketing department

Prerequisites
None

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

Annotation
Please note that only one of the listed 1,5-ECTS courses can be chosen in the module.

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

| M | 4.88 Module: Mathematical Programming [M-WIWI-101473] |

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Election block: Compulsory Elective Courses (at most 2 items)			
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102726	Global Optimization I	4,5 CR	Stein
T-WIWI-103638	Global Optimization I and II	9 CR	Stein
T-WIWI-102856	Convex Analysis	4,5 CR	Stein
T-WIWI-111587	Multicriteria Optimization	4,5 CR	Stein
T-WIWI-102724	Nonlinear Optimization I	4,5 CR	Stein
T-WIWI-103637	Nonlinear Optimization I and II	9 CR	Stein
T-WIWI-102855	Parametric Optimization	4,5 CR	Stein
Election block: Supplementary Courses (at most 2 items)			
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-102727	Global Optimization II	4,5 CR	Stein
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102725	Nonlinear Optimization II	4,5 CR	Stein
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx

Competence Certificate

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

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

Competence Goal

The student

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

Prerequisites

There is no compulsory course in the module.

Content

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

Annotation

The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu).

For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.

Workload

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

M 4.89 Module: Meshes and Point Clouds [M-INFO-100812]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101349	Meshes and Point Clouds	3 CR	Prautzsch

M 4.90 Module: Microeconomic Theory [M-WIWI-101500]

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

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

Election block: Compulsory Elective Courses (at least 9 credits)			
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102861	Advanced Game Theory	4,5 CR	Ehrhart, Puppe, Reiß
T-WIWI-102859	Social Choice Theory	4,5 CR	Puppe
T-WIWI-102613	Auction Theory	4,5 CR	Ehrhart
T-WIWI-105781	Incentives in Organizations	4,5 CR	Nieken

Competence Certificate

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

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

Competence Goal

Students

- are able to model practical microoeconomic 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 decistions under imperfect competition? An example of a normative question is: which voting rule has appealing properties?

Prerequisites

None

Content

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

Workload

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

M 4.91 Module: Microservice-Based Web Applications [M-INFO-104061]

Responsible: Prof. Dr. Sebastian Abeck
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
8	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101271	Web Applications and Service-Oriented Architectures (II)	4 CR	Abeck
T-INFO-103121	Practical Course: Web Applications and Service-Oriented Architectures (II)	5 CR	Abeck

M 4.92 Module: Mobile Communication [M-INFO-100785]

Responsible: Prof. Dr. Oliver Waldhorst
            Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101322	Mobile Communication	4 CR	Waldhorst, Zitterbart

M   4.93 Module: Models of Parallel Processing [M-INFO-100828]

Responsible: Thomas Worsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory		
T-INFO-101365	Models of Parallel Processing	5 CR	Worsch

Recommendation
Siehe Teilleistung

M 4.94 Module: Module Master Thesis [M-WIWI-101656]

Responsible: Studiendekan der KIT-Fakultät für Informatik
                   Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: Master Thesis

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

Mandatory			
T-WIWI-103142	Master Thesis	30 CR	Studiendekan der KIT-Fakultät für Informatik, Studiendekan des KIT-Studienganges

Competence Certificate

Examination by two examiners from the two faculties. For details refer to examination regulation. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.

Competence Goal

The student can independently handle a complex and unfamiliar subject based on scientific criteria and the current state of research.

He/she is in a position to critically analyze and structure the researched information as well as derive principles and regularities. He/she knows how to apply the thereby achieved results to solve the task at hand. Taking into account this knowledge and his/her interdisciplinary knowledge, he/she can draw own conclusions, derive improvement potentials, propose and implement science-based decisions.

This is basically also done under consideration of social and/or ethical aspects.

He/she can interpret, evaluate and if required, graphically present the obtained results.

He/she is in a position to sensibly structure a research paper, document results and clearly communicate the results in scientific form.

Prerequisites

Regulated in §14 of the examination regulation.

The requirements for the examiner are described in §14 (2) of the examination regulation.

Content

- The master thesis shows that the candidate can autonomously investigate a problem from his discipline with scientific methods according to the state-of-the-art of the discipline within a specified time period.
- The master thesis can be written in German or English.
- The topic of a master thesis can be accepted or chosen by each of the examiners according to examination regulation. The examiner accepting a topic for a master thesis acts as the first supervisor of this thesis.
- Writing a master thesis with a supervisor who is not a member of the two faculties participating in the degree programme (Departement of Informatics, Department of Economics and Management) requires acceptance by the examination board of the degree programme. The candidate must have an opportunity to make suggestions for the topic of the master thesis.
- Candidates can write a master thesis in teams. However, this requires that the contribution and performance of each candidate to the thesis is identifiable according to objective criteria which allow a unique delineation of each candidate's contribution. The contribution of each candidate regarded in isolation must fulfill the requirements a individual master thesis.
- In exceptional cases and upon request of the candidate, the chairman of the examination board chooses a supervisor and requests that this supervisor provides the candidate with a topic for the master thesis within 4 weeks after the request. In this case, the candidate is informed by the chairman of the examination board about the topic selected.
- Topic, specification of research tasks and the volume of the master thesis should be limited by the supervisor, so that the master thesis can be written with the assigned workload of 30 credits (750-900h).
- The master thesis must contain the following declaration of the candidate: "I truthfully assure that I have autonomously written this master thesis. I have quoted all sources used precisely and completely. I have labelled everything which has been taken from the work of others with or without change." A master thesis without this declaration will not be accepted.
- The date of the assignment of the topic to a candidate as well as the date of delivery of the master thesis should be registered at the examination board. The candidate can return a topic for the master thesis only one time and only within a period of two month after he has received the topic. Upon a request of the candidate with reasons supporting an extension, the examination board may extend the deadline for the delivery of the master thesis by a maximum of three months. A master thesis not delivered within time is graded as "fail" except when the candidate is not responsible for this delay (e.g. protection of motherhood).
- The master thesis is reviewed and graded by the supervisor and the additional examiner. The team of supervisor and examiner must represent both faculties participating in the degree programme (Department of Informatics, Department of Economics and Management). At least one of the two must be professor or junior professor. If the grades of the supervisor and the examiner differ, the examination board sets the mark within this limit.
- Reviewing and grading should be done within 8 weeks after delivery of the master thesis.

Workload
The total workload for this module is approximately 900 hours. For further information see German version.

M **4.95 Module: Network Economics [M-WIWI-101406]**

Responsible:	Prof. Dr. Kay Mitusch
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	2

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-100005	Competition in Networks	4,5 CR	Mitusch
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba
T-WIWI-102609	Advanced Topics in Economic Theory	4,5 CR	Mitusch
T-WIWI-102712	Regulation Theory and Practice	4,5 CR	Mitusch
T-WIWI-102713	Telecommunication and Internet Economics	4,5 CR	Mitusch

Competence Certificate

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

The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Competence Goal

The students

- have acquired the basic knowledge for a future job in a network company or in a regulatory agency, ministry etc.
- recognize the specific characterizations of network sectors, know fundamental methods for an economic analysis of network sectors and recognize the interfaces for an interdisciplinary cooperation of economists, engineers and lawyers
- understand the interactions between infrastructures, control systems, and the users of networks, especially concerning their implications on investments, price setting and competitive behavior, and they can model or simulate exemplary applications
- can assess the necessity of regulation of natural monopolies and identify regulatory measures that are important for networks.

Prerequisites

None

Content

The module is concerned with network or infrastructure industries in the economy, e.g. telecommunication, traffic and energy sectors. These sectors are characterized by close interdependencies of operators and users of infrastructure as well as on states. States intervene in various forms, by the public and regulation authorities, due to the importance of network industries and due to limited abilities of markets to work properly in these industries. The students are supposed to develop a broad knowledge of these sectors and of the political options available.

Recommendation

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

Workload

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

M 4.96 Module: Network Security: Architectures and Protocols [M-INFO-100782]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart

M 4.97 Module: Networking [M-INFO-101206]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

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

Election block: Networking (at least 1 item as well as at least 8 credits)		
T-INFO-101321 Next Generation Internet	4 CR	Bless, Zitterbart
T-INFO-101319 Network Security: Architectures and Protocols	4 CR	Zitterbart
T-INFO-104386 Practical Course Protocol Engineering	4 CR	Zitterbart
T-INFO-101338 Telematics	6 CR	Zitterbart

Competence Goal

Each student should be able

- to learn and use the concepts and principals of wired network design
- to identify the flaws and benefits of wired communication systems
- to judge the performance of protocols, wired networks and architectures
- master advanced protocols, architectures and algorithms of wired communication systems

Content

This module details selected aspects of wired communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.

M   4.98 Module: Networking Labs [M-INFO-101204]

Responsible:	Prof. Dr. Hannes Hartenstein
	Prof. Dr. Martina Zitterbart
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	1 term	4	2

Election block: Networking Labs (at least 1 item as well as at least 9 credits)			
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart
T-INFO-106061	Access Control Systems: Foundations and Practice	5 CR	Hartenstein

Competence Goal

Each student should be able

- to learn and apply the concepts and principals of wireless network design
- to identify the flaws and benefits of wireless communication systems
- to judge the performance of protocols, wireless networks and architectures
- master advanced protocols, architectures and algorithms of wireless communication systems

Content

This module details and applies selected aspects of communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.

M	**4.99 Module: Networking Security - Theory and Praxis [M-INFO-101207]**

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	1 term	4	2

Election block: Networking Security - Theory and Praxis (at least 1 item as well as at least 9 credits)			
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein
T-INFO-101371	Security	6 CR	Hofheinz, Müller-Quade

Competence Goal
Each student should be able

- to recall the basic security mechanisms and theoretical foundations of networking security and cryptography
- to read and understand actual academic papers
- to judge the security level of actual security solutions
- to identify possible attacks on security solutions

Prerequisites
None

Content
This module details selected aspects of networking security and cryptography in theory and praxis.

M   4.100 Module: Operations Research in Supply Chain Management [M-WIWI-102832]

Responsible: Prof. Dr. Stefan Nickel

Organisation: KIT Department of Economics and Management

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Election block: Compulsory Elective Courses (at most 2 items)		
T-WIWI-102723 Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-106200 Modeling and OR-Software: Advanced Topics	4,5 CR	Nickel
T-WIWI-102715 Operations Research in Supply Chain Management	4,5 CR	Nickel
Election block: Supplementary Courses (at most 2 items)		
T-WIWI-106546 Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-102718 Discrete-Event Simulation in Production and Logistics	4,5 CR	Nickel
T-WIWI-102719 Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720 Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-110162 Optimization Models and Applications	4,5 CR	Sudermann-Merx
T-WIWI-106549 Large-scale Optimization	4,5 CR	Rebennack

Competence Certificate

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

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

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

Competence Goal

The student

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

Prerequisites

There is no compulsory course in the module.

Content

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

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

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

Annotation
Some lectures and courses are offered irregularly.

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

Workload
Total effort for 9 credits: ca. 270 hours

- Presence time: 84 hours
- Preparation/Wrap-up: 112 hours
- Examination and examination preparation: 74 hours

M 4.101 Module: Optimization under Uncertainty in Information Engineering and Management [M-WIWI-103243]

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

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

Mandatory			
T-WIWI-106545	Optimization Under Uncertainty	5 CR	Rebennack

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Competence Goal
The students are familiar with the modern concepts of stochastic modeling and are in a position to describe and to analyse simple systems in an adequate way.

Prerequisites
None

Content
Markov chains are no longer a nice theory but an important tool in order to model, analyse, and optimize a stochastic system as it evolves over time.

Topics overview: Markov chains, Poisson Processes.

Annotation
New module starting summer term 2017.

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

Workload
See German version.

M   4.102 Module: Parallel Algorithms [M-INFO-100796]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory		
T-INFO-101333	Parallel Algorithms	5 CR	Sanders

M 4.103 Module: Pattern Recognition [M-INFO-100825]

Responsible:	Prof. Dr.-Ing. Jürgen Beyerer
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-101362	Pattern Recognition	3 CR	Beyerer

M 4.104 Module: Practical Course: Analysis of Complex Data Sets [M-INFO-102807]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	pass/fail	Irregular	1 term	English	4	1

Mandatory			
T-INFO-105796	Practical Course: Analysis of Complex Data Sets	4 CR	Böhm

M 4.105 Module: Practical Course: Data Science [M-INFO-105632]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	pass/fail	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-111262	Practical Course: Data Science	6 CR	Böhm

M 4.106 Module: Practical Course: Database Systems [M-INFO-101662]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	pass/fail	Each winter term	1 term	German	4	1

Mandatory			
T-INFO-103201	Practical Course: Database Systems	4 CR	Böhm

M 4.107 Module: Practical Course: Geometric Modeling [M-INFO-101666]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-103207	Practical Course: Geometric Modeling	3 CR	Prautzsch

4 MODULES

Module: Practical Course: Implementation and Evaluation of Advanced Data
Mining Approaches for Semi-Structured Data [M-INFO-103128]

M   **4.108 Module: Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data [M-INFO-103128]**

Responsible:	Prof. Dr.-Ing. Klemens Böhm
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	pass/fail	Irregular	1 term	English	4	1

Mandatory			
T-INFO-106219	Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data	4 CR	Böhm

M   4.109 Module: Practical Course: Smart Data Analytics [M-INFO-103235]

Responsible:	Prof. Dr.-Ing. Michael Beigl
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-106426	Practical Course: Smart Data Analytics	6 CR	Beigl

M 4.110 Module: Private Business Law [M-INFO-101216]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Election block: Private Business Law (at least 1 item as well as at least 9 credits)			
T-INFO-111405	Seminar: Commercial and Corporate Law in the IT Industry	3 CR	Dreier, Nolte
T-INFO-101288	Corporate Compliance	3 CR	Herzig
T-INFO-102036	Computer Contract Law	3 CR	Bartsch
T-INFO-111436	Employment Law	3 CR	Hoff
T-INFO-111437	Tax Law	3 CR	Dietrich

Competence Goal

The student

- has gained in-depth knowledge of German company law, commercial law and civil law;
- is able to analyze, evaluate and solve complex legal and economic relations and problems;
- is well grounded in individual labour law, collective labour law and commercial constitutional law, evaluates and critically assesses clauses in labour contracts;
- recognizes the significance of the parties to collective labour agreements within the economic system and has differentiated knowledge of labour disputes law and the law governing the supply of temporary workers and of social law;
- possesses detailed knowledge of national earnings and corporate tax law and is able to deal with provisions of tax law in a scientific manner and assesses the effect of these provisions on corporate decision-making.

Prerequisites

None

Content

The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.

M 4.111 Module: Public Business Law [M-INFO-101217]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	5

Election block: Public Business Law (at least 1 item as well as at least 9 credits)			
T-INFO-101309	Telecommunications Law	3 CR	Hermstrüwer
T-INFO-101312	European and International Law	3 CR	Brühann
T-INFO-111404	Seminar: IT- Security Law	3 CR	Schallbruch
T-INFO-111406	Data Protection Law	3 CR	Eichenhofer

Competence Certificate
see course description.

M 4.112 Module: Randomized Algorithms [M-INFO-100794]

Responsible: Thomas Worsch
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101331	Randomized Algorithms	5 CR	Worsch

M 4.113 Module: Robotics I - Introduction to Robotics [M-INFO-100893]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
6	Grade to a tenth	Each winter term	1 term	German	4	3

Mandatory			
T-INFO-108014	Robotics I - Introduction to Robotics	6 CR	Asfour

M 4.114 Module: Seminar Module Economic Sciences [M-WIWI-102736]

Responsible:	Studiendekan des KIT-Studienganges
Organisation:	KIT Department of Economics and Management
Part of:	Research Course

Credits	Grading scale	Language	Level	Version
3	Grade to a tenth	German	4	1

Election block: Compulsory Elective Courses (1 item)			
T-WIWI-103474	Seminar in Business Administration A (Master)	3 CR	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
T-WIWI-103478	Seminar in Economics A (Master)	3 CR	Professorenschaft des Fachbereichs Volkswirtschaftslehre
T-WIWI-103481	Seminar in Operations Research A (Master)	3 CR	Nickel, Rebennack, Stein
T-WIWI-103483	Seminar in Statistics A (Master)	3 CR	Grothe, Schienle

Competence Certificate

The assessment is done by a seminar with at least 3 CP.

The assessment of the seminar (following §4(2), 3 ER) is described at the course description.

Competence Goal

- Students are able to independently deal with a defined problem in a specialized field based on scientific criteria.
- They are able to research, analyze the information, abstract and derive basic principles and regularities from unstructured information.
- They can solve the problems in a structured manner using their interdisciplinary know-how.
- They know how to validate the obtained results.
- Finally, they are able to logically and systematically present the results both orally and in written form in accordance with scientific guidelines (structuring, technical terminology, referencing). They can argue and defend the results professionally in the discussion.

Prerequisites

None.

Content

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

Annotation

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

Workload

The total workload for this module is approximately 90 hours.

M 4.115 Module: Seminar Module Informatics [M-INFO-102822]

Organisation: KIT Department of Informatics
KIT Department of Economics and Management
Part of: Research Course

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
3	Grade to a tenth	Each term	1 term	German/English	4	2

Election block: Compulsory Elective Seminar in Informatics (1 item)			
T-INFO-104336	Seminar Informatics A	3 CR	Abeck
T-WIWI-103480	Seminar in Informatics B (Master)	3 CR	Professorenschaft des Instituts AIFB
T-INFO-111205	Seminar Informatics Master	3 CR	

M   4.116 Module: Seminar Module Law [M-INFO-101218]

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

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

Mandatory			
T-INFO-101997	Seminar: Legal Studies I	3 CR	Dreier

M   4.117 Module: Seminar: Computer Science TECO [M-INFO-105328]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-110808	Seminar: Computer Science TECO	3 CR	Beigl

M　4.118 Module: Service Analytics [M-WIWI-101506]

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

Organisation: KIT Department of Economics and Management

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German	4	7

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-105777	Business Intelligence Systems	4,5 CR	Mädche, Nadj, Toreini
T-WIWI-102899	Modeling and Analyzing Consumer Behavior with R	4,5 CR	Dorner, Weinhardt
T-WIWI-109940	Special Topics in Information Systems	4,5 CR	Weinhardt

Competence Certificate

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

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

Competence Goal

Students

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

Prerequisites

None

Content

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

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

Recommendation

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

Annotation

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

Workload

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

M 4.119 Module: Service Design Thinking [M-WIWI-101503]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each winter term	2 terms	English	4	1

Mandatory		
T-WIWI-102849	Service Design Thinking	12 CR	Satzger

Competence Certificate

The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Competence Goal

- Deep knowledge of the innovation method Design Thinking, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one's environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one's ideas, to test and iteratively develop them, and to converge on a solution
- Learn to apply the method to a real innovation projects issued by industry partners.

Prerequisites

None

Content

- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges. The bikes will be tested in a race during an international Kick-Off event with other universities of the SUGAR network (intern. Design Thinking network).
- Design Space Exploration: Exploring the problem space through customer and user observation as well as desk research.
- Critical Function Prototype: Identification of critical features from the customer's perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions. Developing radically new ideas are in the focus of this phase.
- Funky Prototype: Integration of the individually tested and successful functions to several complete solution scenarios, which are further tested and developed.
- Functional Prototype: Selection of successful scenarios from the previous phase and building a higher resolution prototype. The final solution to the challenge is lade out in detail and tested with users.
- Final Prototype: Implementing the functional prototype and presenting it to the customer.

Recommendation

This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

Annotation

Due to practical project work as a component of the program, access is limited.

The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.

For more information on the application process and the program itself are provided in the module component description and the program's website (http://sdt-karlsruhe.de).

Furthermore, the KSRI conducts an information event for applicants every year in May.

This module is part of the KSRI Teaching Program „Digital Service Systems". For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.

Workload

The total amount of work for this module is approx. 270 hours (9 credits). The workload for this course is comparably high as the course runs in cooperation with partner universities from around the world as well as partner companies. This causes overhead.

M 4.120 Module: Service Economics and Management [M-WIWI-102754]

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

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

Election block: Compulsory Elective Courses (9 credits)		
T-WIWI-110280	Digital Services: Business Models and Transformation	4,5 CR	Satzger
T-WIWI-102640	Market Engineering: Information in Institutions	4,5 CR	Weinhardt

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

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

Competence Goal
Students

- understand the scientific basics of the management of digital services and corresponding systems
- gain a comprehensive insight in the importance and the most important features of information systems as an central component of the digitalization of business processes, products and services
- know the most relevant concepts and theories to shape the digital transformation process of service systems successfully
- understand the OR methods in the sector of service management and apply them adequately
- are able to use large amounts of available data systematically for the planning, operation and improvement of complex service offers and to design and control information systems
- are able to develop market-oriented coordination mechanisms and apply service systems.

Prerequisites
None

Content
This module provides the foundation for the management of digital services and corresponding systems. The courses in this module cover the major concepts for a successful management of service systems and their digital transformation. Current examples from the research and practice enhance the relevance of the discussed topics.

Recommendation
None

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

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

M 4.121 Module: Service Innovation, Design & Engineering [M-WIWI-102806]

Responsible:	Prof. Dr. Alexander Mädche
	Prof. Dr. Gerhard Satzger
Organisation:	KIT Department of Economics and Management
Part of:	Economics and Management (Elective Modules in Economics and Management)
	Economics and Management (Elective Modules in Business Administration)

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

Election block: Compulsory Elective Courses (9 credits)			
T-WIWI-110877	Engineering Interactive Systems	4,5 CR	
T-WIWI-102639	Business Models in the Internet: Planning and Implementation	4,5 CR	Weinhardt
T-WIWI-110887	Practical Seminar: Service Innovation	4,5 CR	Satzger
T-WIWI-108437	Practical Seminar: Information Systems and Service Design	4,5 CR	Mädche
T-WIWI-102641	Service Innovation	4,5 CR	Satzger

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

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

Competence Goal
Students

- know about the challenges, concepts, methods and tools of service innovation management and are able to use them successfully.
- have a profound comprehension of the development and design of innovative services and are able to apply suitable methods and tools on concrete and specific issues.
- are able to embed the concepts of innovation management, development and design of services into organisations
- are aware of the strategic importance of services, are able to present value creation in the context of services systems and to strategically exploit the possibilities of their digital transformation
- elaborate concrete and problem-solving solutions for practical tasks in teams.

Prerequisites
Dependencies between courses:

The course Practical Seminar Service Innovation cannot be applied in combination with the course Practical Seminar Digital Service Design.

Content
This module is designed to constitute the basis for the development of successful ICT supported innovations thus including the methods and tools for innovation management, for the design and the development of digital services and the implementation of new business models. Current examples from science and practice enhance the relevance of the topics addressed.

Recommendation
Attending the course Practical Seminar Service Innovation [2595477] is recommended in combination with the course Service Innovation [2595468].

Attending the course Practical Seminar Digital Service Design [new] is recommended in combination with the course Digital Service Design [new].

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

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

M 4.122 Module: Service Management [M-WIWI-101448]

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

Organisation: KIT Department of Economics and Management

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	7

Mandatory		
T-WIWI-110280	Digital Services: Business Models and Transformation	4,5 CR	Satzger
Election block: Supplementary Courses (4,5 credits)		
T-WIWI-108715	Artificial Intelligence in Service Systems	4,5 CR	Satzger
T-WIWI-111219	Artificial Intelligence in Service Systems - Applications in Computer Vision	4,5 CR	Satzger
T-WIWI-102899	Modeling and Analyzing Consumer Behavior with R	4,5 CR	Dorner, Weinhardt
T-WIWI-102641	Service Innovation	4,5 CR	Satzger

Competence Certificate

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

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

Competence Goal

The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Prerequisites

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

Content

The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Recommendation

None

Workload

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

M   4.123 Module: Service Operations [M-WIWI-102805]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	6

Election block: Compulsory Elective Courses (at most 2 items)		
T-WIWI-102718 Discrete-Event Simulation in Production and Logistics	4,5 CR	Nickel
T-WIWI-102884 Operations Research in Health Care Management	4,5 CR	Nickel
T-WIWI-102715 Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-102716 Practical Seminar: Health Care Management (with Case Studies)	4,5 CR	Nickel
Election block: Supplementary Courses (at most 2 items)		
T-WIWI-102872 Challenges in Supply Chain Management	4,5 CR	Mohr
T-WIWI-110971 Demand-Driven Supply Chain Planning	4,5 CR	Packowski

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

Competence Goal
Students

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

Prerequisites
There is no compulsory course in the module.

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

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

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

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

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

M 4.124 Module: Software Methods [M-INFO-101202]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	2 terms	4	4

Election block: Software Methods (at least 1 item as well as at least 9 credits)			
T-INFO-101381	Software Architecture and Quality	3 CR	Reussner
T-INFO-101256	Software-Evolution	3 CR	Reussner
T-INFO-101278	Model Driven Software Development	3 CR	Reussner
T-INFO-101300	Requirements Engineering	3 CR	Koziolek

Competence Goal

The students learn the foundations and advanced methods for systematic planning, design, implementation, evaluation and enhancement of software systems. By acquiring knowledge and capabilities to critically evaluate modern technologies, the students are enabled to use these technologies purposefully and effectively. Apart from functional viewpoints and software properties, extra-functional properties such as security and performance are taught. Additionally, an overview of current research topics and challenges are offered.

Prerequisites

None

Content

The content is explained in the course descriptions.

M 4.125 Module: Software Systems [M-INFO-101201]

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: Informatics

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

Election block: Software Systems (at least 1 item as well as at least 9 credits)			
T-INFO-101381	Software Architecture and Quality	3 CR	Reussner
T-INFO-101256	Software-Evolution	3 CR	Reussner
T-INFO-101278	Model Driven Software Development	3 CR	Reussner
T-INFO-101281	Formal Systems II: Application	5 CR	Beckert
T-INFO-101378	Formal Systems II: Theory	5 CR	Beckert
T-INFO-101300	Requirements Engineering	3 CR	Koziolek

Competence Goal

In the courses that comprise this module, students learn different approaches and techniques for systematic and high-quality development of software systems, e.g. requirements engineering, implementing components and services, use of parallelism and multi-core platforms, as well as the verification of created software systems.

Prerequisites

None

Content

The content will be explained in the course descriptions.

M 4.126 Module: Stochastic Optimization [M-WIWI-103289]

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

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German/English	4	10

Election block: Compulsory Elective Courses (between 1 and 2 items)			
T-WIWI-106546	Introduction to Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106548	Advanced Stochastic Optimization	4,5 CR	Rebennack
T-WIWI-106549	Large-scale Optimization	4,5 CR	Rebennack
Election block: Supplementary Courses (at most 1 item)			
T-WIWI-102723	Graph Theory and Advanced Location Models	4,5 CR	Nickel
T-WIWI-102719	Mixed Integer Programming I	4,5 CR	Stein
T-WIWI-102720	Mixed Integer Programming II	4,5 CR	Stein
T-WIWI-111247	Mathematics for High Dimensional Statistics	4,5 CR	Grothe
T-WIWI-103124	Multivariate Statistical Methods	4,5 CR	Grothe
T-WIWI-102715	Operations Research in Supply Chain Management	4,5 CR	Nickel
T-WIWI-106545	Optimization Under Uncertainty	5 CR	Rebennack
T-WIWI-110162	Optimization Models and Applications	4,5 CR	Sudermann-Merx

Competence Certificate

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

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

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

Competence Goal

The student

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

Prerequisites

There is no compulsory course in the module.

Content

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

Recommendation

It is recommended to listen to the lecture "Introduction to Stochastic Optimization" before the lecture "Advanced Stochastic Optimization" is visited.

Annotation

The course "Introduction to Stochastic Optimization" will be offered until the winter semester 2020/21 as an additional option in the elective offer of the module. Thereafter, the course can only be selected in the supplementary offer.

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

Workload

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

| M | **4.127 Module: Subdivision Algorithms [M-INFO-101864]** |

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
5	Grade to a tenth	Each summer term	1 term	German	4	1

Mandatory			
T-INFO-103550	Subdivision Algorithms	5 CR	Prautzsch

Prerequisites
None

M   4.128 Module: Telematics [M-INFO-100801]

Responsible:	Prof. Dr. Martina Zitterbart
Organisation:	KIT Department of Informatics
Part of:	Informatics

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

Mandatory			
T-INFO-101338	Telematics	6 CR	Zitterbart

M	**4.129 Module: Theory and Practice of Data Warehousing and Mining [M-INFO-101256]**

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
9	Grade to a tenth	Each term	1 term	4	5

Election block: Practical Course (at most 1 item as well as at most 4 credits)			
T-INFO-105796	Practical Course: Analysis of Complex Data Sets	4 CR	Böhm
T-INFO-106219	Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data	4 CR	Böhm
T-INFO-103201	Practical Course: Database Systems	4 CR	Böhm
T-INFO-111262	Practical Course: Data Science	6 CR	Böhm
Election block: Lecture (at most 5 credits)			
T-INFO-101317	Deployment of Database Systems	5 CR	Böhm
T-INFO-108377	Data Privacy: From Anonymization to Access Control	3 CR	Böhm
T-INFO-111400	Database as a Service	5 CR	Böhm
T-INFO-111622	Data Science I	5 CR	Böhm, Fouché
T-INFO-111626	Data Science II	3 CR	Böhm, Fouché

Competence Goal
The students

- know the research area of information systems in its various facets and are able to do scientific work in this area,
- are able to explain and to discuss complex aspects of the topics covered by this module with both experts and informed outsiders,
- know the concepts, algorithms, techniques and selected tools in the areas of data warehousing and data mining,
- are familiar with the practical challenges of data analysis and are able to develop respective solutions on their own.

Prerequisites
None

Content
This module aims at exposing students to modern information management, both, in 'breadth´ and 'depth´. We achieve 'breadth´ by means of a close inspection and comparison of different systems and their respective aims. We achieve 'depth´ by means of an extensive examination of the underlying concepts and design alternatives, their assessment as well as by discussing applications. In particular, we look at data warehousing and mining techniques not only from a theoretical point of view but deploy and realise such technologies in a practical course.

Annotation
The courses of this module are offered irregularly. Nonetheless, it is guaranteed that the module can be passed anytime.

M 4.130 Module: Transport Infrastructure Policy and Regional Development [M-WIWI-101485]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: Economics and Management (Elective Modules in Economics and Management)

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

Election block: Compulsory Elective Courses (2 items)		
T-WIWI-103107	Spatial Economics	4,5 CR	Ott
T-WIWI-100007	Transport Economics	4,5 CR	Mitusch, Szimba

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

Competence Goal
The students

- understand the economic issues related to transport and regional development with a main focus on economic policy issues generated by the relationship of transport and regional development with the public sector
- are able to compare different considerations of politics, regulation and the private sector and to analyse and assess the respective decision problems both qualitatively and by applying appropriate methods from economic theory
- are prepared for careers in the public sector, particularly for public companies, politics, regulatory agencies, related consultancies, mayor construction companies or infrastructure project corporations

Prerequisites
None

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

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

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

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

M 4.131 Module: Ubiquitous Computing [M-INFO-100789]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: Informatics

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

Mandatory			
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl

M 4.132 Module: Ubiquitous Computing [M-WIWI-101458]

Responsible:	N.N.
	Prof. Dr. Hartmut Schmeck
Organisation:	KIT Department of Economics and Management
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	1 term	German	4	3

Mandatory			
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl
Election block: Supplementary Courses (between 4 and 5 credits)			
T-WIWI-102761	Advanced Lab in Ubiquitous Computing	4 CR	Beigl, Schmeck
T-INFO-101323	IT-Security Management for Networked Systems	5 CR	Hartenstein

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

Competence Goal
The student

- gets comprehensive knowledge about topics in the area of Ubiquitous Computing
- can design and evaluate ubiquitous systems in different application areas
- acquires appropriate knowledge for addressing specialized aspects in the area of ubiquitous computing

Prerequisites
See German version

Content
Ubiquitous information technology (Ubiquitous Computing) addresses the ubiquitous (or pervasive) availability of information processing. The availability of these systems has the objective to facilitate the operational environment in technical scenarios or in daily life of humans and to enrich it with new capabilities. This module provides fundamentals of ubiquitous computing and further topics like network and Internet technologies, security aspects, the analysis of autonomously operating systems in Organic Computing and also the utilisation of information and communication technologies in highly decentralized energy systems.

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

M   4.133 Module: Wearable Robotic Technologies [M-INFO-103294]

Responsible: Prof. Dr.-Ing. Tamim Asfour
                   Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
4	Grade to a tenth	Each summer term	1 term	German/English	4	2

Mandatory			
T-INFO-106557	Wearable Robotic Technologies	4 CR	Asfour, Beigl

Competence Goal

The students have received fundamental knowledge about wearable robotic technologies and understand the requirements for the design, the interface to the human body and the control of wearable robots. They are able to describe methods for modelling the human neuromusculoskeletal system, the mechatronic design, fabrication and composition of interfaces to the human body. The students understand the symbiotic human–machine interaction as a core topic of Anthropomatics and have knowledge of state of the art examples of exoskeletons, ortheses and protheses.

Content

The lecture starts with an overview of wearable robot technologies (exoskeletons, prostheses and ortheses) and its potentials, followed by the basics of wearable robotics. In addition to different approaches to the design of wearable robots and their related actuator and sensor technology, the lecture focuses on modeling the neuromusculoskeletal system of the human body and the physical and cognitive human-robot interaction for tightly coupled hybrid human-robot systems. Examples of current research and various applications of lower, upper and full body exoskeletons as well as prostheses are presented.

M 4.134 Module: Web and Data Science [M-WIWI-105368]

Responsible: Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

Credits	Grading scale	Recurrence	Duration	Language	Level	Version
9	Grade to a tenth	Each term	2 terms	German/English	4	1

Election block: Compulsory Elective Courses (at least 2 items)			
T-WIWI-102666	Knowledge Discovery	4,5 CR	Färber
T-WIWI-103112	Web Science	4,5 CR	Färber
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

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

Competence Goal
The student

- know the basics of machine learning, data mining and knowledge discovery
- can design, train and evaluate systems that are capable of learning
- carry out knowledge discovery projects, taking into account algorithms, representations and applications.
- will look at current research topics in the field of Web Science and
- learn about the topics Small World Problem, Network Theory, Social Network Analysis, Bibliometrics, Link Analysis and Search,
- apply interdisciplinary thinking and
- apply technological approaches to social science problems.

Prerequisites
None

Content
The module focuses on machine learning and data mining methods for knowledge acquisition from large databases as well as web phenomena and the available technologies.

The lecture Knowledge Discovery gives an overview of approaches of machine learning and data mining for knowledge acquisition from large data sets. These are examined especially with respect to algorithms, applicability to different data representations and the use in real application scenarios.
Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.
The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.
Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

The lecture "Web Science" offers an insight into the analysis of social networks and the metrics used in this context. Thereby especially web phenomena and the available technologies.
Web Science is the emerging study of the people and technologies, applications, processes and practices that make the world Wide Web and are shaped and embossed. Web Science aims to develop theories, methods and findings from the entire academic disciplines and work with industry, business, politics and civil society to create an understanding of the Web: The largest socio-technical infrastructure in the history of mankind.
The lecture gives an introduction to the basic concepts of Web Science. Essential theoretical foundations, Phenomena and methods are presented and explained. This lecture aims to give students a basic knowledge and understanding of the structure and analysis of selected web phenomena and technologies. The topics include the small world problem, Network theory, social network analysis, graph-based search and technologies / standards / architectures.

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

M 4.135 Module: Web Data Management [M-WIWI-101455]

Responsible: Michael Färber
Organisation: KIT Department of Economics and Management
Part of: Informatics

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

Election block: Compulsory Elective Courses (2 items)		
T-WIWI-110848	Semantic Web Technologies	4,5 CR	Käfer
T-WIWI-103112	Web Science	4,5 CR	Färber
T-WIWI-110548	Advanced Lab Informatics (Master)	4,5 CR	Professorenschaft des Instituts AIFB

Competence Certificate

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

Competence Goal

Students

- develop ontologies for semantic web technologies und choose suitable representation languages,
- are able to provide data and applications via a cloud-based infrastructure
- transfer the methods and technologies of semantic web technologies and cloud computing to new application sectors,
- evaluate the potential of semantic web technologies and the cloud computing approaches for new application sectors.

Content

The module Web Data Management covers the basic principles, methods and applications for intelligent systems in the World Wide Web. Cloud Services are essential for the decentralized, scalable provision of data and applications as well as the methods of semantic web based on the description of data and services via metadata in form of so called ontologies.

Formal principles and practical aspects such as knowledge modeling and available representation language tools for ontologies are covered in detail. Methods for the realization of intelligent systems within the World Wide Web are treated and applications as in Web 2.0 or Service Science are discussed and evaluated.

Furthermore the application of modern Cloud technologies for the use of software and hardware as a service via internet is introduced. Cloud technologies allow the efficient implementation of applications on distributed computer clusters and permit a high scalability as well as new business models in the internet.

Workload

The total workload for this module is approximately 270 hours (9 credits). The allocation is based on the credits of the courses of the module. The workload for courses with 4.5 credits is about 135 hours.

The total number of hours per course results from the effort required to attend the lectures and exercises as well as the examination times and the time required to achieve the learning objectives of the module for an average student for an average performance.

M 4.136 Module: Wireless Networking [M-INFO-101203]

Responsible:	Prof. Dr. Martina Zitterbart
Organisation:	KIT Department of Informatics
Part of:	Informatics

Credits	Grading scale	Recurrence	Duration	Level	Version
8	Grade to a tenth	Each term	1 term	4	2

Election block: Wireless Networking (at least 1 item as well as at least 8 credits)			
T-INFO-101337	Internet of Everything	4 CR	Zitterbart
T-INFO-101322	Mobile Communication	4 CR	Waldhorst, Zitterbart
T-INFO-101326	Ubiquitous Computing	5 CR	Beigl
T-INFO-101319	Network Security: Architectures and Protocols	4 CR	Zitterbart

Competence Goal

Each student should be able

- to learn and use the concepts and principals of wireless network design
- to identify the flaws and benefits of wireless communication systems
- to judge the performance of protocols, wireless networks and architectures
- master advanced protocols, architectures and algorithms of wireless communication systems

Content

This module details selected aspects of wireless communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.

5 Courses

T 5.1 Course: A Closer Look at Social Innovation [T-WIWI-109932]

Responsible: Dr. Daniela Beyer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101507 - Innovation Management
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation). The grade consists of an innovation plan (comparable to an exposé) (15%), a guideline interview (25%), a presentation of the results (20%) and a seminar paper (40%).

Prerequisites
None

Recommendation
The previous attendance of the lecture Innovation Management is recommended.

T	5.2 Course: Access Control Systems: Foundations and Practice [T-INFO-106061]

Responsible: Prof. Dr. Hannes Hartenstein
Organisation: KIT Department of Informatics
Part of: M-INFO-101204 - Networking Labs
M-INFO-101210 - Dynamic IT-Infrastructures

Type Written examination	Credits 5	Grading scale Grade to a third	Recurrence Each term	Version 2

Events					
ST 2021	2400111	Access Control Systems: Foundations and Practice	3 SWS	Lecture / Practice (/ 📱	Hartenstein, Leinweber, Grashöfer
Exams					
ST 2021	7500197	Access Control Systems: Foundations and Practice			Hartenstein
ST 2021	7500296	Access Control Systems: Foundations and Practice			Hartenstein

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.3 Course: Advanced Empirical Asset Pricing [T-WIWI-110513]

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

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2530569	Advanced Empirical Asset Pricing	2 SWS	Lecture	Thimme
WT 21/22	2530570	Übung zu Advanced Empirical Asset Pricing	1 SWS	Practice	Thimme

Exams				
WT 21/22	7900319	Advanced Empirical Asset Pricing		Thimme

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

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

Annotation
New course from winter semester 2019/2020.

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

V Advanced Empirical Asset Pricing
2530569, WS 21/22, 2 SWS, Language: English, Open in study portal   **Lecture (V)**

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

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

Literature
Basisliteratur

Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.

zur Vertiefung/ Wiederholung

Investments and Portfolio Management / Bodie, Z., Kane, A., Marcus, A.J. - 9. ed., McGraw-Hill, 2011.

The econometrics of financial markets / Campbell, J.Y., Lo, A.W., MacKinlay, A.C. - 2. printing, with corrections, Princeton Univ. Press, 1997.

T   5.4 Course: Advanced Game Theory [T-WIWI-102861]

Responsible:	Prof. Dr. Karl-Martin Ehrhart
	Prof. Dr. Clemens Puppe
	Prof. Dr. Johannes Philipp Reiß
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101453 - Applied Strategic Decisions
	M-WIWI-101500 - Microeconomic Theory
	M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2521533	Advanced Game Theory	2 SWS	Lecture / 🖥	Reiß
WT 21/22	2521534	Übung zu Advanced Game Theory	1 SWS	Practice / 🖥	Reiß, Peters
Exams					
ST 2021	7900294	Advanced Game Theory			Puppe

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

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

Prerequisites

None

Recommendation

Basic knowledge of mathematics and statistics is assumed.

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

V	**Advanced Game Theory**	Lecture (V)
	2521533, WS 21/22, 2 SWS, Language: English, Open in study portal	Online

| T | **5.5 Course: Advanced Information Systems [T-WIWI-110373]** |

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

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101443 - Information Engineering and Management

Type Written examination	Credits 5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Competence Certificate

Please note that the lecture will no longer be offered as of summer semester 2020. The last opportunity to take an examination is in the winter semester 2020/2021.

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulation).

Recommendation

None

Annotation

The course starts with a short summary of Information Systems I and II. The course is held in English.

T 5.6 Course: Advanced Lab Blockchain Hackathon (Master) [T-WIWI-111126]

Responsible:	Prof. Dr. Ali Sunyaev
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-104403 - Critical Digital Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
WT 21/22	2512403	Advanced Lab Blockchain Hackathon (Bachelor)		Practical course / 🖳	Sunyaev, Kannengießer, Sturm, Beyene
Exams					
WT 21/22	7900141	Advanced Lab Blockchain Hackathon (Master)			Sunyaev

Legend: 🖳 Online, ⚄ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

The alternative exam assessment consists of:

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

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

Prerequisites

None

T   5.7 Course: Advanced Lab in Ubiquitous Computing [T-WIWI-102761]

Responsible: Prof. Dr.-Ing. Michael Beigl
                      Prof. Dr. Hartmut Schmeck
Organisation: KIT Department of Economics and Management
      Part of: M-WIWI-101458 - Ubiquitous Computing

Type Examination of another type	Credits 4	Grading scale Grade to a third	Recurrence Irregular	Version 1

Competence Certificate
See German version

Prerequisites
None

Annotation
See German Version

| T | 5.8 Course: Advanced Lab Informatics (Master) [T-WIWI-110548] |

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101455 - Web Data Management
M-WIWI-101456 - Intelligent Systems and Services
M-WIWI-101477 - Development of Business Information Systems
M-WIWI-105366 - Artificial Intelligence
M-WIWI-105368 - Web and Data Science

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Events					
ST 2021	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course / ⚙	Oberweis, Schiefer, Schüler, Toussaint
ST 2021	2512207	Lab Automation in Everyday Life (Master)	3 SWS	Practical course / ▪	Oberweis, Forell, Frister
ST 2021	2512401	Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course / ▪	Sunyaev, Pandl
ST 2021	2512403	Advanced Lab Blockchain Hackathon (Master)		Practical course / ▪	Sunyaev, Beyene, Kannengießer
ST 2021	2512500	Project Lab Machine Learning	3 SWS	Practical course / ⚙	Zöllner
ST 2021	2512555	Practical lab Security, Usability and Society (Master)	3 SWS	Practical course / ▪	Strufe, Mayer, Arias Cabarcos, Berens, Mossano, Düzgün, Beckmann
WT 21/22	2512205	Lab Realisation of innovative services (Master)	3 SWS	Practical course	Oberweis, Toussaint, Schüler, Schiefer
WT 21/22	2512401	Practical Course Sociotechnical Information Systems Development (Master)	3 SWS	Practical course / ▪	Sunyaev, Pandl, Goram
WT 21/22	2512403	Advanced Lab Blockchain Hackathon (Bachelor)		Practical course / ▪	Sunyaev, Kannengießer, Sturm, Beyene
WT 21/22	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course	Zöllner, Daaboul
WT 21/22	2512557	Practical Course Security (Master)	4 SWS	Practical course	Baumgart, Volkamer, Mayer, Leinweber, Schiffl
WT 21/22	2512600	Project lab Information Service Engineering (Master)	3 SWS	Practical course	Sack
Exams					
ST 2021	7900020	Lab Automation in Everyday Life (Master)			Oberweis
ST 2021	7900086	Project Lab Machine Learning			Zöllner
ST 2021	7900148	Advanced Lab Realization of innovative services (Master)			Oberweis
ST 2021	7900172	Lab Blockchain Hackathon (Master)			Sunyaev
ST 2021	7900173	Advanced Lab Development of Sociotechnical Information Systems (Master)			Sunyaev
ST 2021	7900178	Practical lab Security, Usability and Society (Master)			Volkamer
WT 21/22	7900046	Advanced Lab Security (Master)			Volkamer
WT 21/22	7900102	Advanced Lab Information Service Engineering			Sack
WT 21/22	7900107	Advanced Lab Cognitive Automobile and Robots (Master)			Zöllner
WT 21/22	7900141	Advanced Lab Blockchain Hackathon (Master)			Sunyaev

WT 21/22	7900143	Advanced Lab Development of Sociotechnical Information Systems (Master)	Sunyaev
WT 21/22	7900306	Advanced Lab Realization of Innovative Services (Master)	Oberweis
WT 21/22	7900307	Advanced Lab Security, Usability and Society (Master)	Volkamer

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
The alternative exam assessment consists of:

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

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

Prerequisites
None

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

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

V	**Lab Realisation of innovative services (Master)** 2512205, SS 2021, 3 SWS, Language: German, Open in study portal	**Practical course (P)** **Blended (On-Site/Online)**

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

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

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

V	**Lab Automation in Everyday Life (Master)** 2512207, SS 2021, 3 SWS, Language: German, Open in study portal	**Practical course (P)** **Online**

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

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

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

V	**Development of Sociotechnical Information Systems (Master)** 2512401, SS 2021, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)** **Online**

Content
The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

V	**Project Lab Machine Learning** 2512500, SS 2021, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)** **Blended (On-Site/Online)**

Content

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

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

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

Learning objectives:

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

Recommendations:

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

Workload:

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

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Practical lab Security, Usability and Society (Master)** 2512555, SS 2021, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)** **Online**

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.
WiWi link: https://portal.wiwi.kit.edu/ys/4629

Important dates:

Kick-off: 06.04.2021, 10:00-11:00 CET in Microsoft Teams - Link

Report + code submission : 07.09.2021, 23:59 CET

Presentation deadline : 20.09.2021, 23:59 CET

Presentation day: 24.09.2021, 09:00 CET

Topics:

Privacy Friendly apps

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

- Notes 2.0

Programming Usable Security Intervention

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

- Password Manager Enrolment Add-On
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Visualization app to explore Facebook behavioral data collection
- Authenticating on AR glasses: Implementing an authentication scheme for the Google Glass

Designing Security User studies (online studies only)

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

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

Please, note that registration is not required to participate in the kick-off meeting.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

| V | **Lab Realisation of innovative services (Master)**
2512205, WS 21/22, 3 SWS, Language: German, Open in study portal | **Practical course (P)** |

Content

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

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

Organizational issues

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

| V | **Practical Course Sociotechnical Information Systems Development (Master)**
2512401, WS 21/22, 3 SWS, Language: German/English, Open in study portal | **Practical course (P)**
Online |

Content

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

Learning objectives:

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

V	**Practical Course Cognitive automobiles and robots (Master)** 2512501, WS 21/22, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)**

Content

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

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

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

Learning objectives:

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

Recommendations:

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

Workload:

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

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Practical Course Security (Master)** 2512557, WS 21/22, 4 SWS, Language: German, Open in study portal	**Practical course (P)**

Content

The lab deals with the IT security of everyday utensils. Implemented security mechanisms are first theoretically investigated and put to the test with practical attacks. Finally, countermeasures and suggestions for improvement are worked out. The lab is offered within the competence center for applied security technologies (KASTEL) and is supervised by several institutes.

The success control takes the form of a final presentation, a thesis and the handing over of the developed code.

More information on ILIAS.

V	**Project lab Information Service Engineering (Master)** 2512600, WS 21/22, 3 SWS, Language: English, Open in study portal	**Practical course (P)**

Content

The ISE project lab is based on the summer semester lecture "Information Service Engineering". Goal of the course is to work on a given research problem in small groups (3-4 students) related to the ISE lecture topics, i.e. Natural Language Processing, Knowledge Graphs, and Machine Learning. The solution of the given research problem requires the development of a software implementation.

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

Required coursework includes:

- Mid term presentation (5-10 min)
- Final presentation (10-15 min)
- Course report (c. 20 pages)
- Participation and contribution of the students during the course
- Software development and delivery

Notes:

The ISE project lab can also be credited as a **seminar** (if necessary).

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

Participation will be restricted to 15 students.

Participation in the lecture "Information Service Engineering" (summer semester) is required. There are video recordings on our youtube channel.

ISE Tutor Team:

- M. Sc. Russa Biswas
- M. Sc. Genet Asefa Gesese
- M. Sc. Oleksandra Bruns
- M. Sc. Yiyi Chen
- M. Sc. Mary Ann Tan
- B. Sc. Tabea Tietz

Literature

ISE video channel on youtube: https://www.youtube.com/channel/UCjkkhNSNuXrJpMYZoeSBw6Q/

T   5.9 Course: Advanced Lab Security, Usability and Society [T-WIWI-108439]

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104520 - Human Factors in Security and Privacy

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2612554	Practical lab Security, Usability and Society (Bachelor)	3 SWS	Practical course / 📱	Strufe, Mayer, Arias Cabarcos, Berens, Mossano, Beckmann
WT 21/22	2500024	Praktikum Security, Usability and Society (Master)	3 SWS	Practical course	Volkamer, Mayer, Ghiglieri , Aldag, Beckmann, Mossano
WT 21/22	2512554	Praktikum Security, Usability and Society (Bachelor)	3 SWS	Practical course	Volkamer, Mayer, Ghiglieri , Aldag, Beckmann, Mossano
Exams					
ST 2021	7900029	Practical lab Security, Usability and Society (Bachelor)			Volkamer
WT 21/22	7900116	Advanced Lab Security, Usability and Society (Bachelor)			Volkamer
WT 21/22	7900307	Advanced Lab Security, Usability and Society (Master)			Volkamer

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
The alternative exam assessment consists of:

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

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

Prerequisites
None

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

Annotation
The course is expected to be offered from winter term 2018/2019.

Contents:

In the course of the programming lab, changing topics from the field of Human Factors in Security und Privacy will be worked on.

Learning goals:

The student

- can apply the basics of information security
- is able to implement appropriate measures to achieve different protection goals
- can structure a software project in the field of information security
- can use the Human Centred Security and Privacy by Design technique to develop user-friendly software
- can explain and present technical facts and the results of the programming lab in oral and written form

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

V   Practical lab Security, Usability and Society (Bachelor)
2612554, SS 2021, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Online

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. This internship will be only in English. The kick-off, the presentations, and every written material to be graded must be in English. Communications with supervisors can be in German.
WiWi portal: https://portal.wiwi.kit.edu/ys/4628

Important dates:

Kick-off: 06.04.2021, 10:00-11:00 CET in Microsoft Teams - Link

Report + code submission : 07.09.2021, 23:59 CET

Presentation deadline : 20.09.2021, 23:59 CET

Presentation day: 24.09.2021, 09:00 CET

Topics:

Privacy Friendly apps

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

- Notes 2.0

Programming Usable Security Intervention

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

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

Designing Security User studies (online studies only)

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

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

Please, note that registration is not required to participate in the kick-off meeting.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

V **Praktikum Security, Usability and Society (Master)**
2500024, WS 21/22, 3 SWS, Language: German/English, Open in study portal
Practical course (P)

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on hte WiWi portal and send an email with your chosen topic, plus a back-up one, to melanie.volkamer@kit.edu . Topics are assigned first-come-first-served until all of them are filled. Topics in italics have been already assigned.

Important dates:

Kick-off: 04.10.2021, 10:00-11:00 CET in Microsoft Teams - Link

Report + code submission : 06.02.2022, 23:59 CET

Presentation deadline : 06.02.2022, 23:59 CET

Presentation day: 08.02.2022

Topics:

Privacy Friendly apps

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

- Notes 2.0

Programming Usable Security Intervention

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

- *Password Manager Enrolment Add-On*
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Cookie Consent Manager for Websites

Designing Security User studies (online studies only)

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

- How to display URLs to support people's ability to detect phishing (English)
- *Studying the Effect of Static vs. Dynamic Phishing Detection*
- *How effective are QR-scanners in helping users detecting phishing emails?*

Please, note that registration is not required to participate in the kick-off meeting.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

V	**Praktikum Security, Usability and Society (Bachelor)** 2512554, WS 21/22, 3 SWS, Language: German/English, Open in study portal	**Practical course (P)**

Content

The internship "Security, Usability and Society" will cover topics both of usable security and privacy programming, and how to conduct user studies. To reserve a place, please, register on hte WiWi portal and send an email with your chosen topic, plus a back-up one, to melanie.volkamer@kit.edu . Topics are assigned first-come-first-served until all of them are filled. Topics in italics have been already assigned.

Important dates:

Kick-off: 04.10.2021, 10:00-11:00 CET in Microsoft Teams - Link

Report + code submission : 06.02.2022, 23:59 CET

Presentation deadline : 06.02.2022, 23:59 CET

Presentation day: 08.02.2022

Topics:

Privacy Friendly apps

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

- *Notes 2.0*

Programming Usable Security Intervention

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

- *Password Manager Enrolment Add-On*
- Portfolio Graphical Recognition-Based Passwords with Gamepads
- Cookie Consent Manager for Websites

Designing Security User studies (online studies only)

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

- *How to display URLs to support people's ability to detect phishing (English)*
- Studying the Effect of Static vs. Dynamic Phishing Detection
- *How effective are QR-scanners in helping users detecting phishing emails?*

Please, note that registration is not required to participate in the kick-off meeting.

This event counts towards the KASTEL certificate. Further information on how to obtain the certificate can be found on the SECUSO website https://secuso.aifb.kit.edu/Studium_und_Lehre.php) .

T   5.10 Course: Advanced Machine Learning [T-WIWI-109921]

Responsible: Prof. Dr. Andreas Geyer-Schulz
                   Dr. Abdolreza Nazemi
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101470 - Data Science: Advanced CRM
                   M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540535	Advanced Machine Learning	2 SWS	Lecture / 📱	Nazemi
ST 2021	2540536	Exercise Advanced Machine Learning	1 SWS	Practice / 📱	Nazemi
Exams					
ST 2021	7900227	Advanced Machine Learning			Geyer-Schulz

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

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

V	**Advanced Machine Learning** 2540535, SS 2021, 2 SWS, Language: English, Open in study portal	Lecture (V) Online

Content

In recent years, the volume, variety, velocity, veracity, and variability of available data have increased due to improvements in computational and storage power. The rise of the Internet has made available large sets of data that allow us to use and merge them for different purposes. Data science helps us to extract knowledge from the continually-increasing large datasets. This course will introduce students to a wide range of machine learning and statistical techniques such as deep learning, LASSO, and support vector machine. You will get familiar with text mining, and the tools you need to analyze the various facets of data sets in practice. Students will learn theory and concepts with real data sets from different disciplines such as marketing, finance, and business.

<u>Tentative Course Outline:</u>

- Introduction
- Statistical Inference
- Shrinkage Methods
- Model Assessment and Selection
- Tree-based Machine Learning Algorithms
- Dimensionality Reduction
- Neural Networks and Deep Learning
- Natural Language Processing with Deep Learning
- Support Vector Machine

<u>Time of attendance</u>

- Attending the lecture: 13 x 90min = 19h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m

<u>The student will learn</u>

- A wide range of machine learning algorithms and their weaknesses.
- The fundamental issues and challenges: data, high-dimension, train, model selection, etc.
- How to imply machine learning algorithms for real-world applications.
- The fundamentals of deep learning, main research activities, and on-going research in this field.

Literature

- Alpaydin, E. (2014). Introduction to Machine Learning. Third Edition, MIT Press.
- De Prado, M. L. (2018). Advances in Financial Machine Learning. John Wiley & Sons.
- Goodfellow, I., Bengio, Y., and A. Courville (2017). Deep Learning. MIT Press. (online available)
- Hastie, T., Tibshirani, R., and J. Friedman (2009). Elements of Statistical Learning. Second Edition. Springer. (online available)
- Leskovec, J., Rajaraman, A., Ullman, J. D., (2014). Mining of Massive Datasets. Cambridge University Press. (online available)
- Witten, I. H., Eibe, F., Hall, M. A., Pal, C. J. (2016). Data Mining: Practical Machine Learning Tools and Techniques. Morgan Kaufmann.

T 5.11 Course: Advanced Machine Learning and Data Science [T-WIWI-111305]

Responsible:	Prof. Dr. Maxim Ulrich
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105659 - Advanced Machine Learning and Data Science

Type Examination of another type	Credits 9	Grading scale Grade to a third	Recurrence Each term	Version 1

Events					
ST 2021	2530357	Advanced Machine Learning and Data Science	4 SWS	Practical course / 🖥	Ulrich
WT 21/22	2530357	Advanced Machine Learning and Data Science	4 SWS	Practical course / 🖥	Ulrich

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

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

Annotation
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning. Please apply via the link: https://portal.wiwi.kit.edu/forms/form/fbv-ulrich-msc-project. The application will be accepted on a rolling basis.

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

V Advanced Machine Learning and Data Science
2530357, SS 2021, 4 SWS, Language: English, Open in study portal

Practical course (P)
Online

Content
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning.

Organizational issues
14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

V Advanced Machine Learning and Data Science
2530357, WS 21/22, 4 SWS, Language: English, Open in study portal

Practical course (P)
Online

Content
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning.

Organizational issues
14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

T   5.12 Course: Advanced Management Accounting [T-WIWI-102885]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Each winter term	2

Events					
WT 21/22	2579907	Advanced Management Accounting	4 SWS	Lecture	Wouters

Competence Certificate

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

Prerequisites

None.

Recommendation

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

Annotation

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

The course is compulsory and must be examined.

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

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

V	**Advanced Management Accounting** 2579907, WS 21/22, 4 SWS, Language: English, Open in study portal	**Lecture (V)**

Content

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

Inhalt:

- The course addresses several topics where management accounting is strongly related to marketing, finance, or organization and strategy, such as customer value propositions, financial performance measures, managing new product development, and technology investment decisions.

Learning objectives:

- Students will be able to consider advanced management accounting methods in an interdisciplinary way and to apply these to managerial decision-making problems in operations and innovation.
- They will also be able to identify relevant research results on such methods.

Examination:

- The assessment consists of an oral exam (30 min) taking place in the recess period (according to § 4 (2) No. 2 of the examination regulation).
- The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Required prior Courses:

- The course is compulsory and must be examined.

Recommendations:

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

Workload:

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

Literature

Literature is mostly made available via ILIAS.

T   5.13 Course: Advanced Management Accounting 2 [T-WIWI-110179]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	see Annotations	1

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

Prerequisites
None.

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

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

T 5.14 Course: Advanced Statistics [T-WIWI-103123]

Responsible: Prof. Dr. Oliver Grothe
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101637 - Analytics and Statistics

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2550552	Statistik für Fortgeschrittene	2 SWS	Lecture	Grothe
WT 21/22	2550553	Übung zu Statistik für Fortgeschrittene	2 SWS	Practice	Grothe, Rieger
Exams					
ST 2021	7900360	Advanced Statistics			Grothe

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

Prerequisites
None

Annotation
New course starting winter term 2015/2016

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

V	**Statistik für Fortgeschrittene** 2550552, WS 21/22, 2 SWS, Open in study portal	Lecture (V)

Literature
Skript zur Vorlesung

T   5.15 Course: Advanced Stochastic Optimization [T-WIWI-106548]

Responsible:	Prof. Dr. Steffen Rebennack
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Prerequisites

None.

T 5.16 Course: Advanced Topics in Economic Theory [T-WIWI-102609]

Responsible:	Prof. Dr. Kay Mitusch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101406 - Network Economics
	M-WIWI-101500 - Microeconomic Theory
	M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
ST 2021	2520527	Advanced Topics in Economic Theory	2 SWS	Lecture / 📱	Mitusch, Brumm
ST 2021	2520528	Übung zu Advanced Topics in Economic Theory	1 SWS	Practice / 📱	Pegorari
Exams					
ST 2021	00227	Advanced Topics in Economic Theory			Mitusch, Brumm
ST 2021	7900329	Advanced Topics in Economic Theory			Mitusch, Brumm

Legend: 📱 Online, ✼ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written exam (60min) (following §4(2), 1 of the examination regulation) at the end of the lecture period or at the beginning of the following semester.

Prerequisites

None

Recommendation

This course is designed for advanced Master students with a strong interest in economic theory and mathematical models. Bachelor students who would like to participate are free to do so, but should be aware that the level is much more advanced than in other courses of their curriculum.

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

V	**Advanced Topics in Economic Theory**	**Lecture (V)**
	2520527, SS 2021, 2 SWS, Language: English, Open in study portal	**Online**

Literature

Die Veranstaltung wird in englischer Sprache angeboten:

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

T 5.17 Course: Algorithm Engineering [T-INFO-101332]

Responsible: Prof. Dr. Peter Sanders
                   Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: M-INFO-100795 - Algorithm Engineering
                   M-INFO-101199 - Advanced Algorithms: Design and Analysis
                   M-INFO-101200 - Advanced Algorithms: Engineering and Applications

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2021	2400051	Algorithm Engineering	2/1 SWS	Lecture / 🖥	Sanders, Witt, Seemaier
Exams					
ST 2021	75514	Algorithm Engineering			Sanders

Legend: 🖥 Online, ⬡ Blended (On-Site/Online), 🞄 On-Site, ✗ Cancelled

T 5.18 Course: Algorithmic Methods for Hard Optimization Problems [T-INFO-103334]

Responsible: Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: M-INFO-101199 - Advanced Algorithms: Design and Analysis
M-INFO-101200 - Advanced Algorithms: Engineering and Applications
M-INFO-101237 - Algorithmic Methods for Hard Optimization Problems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

T 5.19 Course: Algorithmic Methods for Network Analysis [T-INFO-104759]

Responsible: Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: M-INFO-102400 - Algorithmic Methods for Network Analysis

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
ST 2021	2400018	Algorithmic Methods for Network Analysis	2+1 SWS	Lecture / Practice (/ 📱	Ueckerdt, Hamann
Exams					
ST 2021	7500319	Algorithmic Methods for Network Analysis			Ueckerdt

Legend: 📱 Online, ⚛ Blended (On-Site/Online), ● On-Site, ✘ Cancelled

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

V Algorithmic Methods for Network Analysis
2400018, SS 2021, 2+1 SWS, Language: German, Open in study portal

**Lecture / Practice (VÜ)
Online**

Content
150 h

Literature
Brandes, Erlebach: Network Analysis - Methodological Foundations. Springer, 2005.

Newman: Networks. An Introduction. Oxford University Press, 2010.

| **T** | **5.20 Course: Algorithms for Routing [T-INFO-100002]** |

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: M-INFO-100031 - Algorithms for Routing
M-INFO-101199 - Advanced Algorithms: Design and Analysis
M-INFO-101200 - Advanced Algorithms: Engineering and Applications

| **Type** Oral examination | **Credits** 5 | **Grading scale** Grade to a third | **Recurrence** Each summer term | **Version** 2 |

Events					
ST 2021	2424638	Algorithmen für Routenplanung (mit Übungen)	3 SWS	Lecture / Practice (/	Buchhold, Zeitz, Sauer, Ueckerdt
Exams					
ST 2021	7500019	Algorithms for Routing			Ueckerdt

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

T 5.21 Course: Algorithms for Visualization of Graphs [T-INFO-104390]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: M-INFO-101199 - Advanced Algorithms: Design and Analysis
                   M-INFO-101200 - Advanced Algorithms: Engineering and Applications
                   M-INFO-102094 - Algorithms for Visualization of Graphs

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
WT 21/22	2424118	Algorithmen zur Visualisierung von Graphen	2+1 SWS	Lecture / Practice (/ ❖	Wagner, Ueckerdt, Jungeblut

Legend: ▯ Online, ❖ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

T 5.22 Course: Algorithms II [T-INFO-102020]

Responsible: Prof. Dr. Peter Sanders
Organisation: KIT Department of Informatics
Part of: M-INFO-101173 - Algorithms II

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 21/22	24079	Algorithms II	4 SWS	Lecture	Sanders, Seemaier, Lehmann
Exams					
ST 2021	7500464	Algorithms II			Sanders

T   5.23 Course: Algorithms in Cellular Automata [T-INFO-101334]

Responsible:	Thomas Worsch
Organisation:	KIT Department of Informatics
Part of:	M-INFO-100797 - Algorithms in Cellular Automata
	M-INFO-101199 - Advanced Algorithms: Design and Analysis

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2021	24622	Algorithms for Cellular Automata	3 SWS	Lecture / ▯	Worsch, Vollmar
Exams					
ST 2021	75400001	Algorithms in Cellular Automata			Worsch

Legend: ▯ Online, ⌘ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

T 5.24 Course: Analyzing and Evaluating Innovation Processes [T-WIWI-108774]

Responsible:	Dr. Daniela Beyer
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
ST 2021	2545108	Innovationsprozesse analysieren & evaluieren	2 SWS	Seminar / 📱	Beyer
Exams					
ST 2021	7900017	Innovationsprozesse analysieren & evaluieren			Weissenberger-Eibl

Legend: 📱 Online, ⚃ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

Non exam assessment (following §4(2) 3 of the examination regulation).

Innovation plan (exposé) (20%), Guided interviews/ quantitative survey (20%), presentation of results (20%), seminar paper (about 5 pages per person) (40%).

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management is recommended.

T 5.25 Course: Applied Econometrics [T-WIWI-111388]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Irregular	Version 1

Events					
WT 21/22	2520020	Applied Econometrics	2 SWS	Lecture	Krüger
WT 21/22	2520021	Tutorial in Applied Econometrics	2 SWS	Practice	Krüger, Koster

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

Prerequisites
None

Annotation
The course is not offered regularly.

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

V Applied Econometrics
2520020, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Content:

- Causal effects and prediction in the linear model, instrumental variables, analysis of natural experiments

- Theoretical exercises with computer-based illustrations

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Independent Study: 105 hours

Literature
Hansen (2021): Econometrics. Online textbook, University of Wisconsin.

Angrist und Pischke (2009): Mostly Harmless Econometrics. Princeton University Press, 2009.

Weitere Literatur wird in der Vorlesung bekanntgegeben.

T   5.26 Course: Artificial Intelligence in Service Systems [T-WIWI-108715]

Responsible:	Prof. Dr. Gerhard Satzger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101448 - Service Management
	M-WIWI-101506 - Service Analytics
	M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2595650	Artificial Intelligence in Service Systems	1,5 SWS	Lecture / 🖥	Kühl, Vössing
Exams					
ST 2021	7900240	Artificial Intelligence in Service Systems			Satzger
WT 21/22	7900321	Artificial Intelligence in Service Systems (16.03.22) - Hauptklausur			Satzger

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min). Successful completion of the exercises is a prerequisite for admission to the written exam.

Prerequisites
None

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

V   Artificial Intelligence in Service Systems
2595650, WS 21/22, 1,5 SWS, Language: English, Open in study portal   **Lecture (V)**
      Online

Content
Artificial Intelligence (AI) and the application of machine learning is becoming more and more popular to solve relevant business challenges — both within isolated entities but also within co-creating systems (like value chains). However, it is not only essential to be familiar with precise algorithms but rather a general understanding of the necessary steps with a holistic view—from real-world challenges to the successful deployment of an AI-based solution. As part of this course, we teach the complete lifecycle of an AI project focusing on supervised machine learning challenges. We do so by also introducing the use of Python and the required packages like scikit-learn with exemplary data and use cases. We then take this knowledge to the more complex case of service systems with different entities (e.g., companies) who interact with each other and show possibilities on how to derive holistic insights. Apart from the technical aspects necessary when developing AI within service systems, we also shed light on the collaboration of humans and AI in such systems (e.g., with the support of XAI), topics of ethics and bias in AI, as well as AI's capabilities on being creative.

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

Organizational issues
Diese Veranstaltung findet mittwochs von 10:00 - 11.30 Uhr online statt.

Literature

- Baier, L., Kühl, N., & Satzger, G. (2019). How to cope with change?-preserving validity of predictive services over time. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Cawley, G. C., & Talbot, N. L. (2010). On over-fitting in model selection and subsequent selection bias in performance evaluation. The Journal of Machine Learning Research, 11, 2079-2107.
- Fink, O., Netland, T., & Feuerriegel, S. (2021). Artificial intelligence across company borders. arXiv preprint arXiv:2107.03912.
- Gama, J., Žliobaitė, I., Bifet, A., Pechenizkiy, M., & Bouchachia, A. (2014). A survey on concept drift adaptation. ACM computing surveys (CSUR), 46(4), 1-37.
- Hemmer, P., Schemmer, M., Vössing, M., & Kühl, N. (2021). Human-AI Complementarity in Hybrid Intelligence Systems: A Structured Literature Review. PACIS 2021 Proceedings.
- Hirt, R., & Kühl, N. (2018). Cognition in the Era of Smart Service Systems: Inter-organizational Analytics through Meta and Transfer Learning. In 39th International Conference on Information Systems, ICIS 2018; San Francisco Marriott MarquisSan Francisco; United States; 13 December 2018 through 16 December 2018.
- Kühl, N., Goutier, M., Hirt, R., & Satzger, G. (2019, January). Machine Learning in Artificial Intelligence: Towards a Common Understanding. In Proceedings of the 52nd Hawaii International Conference on System Sciences.
- Kühl, N., Hirt, R., Baier, L., Schmitz, B., & Satzger, G. (2021). How to Conduct Rigorous Supervised Machine Learning in Information Systems Research: The Supervised Machine Learning Report Card. Communications of the Association for Information Systems, 48(1), 46.
- Maleshkova, M., Kühl, N., & Jussen, P. (Eds.). (2020). Smart Service Management: Design Guidelines and Best Practices. Springer Nature.
- Martin, D., Hirt, R., & Kühl, N. (2019). Service Systems, Smart Service Systems and Cyber-Physical Systems—What's the difference? Towards a Unified Terminology. 14. Internationale Tagung Wirtschaftsinformatik 2019 (WI 2019), Siegen, Germany, February 24-27.
- Mehrabi, N., Morstatter, F., Saxena, N., Lerman, K., & Galstyan, A. (2019). A survey on bias and fairness in machine learning. arXiv preprint arXiv:1908.09635.
- Müller, V. C., & Bostrom, N. (2016). Future progress in artificial intelligence: A survey of expert opinion. In Fundamental issues of artificial intelligence (pp. 555-572). Springer, Cham.
- Pan, S. J., & Yang, Q. (2009). A survey on transfer learning. IEEE Transactions on knowledge and data engineering, 22(10), 1345-1359.
- Schöffer, J., Machowski, Y., & Kühl, N. (2021). A Study on Fairness and Trust Perceptions in Automated Decision Making. In Joint Proceedings of the ACM IUI 2021 Workshops, April 13–17, 2021, College Station, USA.
- Shmueli, G., & Koppius, O. R. (2011). Predictive analytics in information systems research. MIS quarterly, 553-572.
- Zahn, M. V., Feuerriegel, S., & Kühl, N. (2021). The cost of fairness in AI: Evidence from e-commerce. Business & information systems engineering.

T   5.27 Course: Artificial Intelligence in Service Systems - Applications in Computer Vision [T-WIWI-111219]

Responsible:	Prof. Dr. Gerhard Satzger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101448 - Service Management
	M-WIWI-101470 - Data Science: Advanced CRM
	M-WIWI-101506 - Service Analytics
	M-WIWI-103117 - Data Science: Data-Driven Information Systems
	M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2595501	Artificial Intelligence in Service Systems - Applications in Computer Vision	3 SWS	Lecture / 🖥	Satzger, Schmitz

Exams			
ST 2021	7900305	Artificial Intelligence in Service Systems - Applications in Computer Vision	Satzger
WT 21/22	7900025	Artificial Intelligence in Service Systems - Applications in Computer Vision	Satzger

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment.

Annotation
This course is admission restricted (see http://dsi.iism.kit.edu).

The course replaces "Service Analytics A" as of summer semester 2021.

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

V	**Artificial Intelligence in Service Systems - Applications in Computer Vision** 2595501, SS 2021, 3 SWS, Language: English, Open in study portal	Lecture (V) **Online**

Content
---We renamed this course from "Service Analytics A" to "Artificial Intelligence in Service Systems - Applications in Computer Vision ---

Learning objectives
This course teaches students how to apply machine learning concepts to develop predictive models that form the basis of many innovative service offerings and business models today. Using a selected use case each term, students learn the foundations of selected algorithms and development frameworks and apply them to build a functioning prototype of an analytics-based service. Students will become proficient in writing code in Python to implement a data science use case over the course period.

Description

Data-driven services have become a key differentiator for many companies. Their development is based on the increasing availability of structured and unstructured data and their analysis through methods from data science and machine learning. Examples comprise highly innovative service offerings based on technologies such as natural language processing, computer vision or reinforcement learning.

Using a selected use case, this lecture will teach students how to develop analytics-based services in an applied setting. We teach the theoretical foundations of selected machine learning algorithms (e.g., convolutional neural networks) and development concepts (e.g., developing modeling, training, inference pipelines) and teach how to apply these concepts to build a functioning prototype of an analytics-based service (e.g., inference running on a device). During the course, students will work in small groups to apply the learned concepts in the programming language Python using packages such as Keras, Tensorflow or Scikit-Learn.

Recommendations

The course is aimed at students in the Master's program with basic knowledge in statistics and applied programming in Python. Knowledge from the lecture Artificial Intelligence in Service Systems may be beneficial.

Additional information

Due to the practical group sessions in the course, the number of participants is limited. The offiicial application period in the WiWi portal is over. However, there is a limited number of remaining spaces. In case you are motivated to participate and have previous experience in the fields of Python Programming and Machine Learning please send a mail to jannis.walk∂kit.edu until Friday, 9th of April 2021.
Your mail has to contain:
- A short letter of motivation, ideally (but not necessarily) with reference to previous experience in programming and data science (maximum one page)
- Transcript of records (for Bachelor and Master if available)

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

Literature

- Friedman, Jerome, Trevor Hastie, and Robert Tibshirani. *The elements of statistical learning*. Vol. 1. No. 10. New York: Springer series in statistics, 2001.
- Russell, S., & Norvig, P. (2002). Artificial intelligence: a modern approach.
- Goldstein, E. B. (2009). Sensation and perception. 8th. *Belmont: Wadsworth, Cengage Learning, 496*(3).
- Gonzalez, Rafael C., Woods, Richard E. (2018). *Digital Image Processing*. 4th Pearson India
- Szeliski, R. (2010). *Computer vision: algorithms and applications*. Springer Science & Business Media.
- Redmon, J., Divvala, S., Girshick, R., & Farhadi, A. (2016). You only look once: Unified, real-time object detection. In *Proceedings of the IEEE conference on computer vision and pattern recognition*(pp. 779-788).
- Sermanet, P., Chintala, S., & LeCun, Y. (2012, November). Convolutional neural networks applied to house numbers digit classification. In *Proceedings of the 21st International Conference on Pattern Recognition (ICPR2012)*(pp. 3288-3291). IEEE.
- Ren, S., He, K., Girshick, R., & Sun, J. (2015). Faster r-cnn: Towards real-time object detection with region proposal networks. In *Advances in neural information processing systems*(pp. 91-99).
- Girshick, R., Donahue, J., Darrell, T., & Malik, J. (2014). Rich feature hierarchies for accurate object detection and semantic segmentation. In *Proceedings of the IEEE conference on computer vision and pattern recognition*(pp. 580-587).
- Krizhevsky, A., Sutskever, I., & Hinton, G. E. (2012). Imagenet classification with deep convolutional neural networks. In *Advances in neural information processing systems*(pp. 1097-1105).

T	**5.28 Course: Asset Pricing [T-WIWI-102647]**

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

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101480 - Finance 3
                   M-WIWI-101482 - Finance 1
                   M-WIWI-101483 - Finance 2
                   M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2530555	Asset Pricing	2 SWS	Lecture / 📱	Uhrig-Homburg
ST 2021	2530556	Übung zu Asset Pricing	1 SWS	Practice / 📱	Uhrig-Homburg, Reichenbacher
Exams					
ST 2021	7900110	Asset Pricing			Uhrig-Homburg, Thimme
WT 21/22	7900056	Asset Pricing			Uhrig-Homburg

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

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

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

V	**Asset Pricing**	**Lecture (V)**
	2530555, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Organizational issues
Veranstaltungskonzept umfasst vollständige Aufzeichnungen von Vorlesung und Übung. Ergänzend bieten wir zweiwöchig freiwillige Live-Fragerunden zum fachlichen und organisatorischen Austausch an.

Literature
Basisliteratur

- Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.

Zur Wiederholung/Vertiefung

- Investments and Portfolio Management / Bodie, Z., Kane, A., Marcus, A.J. - 9. ed., McGraw-Hill, 2011.
- The econometrics of financial markets / Campbell, J.Y., Lo, A.W., MacKinlay, A.C. - 2. printing, with corrections, Princeton Univ. Press, 1997.

T 5.29 Course: Asymmetric Encryption Schemes [T-INFO-101260]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

T 5.30 Course: Auction Theory [T-WIWI-102613]

Responsible: Prof. Dr. Karl-Martin Ehrhart
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2520408	Auktionstheorie	2 SWS	Lecture	Ehrhart
WT 21/22	2520409	Übungen zu Auktionstheorie	1 SWS	Practice	Ehrhart
Exams					
ST 2021	7900255	Auction Theory			Ehrhart
WT 21/22	7900216	Auction Theory			Ehrhart

Competence Certificate

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

The exam is offered each semester.

Prerequisites

None

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

V Auktionstheorie
2520408, WS 21/22, 2 SWS, Open in study portal

Lecture (V)

Literature

- Ehrhart , K.-M. und S. Seifert: Auktionstheorie, Skript zur Vorlesung, KIT, 2011
- Krishna, V.: Auction Theory, Academic Press, Second Edition, 2010
- Milgrom, P.: Putting Auction Theory to Work, Cambridge University Press, 2004
- Ausubel, L.M. und P. Cramton: Demand Reduction and Inefficiency in Multi-Unit Auctions, University of Maryland, 1999

T   5.31 Course: Automated Planning and Scheduling [T-INFO-109085]

Responsible:	Prof. Dr. Peter Sanders
Organisation:	KIT Department of Informatics
Part of:	M-INFO-104447 - Automated Planning and Scheduling

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 21/22	2400026	Nicht im WS 2021/22 - Automated Planning and Scheduling	2/1 SWS	Lecture / Practice (	Balyo, Schreiber, Sanders

T 5.32 Course: Automated Visual Inspection and Image Processing [T-INFO-101363]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: M-INFO-100826 - Automated Visual Inspection and Image Processing
M-INFO-101239 - Machine Vision

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	2

Events					
WT 21/22	24169	Automated Visual Inspection and Image Processing	4 SWS	Lecture	Beyerer
Exams					
ST 2021	7500003	Automated Visual Inspection and Image Processing			Beyerer
WT 21/22	7500008	Automated Visual Inspection and Image Processing			Beyerer

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

V Automated Visual Inspection and Image Processing
24169, WS 21/22, 4 SWS, Language: German, Open in study portal

Lecture (V)

Content
Topics covered:

- sensors and concepts for image acquisition
- light and colour
- image signals (system theory, Fourier transformation, stochastic processes)
- excursion to wave optics
- pre-processing and image enhancement
- image restoration
- segmentation
- morphological image processing
- texture analysis
- detection
- image pyramids, multi scale analysis and wavelet-transform

Educational objective:

- Students have a sound knowledge regarding the basic concepts and methods of image processing (pre-processing and image enhancement, image restoration, image segmentation, morphological filtering, texture analysis, detection, image pyramids, multi-scale analysis and the wavelet transform)
- Students are in the position to work out and to evaluate solution concepts for problems of automated visual inspection
- Students have a sound knowledge of the different sensors and methods for the acquisition of image data as well as of the relevant optical principles
- Students know different concepts to describe image data and they know the essential system theoretical concepts and interrelations

Organizational issues
Die Erfolgskontrolle wird in der Modulbeschreibung erläutert.

Empfehlungen:

Grundkenntnisse der Optik und der Signalverarbeitung sind hilfreich.

Literature
Weiterführende Literatur

- R. C. Gonzalez und R. E. Woods, Digital Image Processing, Prentice-Hall, Englewood Cliffs, New Jersey, 2002
- B. Jähne, Digitale Bildverarbeitung, Springer, Berlin, 2002

T 5.33 Course: Basics of German Company Tax Law and Tax Planning [T-WIWI-108711]

Responsible:	Gerd Gutekunst
	Prof. Dr. Berthold Wigger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 21/22	2560134	Basics of German Company Tax Law and Tax Planning	3 SWS	Lecture / 📱	Wigger, Gutekunst
Exams					
ST 2021	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger
WT 21/22	790unbe	Basics of German Company Tax Law and Tax Planning			Wigger

Legend: 📱 Online, ⬡ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5 h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Knowledge of the collection of public revenues is assumed. Therefore it is recommended to attend the course "Öffentliche Einnahmen" beforehand.

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

V	**Basics of German Company Tax Law and Tax Planning**	Lecture (V)
	2560134, WS 21/22, 3 SWS, Language: German, Open in study portal	Online

Content
Workload:

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

T 5.34 Course: Biologically Inspired Robots [T-INFO-101351]

Responsible: Prof. Dr.-Ing. Rüdiger Dillmann
                    Dr.-Ing. Arne Rönnau
Organisation: KIT Department of Informatics
Part of: M-INFO-101251 - Autonomous Robotics

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	24619	Biologisch Motivierte Robotersysteme	2 SWS	Lecture / 🖥	Rönnau
Exams					
ST 2021	7500237	Biologically Inspired Robot			Rönnau

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

T	**5.35 Course: Biometric Systems for Person Identification [T-INFO-101297]**

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation: KIT Department of Informatics
Part of: M-INFO-101239 - Machine Vision

Type	Credits	Grading scale	Version
Oral examination	3	Grade to a third	1

Events					
ST 2021	2403011	Biometric Systems for Person Identification	2 SWS	Lecture / 📱	Sarfraz
Exams					
WT 21/22	7500043	Biometric Systems for Person Identification			Stiefelhagen

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

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

V	**Biometric Systems for Person Identification** 2403011, SS 2021, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **Online**

Content
Biometrics deals with the science of recognizing and identifying humans based on their biometrics traits, such as finger prints, face, iris, gait etc. With the increasing demands put on security and surveillance e.g. safer access control, border control/passports and identifying criminals /law enforcement, biometrics becomes more and more essential and technologies are being developed to solve many issues in this demanding area of research. In this course, the students will learn the fundamental concepts of underlying biometrics technologies, understanding of various techniques for different topics/technologies used in biometrics.

The topics include
- Introduction: Biometrics acquisitions and image processing, basic introduction to the area of computer vision/machine learning applied to biometrics
- Biometrics system: requirements, enrollment, identification/verification, performance metrics
- Biometrics technologies: Overview of different biometrics technologies
- Finger print recognition: image enhancement, state-of-the art techniques, challenges
- Iris recognition: image acquisitions, feature extraction, state-of-the-art techniques, challenges
- Face recognition: introduction, current methods, applications
- Palm print recognition: current methods
- Gait recognition: emerging methods
- Multi-Biometrics: multiple modes of biometrics, fusion strategies
- Risk analysis: attacks, liveness detection, fraud prevention

T	5.36 Course: Blockchains & Cryptofinance [T-WIWI-108880]

Responsible: Dr. Philipp Schuster
Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101409 - Electronic Markets
M-WIWI-101446 - Market Engineering
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Exams				
ST 2021	7900260	Blockchains & Cryptofinance (second attempt only)		Uhrig-Homburg

Competence Certificate
The examination is offered for the last time in winter semester 20/21 for first-time writers and then again for second attempts. The assessment consists of a written exam (75 min).
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

Recommendation
None

Annotation
The lecture is currently not offered.

T	**5.37 Course: Bond Markets [T-WIWI-110995]**

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

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2530560	Bond Markets	3 SWS	Lecture / Practice (	Uhrig-Homburg, Müller
Exams					
ST 2021	7900280	Bond Markets			Uhrig-Homburg
WT 21/22	7900311	Bond Markets			Uhrig-Homburg

Competence Certificate

The assessment consists of a written exam (75min.) A bonus can be earned through successful participation in the tutorial sessions. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Depending on further pandemic developments, the examination will be offered as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Annotation

This course will be held in English.

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

V	**Bond Markets** 2530560, WS 21/22, 3 SWS, Language: English, Open in study portal	**Lecture / Practice (VÜ)**

Content

The lecture "Bond Markets" deals with the national and international bond markets, which are an important source of financing for companies, as well as for the public sector. After an overview of the most important bond markets, different yield definitions are discussed. Based on this, the concept of the yield curve is presented. In addition, the theoretical and empirical relationships between ratings, default probabilities and spreads are analyzed. The focus will then be on questions regarding the valuation, measurement, management and control of credit risks.

The total workload for this course is approximately 135 hours (4.5 credits).

The assessment consists of a written exam (75min.) (according to §4(2), 1 SPO). A bonus can be earned through successful participation in the tutorial sessions. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one level (0.3 or 0.4). The examination is offered in each semester and can be repeated at any regular examination date.

Students deepen their knowledge of national and international bond markets. They gain knowledge of the traded instruments and their key figures for describing default risk such as ratings, default probabilities or credit spreads.

Organizational issues

Blockveranstaltung: Do 14:00-19:00 Uhr, Fr 9:45-17:15 Uhr

21./22.10., 04./05.11., 18./19.11.

T 5.38 Course: Bond Markets - Models & Derivatives [T-WIWI-110997]

Responsible: Prof. Dr. Marliese Uhrig-Homburg

Organisation: KIT Department of Economics and Management

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

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2530565	Bond Markets - Models & Derivatives	2 SWS	Lecture / Practice (	Grauer, Uhrig-Homburg
Exams					
WT 21/22	7900318	Bond Markets - Models & Derivatives			Uhrig-Homburg

Competence Certificate

The assessment of success consists in equal parts of a written thesis and an oral exam including a discussion of one's own work. The main examination is offered once a year, re-examinations every semester.

Recommendation

Knowledge of "Bond Markets" and "Derivatives" courses is very helpful.

Annotation

This course will be held in English.

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

V Bond Markets - Models & Derivatives
2530565, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture / Practice (VÜ)

Content

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

Organizational issues

Blockveranstaltung, Kickoff am 03.12.21, Präsentation am 11.02.22

T 5.39 Course: Bond Markets - Tools & Applications [T-WIWI-110996]

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

Type Examination of another type	**Credits** 1,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2530562	Bond Markets - Tools & Applications	1 SWS	Block	Uhrig-Homburg, Grauer
Exams					
WT 21/22	7900317	Bond Markets - Tools & Applications			Uhrig-Homburg

Competence Certificate

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

Recommendation

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

Annotation

This course will be held in English.

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

V Bond Markets - Tools & Applications
2530562, WS 21/22, 1 SWS, Language: English, Open in study portal

Block (B)

Content

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

Organizational issues

Blockveranstaltung, Kickoff am 21./22.10.21 in der Blockveranstaltung Bond Markets (Ort tba), Präsentation am 03.12.21

Seminarraum 320 Geb. 09.21

T   5.40 Course: Building Intelligent and Robo-Adviced Portfolios [T-WIWI-106442]

Responsible:	Prof. Dr. Maxim Ulrich
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103247 - Intelligent Risk and Investment Advisory

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Competence Certificate

The exam will be cancelled for the winter semester 2019/2020.

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.

Details of the grade formation will be announced at the beginning of the event.

Prerequisites

None.

Recommendation

Good skills in applied math modeling (differential equations).

Annotation

The course is not offered regularly.

T 5.41 Course: Business Administration in Information Engineering and Management [T-WIWI-102886]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101443 - Information Engineering and Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each summer term	1

Competence Certificate
The lecture is no longer offered.

Prerequisites
None

Recommendation
Basic knowledge from Operations Research (linear programming) and from decision theory are expected.

T   5.42 Course: Business Data Analytics: Application and Tools [T-WIWI-109863]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103117 - Data Science: Data-Driven Information Systems
	M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2540466	Business Data Analytics: Application and Tools	2 SWS	Lecture / 🖳	Dann, Grote, Stoeckel
ST 2021	2540467	Excercise Business Data Analytics: Application and Tools	1 SWS	Practice / 🖳	Badewitz, Grote, Sterk
Exams					
ST 2021	7900183	Business Data Analytics: Application and Tools			Weinhardt
ST 2021	7900189	Business Data Analytics: Application and Tools			Weinhardt

Legend: 🖳 Online, ✸ Blended (On-Site/Online), ◆ On-Site, ✗ Cancelled

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

Prerequisites
None

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

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

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

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

T 5.43 Course: Business Data Strategy [T-WIWI-106187]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2540484	Business Data Strategy	2 SWS	Lecture	Weinhardt, Dinther
WT 21/22	2540485	Übung zu Business Data Strategy	1 SWS	Practice	Weinhardt, Badewitz

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulationand an alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. The grade isdetermined by 2/3 through the written exam and by 1/3 through the alternative exam assessment (e.g., presentation).

Prerequisites

None

Recommendation

Students should be familiar with basic concepts of business organisations, information systems, and programming. However, all material will be introduced, so no formal pre-conditions are applied.

Annotation

Limited number of participants.

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

V Business Data Strategy
2540484, WS 21/22, 2 SWS, Language: English, Open in study portal
Lecture (V)

Content

With new methods for capturing and using different types of data and industry's recognition that society's use of data is less than optimal, the need for comprehensive strategies is more important than ever before. Advances in cybersecurity and information sharing and the use of data in its raw form for decision making all add to the complexity of integrated processes, ownership, stewardship, and sharing. The life cycle of data in its entirety spans the infrastructure, system design, development, integration, and implementation of information-enabling solutions. This lecture focuses on teaching about these dynamics and tools to comprehend and manage them in organisation contexts. Given the increasing size and complexity of data, methods for the transformation and structured preparation are an important tool in the process of sense–making. Modern software solutions and programming languages provide frameworks for such tasks that form another part of this course ranging from conceptual systems modelling to data manipulation to automated generation of HTML reports and web-applications.

Organizational issues
Application/Registration

Attendance will be limited to 20-25 participants. Application/registration is therefore preliminary. After the application deadline has passed, positions will be allocated, based on evaluation of the previous study records. Applications are accepted only through the Wiwi-Portal: https://portal.wiwi.kit.edu/ys/5254

Anmeldung

Die Teilnehmeranzahl ist begrenzt (ca. 20-25 Plätze). Eine Anmeldung erfolgt deshalb zunächst unter Vorbehalt. Nach Ablauf der Anmeldefrist werden die Plätze zur Teilnahme, nach Einsicht der Vorleistungen im Studium vergeben. Die Anmeldung/Bewerbung erfolgt ausschließlich über das Wiwi-Portal: https://portal.wiwi.kit.edu/ys/5254

T 5.44 Course: Business Dynamics [T-WIWI-102762]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
	Dr Paul Glenn
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101409 - Electronic Markets
	M-WIWI-101470 - Data Science: Advanced CRM
	M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2540531	Business Dynamics	2 SWS	Lecture	Geyer-Schulz, Glenn
WT 21/22	2540532	Exercise Business Dynamics	1 SWS	Practice	Geyer-Schulz, Glenn
Exams					
ST 2021	7900317	Business Dynamics (Nachklausur WS 2020/2021)			Geyer-Schulz

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

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

V Business Dynamics
2540531, WS 21/22, 2 SWS, Language: German, Open in study portal

Lecture (V)

Literature
John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

T 5.45 Course: Business Intelligence Systems [T-WIWI-105777]

Responsible:	Prof. Dr. Alexander Mädche Mario Nadj Dr. Peyman Toreini
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101506 - Service Analytics M-WIWI-101510 - Cross-Functional Management Accounting M-WIWI-103117 - Data Science: Data-Driven Information Systems M-WIWI-104068 - Information Systems in Organizations

Type Examination of another type	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 2

Events					
WT 21/22	2540422	Business Intelligence Systems	3 SWS	Lecture	Mädche, Nadj
Exams					
ST 2021	7900149	Business Intelligence Systems			Mädche
WT 21/22	7900224	Business Intelligence Systems			Mädche

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
Basic knowledge on database systems is helpful.

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

V	**Business Intelligence Systems** 2540422, WS 21/22, 3 SWS, Language: English, Open in study portal	**Lecture (V)**

Content

In most modern enterprises, Business Intelligence & Analytics (BI&A) Systems represent a core enabler of decision-making in that they are supplying up-to-date and accurate information about all relevant aspects of a company's planning and operations: from stock levels to sales volumes, from process cycle times to key indicators of corporate performance. Modern BI&A systems leverage beyond reporting and dashboards also advanced analytical functions. Thus, today they also play a major role in enabling data-driven products and services. The aim of this course is to introduce theoretical foundations, concepts, tools, and current practice of BI&A Systems from a managerial and technical perspective.

The course is complemented with an engineering capstone project, where students work in a team with real-world use cases and data in order to create running Business intelligence & Analytics system prototypes.

Learning objectives

- Understand the theoretical foundations of key Business Intelligence & Analytics concepts supporting decision-making
- Explore key capabilities of state-of-the-art Business Intelligence & Analytics Systems
- Learn how to successfully implement and run Business Intelligence & Analytics Systems from multiple perspectives, e.g. architecture, data management, consumption, analytics
- Get hands-on experience by working with Business Intelligence & Analytics Systems with real-world use cases and data

Prerequisites

This course is limited to a capacity of 50 places. The capacity limitation is due to the attractive format of the accompanying engineering capstone project. Strong analytic abilities and profound skills in SQL as wells as Python and/or R are required. Students have to apply with their CV and transcript of records.

Literature

- Turban, E., Aronson, J., Liang T.-P., Sharda, R. 2008. "Decision Support and Business Intelligence Systems".
- Watson, H. J. 2014. "Tutorial: Big Data Analytics: Concepts, Technologies, and Applications," Communications of the Association for Information Systems (34), p. 24.
- Arnott, D., and Pervan, G. 2014. "A critical analysis of decision support systems research revisited: The rise of design science," Journal of Information Technology (29:4), Nature Publishing Group, pp. 269–293 (doi: 10.1057/jit.2014.16).
- Carlo, V. (2009). "Business intelligence: data mining and optimization for decision making". Editorial John Wiley and Sons, 308-317.
- Chen, H., Chiang, R. H. L, and Storey, V. C. 2012. „Business Intelligence and Analytics: From Big Data to Big Impact," MIS Quarterly (36:4), pp. 1165-1188.
- Davenport, T. 2014. Big Data @ Work, Boston, MA: Harvard Business Review.
- Economist Intelligence Unit. 2015 "Big data evolution: Forging new corporate capabilities for the long term"
- Power, D. J. 2008. "Decision Support Systems: A Historical Overview," Handbook on Decision Support Systems, pp. 121–140 (doi: 10.1007/978-3-540-48713-5_7).
- Sharma, R., Mithras, S., and Kankanhalli, A. 2014. „Transforming decision-making processes: a research agenda for understanding the impact of business analytics on organisations," European Journal of Information Systems (23:4), pp. 433-441.
- Silver, M. S. 1991. "Decisional Guidance for Computer-Based Decision Support," MIS Quarterly (15:1), pp. 105-122.

Further literature will be made available in the lecture.

T   5.46 Course: Business Models in the Internet: Planning and Implementation [T-WIWI-102639]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101410 - Business & Service Engineering
	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-102806 - Service Innovation, Design & Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2540456	Internet Business Models	2 SWS	Lecture / 📱	Huber
ST 2021	2540457	Übungen zu Geschäftsmodelle im Internet: Planung und Umsetzung	1 SWS	Practice / 📱	Richter, Huber, Fegert
Exams					
ST 2021	7910454	Business Models in the Internet: Planning and Implementation			Weinhardt
ST 2021	7979234	Business Models in the Internet: Planning and Implementation			Weinhardt

Legend: 📱 Online, ⚙️ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

Please note that in the summer semester 2020 the exam will only be offered to students who have completed the semester performance but have not yet taken the exam. From summer semester 2021 the exam will be offered again regularly.

Success is monitored through ongoing elaborations and presentations of tasks and a written exam (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Successful participation in the excercises is a prerequisite for admission to the written examination.

Prerequisites
None

Recommendation
None

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

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

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

Lecture (V)
Online

Literature
Wird in der Vorlesung bekannt gegeben.

T 5.47 Course: Business Planning [T-WIWI-102865]

Responsible:	Prof. Dr. Orestis Terzidis
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2021	2545007	Business Planning for Founders	2 SWS	Seminar / 🖥	Kleinn, Ntagiakou, Terzidis
ST 2021	2545109	Business Planning for Founders in the field of IT-Security (KASTEL)	2 SWS	Seminar / 🖥	Ntagiakou, Terzidis
WT 21/22	2545007	Business Planning for Founders	2 SWS	Seminar / 🖥	Wohlfeil, Bauman
Exams					
ST 2021	7900234	Business Planning for Founders			Terzidis
ST 2021	7900236	Business Planning for Founders in the field of IT-Security			Terzidis
WT 21/22	7900023	Business Planning for Founders			Terzidis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
None

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

V	Business Planning for Founders	Seminar (S)
	2545007, SS 2021, 2 SWS, Language: English, Open in study portal	Online

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

Organizational issues
Block am 26.04., 03.05., 10.05. jeweils 9-17 Uhr

V	Business Planning for Founders in the field of IT-Security (KASTEL)	Seminar (S)
	2545109, SS 2021, 2 SWS, Language: German/English, Open in study portal	Online

Content

In order to identify opportunities, the participants should identify fields for entrepreneurial opportunities in a systematic web research. For this purpose, Systematic Mapping procedures will be adapted to the research of general web sources and applied to the research of interesting fields in the area of cyber security.

Information about the seminar:

In the seminar you will work in groups of max. 4 persons. Group applications are welcome but not a prerequisite for participation.

Some of the seminars will be held in English.

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

Target group:

Master Students

Information on the allocation of seminar places:

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

Seminar contents:

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

Organizational issues

Blockveranstaltung im Rahmen des KASTEL Projekts am 12.05., 09.06., 23.06.

V	**Business Planning for Founders** 2545007, WS 21/22, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

The seminar introduces students to basic concepts of business planning based on technological innovations. On the one hand, this involves concepts for the concretization of business ideas (business modeling, market potential assessment, resource planning, etc.) and, on the other hand, the creation of a feasible business plan (with or without VC financing).

During the seminar, students are familiarized with methods to develop technological inventions and initial business ideas into a more concrete business plan. After completing this seminar, students will have learned and actually practiced the whole business model development process.

T 5.48 Course: Business Strategies of Banks [T-WIWI-102626]

Responsible: Prof. Dr. Wolfgang Müller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
ST 2021	2530299	Business Strategies of Banks	2 SWS	Lecture / ✘	Müller
WT 21/22	2530299	Business Strategies of Banks	2 SWS	Lecture	Müller
Exams					
ST 2021	7900079	Business Strategies of Banks			Müller
WT 21/22	7900064	Business Strategies of Banks			Müller, Ruckes

Legend: 🗎 Online, ⚙ Blended (On-Site/Online), 🖐 On-Site, ✘ Cancelled

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

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

V Business Strategies of Banks
2530299, SS 2021, 2 SWS, Language: German, Open in study portal

**Lecture (V)
Cancelled**

Literature
Weiterführende Literatur:

- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer

V Business Strategies of Banks
2530299, WS 21/22, 2 SWS, Language: German, Open in study portal

Lecture (V)

Organizational issues
Die Veranstaltung findet nur statt, wenn sie in Präsenz stattfinden kann.

Termine und Räume laut Ankündigung am Institut.

Literature
Weiterführende Literatur:

- Ein Skript wird im Verlauf der Veranstaltung kapitelweise ausgeteilt.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2014, Bankbetriebslehre, 6. Auflage, Springer

T 5.49 Course: Case Studies Seminar: Innovation Management [T-WIWI-102852]

Responsible:	Prof. Dr. Marion Weissenberger-Eibl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 21/22	2545105	Case studies seminar: Innovation management	2 SWS	Seminar / 🧩	Weissenberger-Eibl

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessments (§4(2), 3 SPO).

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

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

V	**Case studies seminar: Innovation management** 2545105, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
The objective of the seminar is to master selected concepts and methods of innovation management and then to apply these practically. Working in groups, the students apply the described concepts and methods of innovation management to a case study from the automotive industry to answer specific questions. Accordingly, the block seminar involves a switch from input to the application of this input. At the end, the results of the group work are presented in the form of a seminar paper and discussed by the whole course. A short introduction to presentation techniques is planned to help students prepare the seminar papers.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

T 5.50 Course: Challenges in Supply Chain Management [T-WIWI-102872]

Responsible: Esther Mohr
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations
M-WIWI-102808 - Digital Service Systems in Industry

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2550494	Challenges in Supply Chain Management	3 SWS	Lecture / 🖥	Mohr
Exams					
ST 2021	7900358	Challenges in Supply Chain Management			Nickel

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written paper and an oral exam of ca. 30-40 min.

Prerequisites
None

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

Annotation
The number of course participants is limited to 12 participants due to joint work in BASF project teams. Due to these capacity restrictions, registration before course start is required. For further information see the webpage of the course.

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

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

V Challenges in Supply Chain Management
2550494, SS 2021, 3 SWS, Language: English, Open in study portal

**Lecture (V)
Online**

Content
The course consists of case studies of BASF which cover future challenges of supply chain management. Thus, the course aims at a case-study based presentation, critical evaluation and exemplary discussion of recent questions in supply chain management. The focus lies on future challenges and trends, also with regard to their applicability in practical cases (especially in the chemical industry).

The main part of the course is working on a project together with BASF in Ludwigshafen. The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the project topic.

This course will include working on cutting edge supply chain topics like Industry 4.0 / "Internet of Everything in production", supply chain analytics, risk management, procurement and production in SCM. The team essays / project reports will be linked to industry-related challenges as well as to upcoming theoretical concepts. The topics of the seminar will be announced at the beginning of the term in a preliminary meeting.

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

Literature
Wird in Abhängigkeit vom Thema in den Projektteams bekanntgegeben.

T 5.51 Course: Cognitive Systems [T-INFO-101356]

Responsible: Prof. Dr. Gerhard Neumann
                    Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
       Part of: M-INFO-100819 - Cognitive Systems

Type Written examination	Credits 6	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	24572	Kognitive Systeme	4 SWS	Lecture / Practice (/ 🖥	Waibel, Stüker, Neumann
Exams					
ST 2021	7500157	Cognitive Systems			Waibel, Neumann
WT 21/22	7500158	Cognitive Systems Waibel/Neumann			Waibel, Neumann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

T 5.52 Course: Competition in Networks [T-WIWI-100005]

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101406 - Network Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	3

Events					
WT 21/22	2561204	Competition in Networks	2 SWS	Lecture	Mitusch
WT 21/22	2561205	Übung zu Wettbewerb in Netzen	1 SWS	Practice	Wisotzky, Mitusch, Corbo
Exams					
ST 2021	7900274	Competition in Networks			Mitusch

Competence Certificate
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
None.

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

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

V Competition in Networks
2561204, WS 21/22, 2 SWS, Language: German, Open in study portal   **Lecture (V)**

Content
Network or infrastructure industries like telecommunication, transport, and utilities form the backbone of modern economies. The lecture provides an overview of the economic characteristics of network industries. The planning of networks is complicated by the multitude of aspects involved (like spatial differentiation and the like). The interactions of different companies - competition or cooperation or both - are characterized by complex interdependencies within the networks: network effects, economies of scale, effects of vertical integration, switching costs, standardization, compatibility etc. appear increasingly in these sectors and even tend to appear in combination. Additionally, government interventions can often be observed, partly driven by the aims of competition policy and partly driven by the aims industrial policy. All these issues are brought up, analyzed formally (in part) and illustrated by several examples in the lecture

Literature
Literatur und Skripte werden in der Veranstaltung angegeben.

T 5.53 Course: Computational Complexity Theory, with a View Towards Cryptography [T-INFO-103014]

Responsible:	Prof. Dr. Dennis Hofheinz
	Prof. Dr. Jörn Müller-Quade
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101575 - Computational Complexity Theory, with a View Towards Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Irregular	1

Exams			
ST 2021	7500183	Computational Complexity Theory, with a View Towards Cryptography	Geiselmann, Hofheinz

T 5.54 Course: Computational Geometry [T-INFO-104429]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: M-INFO-102110 - Computational Geometry

Type	Credits	Grading scale	Recurrence	Version
Oral examination	6	Grade to a third	Irregular	2

Events					
WT 21/22	2400083	Computational Geometry	4 SWS	Lecture / Practice (/ 🗣	Bläsius, Wilhelm

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

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

V Computational Geometry
2400083, WS 21/22, 4 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
On-Site

Organizational issues
nur Masterstudiengang Informatik

T	5.55 Course: Computational Risk and Asset Management [T-WIWI-102878]

Responsible: Prof. Dr. Maxim Ulrich

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105032 - Data Science for Finance

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	4

Competence Certificate

The module examination takes the form of an alternative exam assessment.

The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Recommendation

Basic knowledge of capital markt theory.

T	**5.56 Course: Computational Risk and Asset Management I [T-WIWI-107032]**

Responsible:	Prof. Dr. Maxim Ulrich
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103247 - Intelligent Risk and Investment Advisory

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Competence Certificate

The exam will be cancelled for the winter semester 2019/2020.

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.

Prerequisites

None.

Recommendation

None

T	**5.57 Course: Computational Risk and Asset Management II [T-WIWI-106494]**

Responsible: Prof. Dr. Maxim Ulrich

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-103247 - Intelligent Risk and Investment Advisory

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Competence Certificate

The exam will be cancelled for the winter semester 2019/2020.

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation and 6 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.

Prerequisites

None.

Recommendation

It is recommend that students have studied the material of „Computational Risk and Asset Management I".

T	**5.58 Course: Computer Contract Law [T-INFO-102036]**

Responsible:	Michael Bartsch
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101216 - Private Business Law

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2411604	Computer Contract Law	2 SWS	Lecture / 🗣	Menk
Exams					
ST 2021	7500066	Computer Contract Law			Dreier, Matz

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

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

V	**Computer Contract Law** 2411604, WS 21/22, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **On-Site**

Content

The course deals with contracts from the following areas:

- Contracts of programming, licencing and maintaining software
- Contracts in the field of IT employment law
- IT projects and IT Outsourcing
- Internet Contracts

From these areas single contracts will be chosen and discussed (e.g. software maintenance, employment contract with a software engineer). Concerning the respective contract the technical features, the economic background and the subsumption in the national law of obligation (BGB-Schuldrecht) will be discussed. As a result different contractual clauses will be developed by the students. Afterwards typical contracts and conditions will be analysed with regard to their legitimacy as standard business terms (AGB). It is the aim to show the effects of the german law of standard business terms (AGB-Recht) and to point out that contracts are a means of drafting business concepts and market appearance.

It is the aim of this course to provide students with knowledge in the area of contract formation and formulation in practice that builds upon the knowledge the students have already acquired concerning the legal protection of computer programs. Students shall understand how the legal rules depend upon, and interact with, the economic background and the technical features of the subject. The contract drafts shall be prepared by the students and will be corporately completed during the lecture. It is the aim of the course that students will be able to formulate contracts by themselves.

Literature

- Langenfeld, Gerrit Vertragsgestaltung Verlag C.H.Beck, III. Aufl. 2004
- Heussen, Benno Handbuch Vertragsverhandlung und Vertragsmanagement Verlag C.H.Beck, II. Aufl. 2002
- Schneider, Jochen Handbuch des EDV-Rechts Verlag Dr. Otto Schmidt KG, III. Aufl. 2002

Weiterführende Literatur

Ergänzende Literatur wird in den Vorlesungsfolien angegeben.

T 5.59 Course: Computer Vision for Human-Computer Interaction [T-INFO-101347]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation: KIT Department of Informatics
Part of: M-INFO-101239 - Machine Vision

Type Written examination	Credits 6	Grading scale Grade to a third	Recurrence Each winter term	Version 2

Events					
WT 21/22	24180	Computer Vision for Human-Computer Interaction	4 SWS	Lecture	Stiefelhagen, Sarfraz
Exams					
ST 2021	7500060	Computer Vision for Human-Computer Interaction			Stiefelhagen
WT 21/22	7500044	Computer Vsion for Human-Computer Interaction			Stiefelhagen

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

V Computer Vision for Human-Computer Interaction
24180, WS 21/22, 4 SWS, Language: German, Open in study portal

Lecture (V)

Content
In this lecture current projects of the field of image processing will be presented which deal with the visual perception of persons re. human-computer interaction.
In respect of the individual topics we will discuss various methods and algorithms, their pros and cons and state of the art:
• Face detection and localisation
• Facial expression
• Assessment of head turns and viewing direction
• Person tracking and localisation
• Articulated body tracking
• Gesture recognition
• Audio-visual speech recognition
• Multi-camera environments
• Tools and libraries

The student acquires a basic understanding of computer vision topics within the context of human-computer interaction and learns how to apply them.

Organizational issues
findet im WS 2019/20 nicht statt!

Literature
Weiterführende Literatur

Wissenschaftliche Veröffentlichungen zum Thema, werden auf der VL-Website bereitgestellt.

T 5.60 Course: Consulting in Practice [T-INFO-101975]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management

Type Completed coursework	Credits 1,5	Grading scale pass/fail	Recurrence Irregular	Version 1

Events					
WT 21/22	24664	Praxis der Unternehmensberatung	2 SWS	Lecture	Böhm, Lang

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

V Praxis der Unternehmensberatung
24664, WS 21/22, 2 SWS, Open in study portal

Lecture (V)

Content

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

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

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

Emphasised topics in the course are:

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

At the end of the course, the participants

- have gained knowledge and understanding for the activities of the consulting process in general,
- have gained function-specific knowledge and understanding of IT consulting,
- have an overview about consulting companies,
- know concrete consulting examples,
- have experienced how effective teams work and
- have got an insight into the professional field "consulting".

T 5.61 Course: Context Sensitive Systems [T-INFO-107499]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-100728 - Context Sensitive Systems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2021	2400099	Context Sensitive Systems	1 SWS	Practice / 🖥	Riedel
ST 2021	24658	Context Sensitive Systems	2 SWS	Lecture / 🖥	Riedel, Beigl
Exams					
ST 2021	7500149_0723	Context Sensitive Systems			Beigl, Riedel
ST 2021	7500149_0906	Context Sensitive Systems			Beigl, Riedel
ST 2021	7500149_1011	Context Sensitive Systems			Beigl, Riedel
ST 2021	7500149_1108	Context Sensitive Systems			Beigl, Riedel

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.62 Course: Convex Analysis [T-WIWI-102856]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Events					
ST 2021	2550120	Konvexe Analysis	2 SWS	Lecture / 📱	Stein
Exams					
ST 2021	7900273_SS2021_HK	Convex Analysis			Stein

Legend: 📱 Online, ✿ Blended (On-Site/Online), ✪ On-Site, ✗ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

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

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

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

V Konvexe Analysis
2550120, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
Convex Analysis deals with properties of convex functions and convex sets, amongst others with respect to the minimization of convex functions over convex sets. That the involved functions are not necessarily assumed to be differentiable allows a number 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 intuitive example, where a nonsmooth obstacle set is to be described by a single smooth convex constraint such that minimal and maximal distances to the obstacle can be computed. The lecture is structured as follows:

- Introduction to entropic smoothing and convexity
- Global error bounds
- Smoothness properties of convex functions
- The convex subdifferential
- Global Lipschitz continuity
- Descent directions and stationarity conditions

Remark:

Prior to the attendance of this lecture, it is strongly recommend to acquire basic knowledge on optimization problems in one of the lectures "Global Optimization I and II" and "Nonlinear Optimization I and II".

Learning objectives:

The student

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

Literature

- J. Borwein, A. Lewis, Convex Analysis and Nonlinear Optimization: Theory and Examples (2 ed.), Springer, 2006
- S. Boyd, L. Vandenberghe, Convex Optimization, Cambridge University Press, 2004
- O. Güler, Foundations of Optimization, Springer, 2010
- J.-B. Hiriart-Urruty, C. Lemarechal, Fundamentals of Convex Analysis, Springer, 2001
- B. Mordukhovich, N.M. Nam, An Easy Path to Convex Analysis and Applications, Morgan & Claypool Publishers, 2014
- R.T. Rockafellar, Convex Analysis, Princeton University Press, 1970
- R.T. Rockafellar, R.J.B. Wets, Variational Analysis, Springer, Berlin, 1998

T 5.63 Course: Copyright [T-INFO-101308]

Responsible:	Prof. Dr. Thomas Dreier
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 21/22	24121	Copyright	2 SWS	Lecture / 📱	Dreier
Exams					
ST 2021	7500064	Copyright			Dreier, Matz

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 📍 On-Site, ✗ Cancelled

| T | **5.64 Course: Corporate Compliance [T-INFO-101288]** |

Responsible: Andreas Herzig
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

| **Type** Written examination | **Credits** 3 | **Grading scale** Grade to a third | **Recurrence** Each winter term | **Version** 1 |

Events					
WT 21/22	2400087	Corporate Compliance	2 SWS	Lecture / 🗣	Herzig
Exams					
ST 2021	7500063	Corporate Compliance			Dreier, Matz

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

| T | **5.65 Course: Corporate Financial Policy [T-WIWI-102622]** |

Responsible:	Prof. Dr. Martin Ruckes
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101453 - Applied Strategic Decisions
	M-WIWI-101480 - Finance 3
	M-WIWI-101483 - Finance 2
	M-WIWI-101502 - Economic Theory and its Application in Finance

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each summer term	**Version** 1

Events					
ST 2021	2530214	Corporate Financial Policy	2 SWS	Lecture / 📱	Ruckes
ST 2021	2530215	Übungen zu Corporate Financial Policy	1 SWS	Practice / 📱	Ruckes, Hoang
Exams					
ST 2021	7900073	Corporate Financial Policy			Ruckes
WT 21/22	7900058	Corporate Financial Policy			Ruckes

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🍃 On-Site, ✗ Cancelled

Competence Certificate

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

The exam is offered each semester.

Prerequisites

None

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

| V | **Corporate Financial Policy**
2530214, SS 2021, 2 SWS, Language: English, Open in study portal | **Lecture (V)**
Online |

Content

The course develops the foundations for the management and financing of firms in imperfect markets.

The course covers the following topics:

- Measures of good corporate governance
- Corporate finance
- Liquidity management
- Executive compensation and incentives
- Corporate takeovers

Learning outcomes: The students

- are able to explain the importance of information asymmetry for the contract design of firms,
- are capable to evaluate measures for the reduction of information asymmetry,
- are in the position to analyze contracts with regard to their incentive and communication effects.

T   5.66 Course: Corporate Risk Management [T-WIWI-109050]

Responsible:	Prof. Dr. Martin Ruckes
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101480 - Finance 3
	M-WIWI-101483 - Finance 2
	M-WIWI-101502 - Economic Theory and its Application in Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Exams				
ST 2021	7900259	Corporate Risk Management		Ruckes
WT 21/22	7900136	Corporate Risk Management		Ruckes

Competence Certificate

The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

Prerequisites

None

Recommendation

None

Annotation

The course will be held again in the summer term 2023 at the earliest. Please pay attention to the announcements on our website.

T	**5.67 Course: Credit Risk [T-WIWI-102645]**

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

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** see Annotations	**Version** 1

Competence Certificate

The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment consists of a written exam (75 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The examination is offered every semester and can be repeated at every regular examination date.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

Knowledge from the course "Derivatives" is very helpful.

Annotation

The course will no longer be offered from winter semester 2020/21.

T 5.68 Course: Critical Information Infrastructures [T-WIWI-109248]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104403 - Critical Digital Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	4

Events					
WT 21/22	2511400	Critical Information Infrastructures	2 SWS	Lecture	Sunyaev, Dehling, Lins
WT 21/22	2511401	Exercises to Critical Information Infrastructures	1 SWS	Practice	Sunyaev, Dehling, Lins
Exams					
ST 2021	7900061	Critical Information Infrastructures			Sunyaev
WT 21/22	7900067	Critical Information Infrastructures			Sunyaev

Competence Certificate
The alternative exam assessment consists of

- the preparation of a written elaboration as well as
- an oral examination as part of a presentation of the work.

Details of the grades will be announced at the beginning of the course.

The examination is only offered to first-time students in the winter semester, but can be repeated in the following summer semester.

Prerequisites
None.

Annotation
New lecture from winter semester 2018/2019.

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

V Critical Information Infrastructures
2511400, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content

The course critical information infrastructures (CII) introduces students to the world of complex sociotechnical systems that permeate societies on a global scale. Students will learn to handle the complexities involved in the design, development, operation, and evaluation of critical information infrastructures. In the beginning of the course, critical information infrastructures will be introduced on a general level.

The following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Distributed Ledger Technology
- Critical Cloud Services
- Health Information Infrastructures
- Vehicluar Fog Computing
- Information Privacy
- Trustworthy Artificial Intelligence

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:

Students know concepts and technologies relevant for the design and reliable operation of critical information infrastructures and can leverage them to develop solutions for real-world challenges.

Notes:

The number of participants is limited to 24 students. Please register via the WiWi portal: https://portal.wiwi.kit.edu/ys/5035

The registration will be opened from August 17, 2021 until October 1, 2021.

Please make sure that you are available at the following dates if you want to take the course:

- 21.10.2021, Noon–01:30 pm: 1. Introduction & Topic Area Presentations
- 28.10.2021, Noon–01:30 pm: 2. Foundations to Critical Information Infrastructures
- 04.11.2021, Noon–01:30 pm: 3. Critical Information Infrastructure Landscape
- 11.11.2021, Noon–01:30 pm: 4. Research on Information Systems & Group Assignment
- 10.12.2021, 10:00 am–06:00 pm: Interim Presentation (estimated)
- 28.01.2022, 10:00 am–06:00 pm: Final Presentation (estimated)

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams, as currently planned. We will provide a link to join the team if your registration was approved. Interim and final presentation may take a hybrid or real-life form.

If you have any questions regarding course registration, please contact lins@kit.edu or dehling@kit.edu

T 5.69 Course: Cryptographic Voting Schemes [T-INFO-101279]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

Events					
WT 21/22	2400122	Cryptographic Voting Schemes	2 SWS	Lecture / 🗔	Müller-Quade, Schwerdt, Dörre

Legend: 🗔 Online, ⚄ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

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

V	**Cryptographic Voting Schemes**	Lecture (V)
	2400122, WS 21/22, 2 SWS, Language: German, Open in study portal	Online

| T | **5.70 Course: Current Issues in Innovation Management [T-WIWI-102873]** |

Responsible:	Prof. Dr. Marion Weissenberger-Eibl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation).

Prerequisites
None

Recommendation
None

Annotation
Please note that the seminars we offer vary from semester to semester. Information about the currently offered seminars can be found in the Wiwi-Portal and on the iTM Website.

T 5.71 Course: Data and Storage Management [T-INFO-101276]

Responsible: Prof. Dr. Bernhard Neumair
Organisation: KIT Department of Informatics
       Part of: M-INFO-101210 - Dynamic IT-Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 21/22	24074	Data and Storage Management	2 SWS	Lecture	Neumair

| T | **5.72 Course: Data Privacy: From Anonymization to Access Control [T-INFO-108377]** |

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management
M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
M-INFO-104045 - Data Privacy: From Anonymization to Access Control

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Irregular	**Version** 1

Exams			
ST 2021	7500209	Data Privacy: From Anonymization to Access Control	Böhm

T	**5.73 Course: Data Protection Law [T-INFO-111406]**

Responsible: Dr. Johannes Eichenhofer
Organisation: KIT Department of Informatics
Part of: M-INFO-101217 - Public Business Law

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2400238	Bereichsdatenschutz	2 SWS	Lecture / ▯	Boehm

Legend: ▯ Online, ✧ Blended (On-Site/Online), ◗ On-Site, ✗ Cancelled

T 5.74 Course: Data Science I [T-INFO-111622]

Responsible:	Prof. Dr.-Ing. Klemens Böhm
	Dr.-Ing. Edouard Fouché
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101208 - Innovative Concepts of Data and Information Management
	M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
	M-INFO-105799 - Data Science I

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	2

Events					
WT 21/22	24114	Data Science 1	3 SWS	Lecture / ⚙	Fouché

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ♟ On-Site, ✗ Cancelled

| T | **5.75 Course: Data Science II [T-INFO-111626]** |

Responsible: Prof. Dr.-Ing. Klemens Böhm
                   Dr.-Ing. Edouard Fouché
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management
                   M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
                   M-INFO-105801 - Data Science II

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

Prerequisites

T 5.76 Course: Database as a Service [T-INFO-111400]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management
                    M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
                    M-INFO-105724 - Database as a Service

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Events					
WT 21/22	24109	Database as a Service	2 SWS	Lecture /	Böhm

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

Prerequisites

T 5.77 Course: Database Systems [T-INFO-101497]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101178 - Communication and Database Systems

Type Written examination	Credits 4	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	24516	Datenbanksysteme	2 SWS	Lecture / 🖥	Böhm, Mülle
ST 2021	24522	Übungen zu Datenbanksysteme	1 SWS	Practice / 🖥	Böhm, Mülle
Exams					
ST 2021	7500166	Database Systems			Böhm

Legend: 🖥 Online, ⚯ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T 5.78 Course: Database Systems and XML [T-WIWI-102661]

Responsible:	Prof. Dr. Andreas Oberweis
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101456 - Intelligent Systems and Services
	M-WIWI-101477 - Development of Business Information Systems

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 2

Events					
WT 21/22	2511202	Database Systems and XML	2 SWS	Lecture	Oberweis
WT 21/22	2511203	Exercises Database Systems and XML	1 SWS	Practice	Oberweis, Fritsch
Exams					
ST 2021	7900046	Database Systems and XML (Registration until 12 July 2021)			Oberweis
WT 21/22	7900007	Database Systems and XML			Oberweis

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

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

V Database Systems and XML   Lecture (V)
2511202, WS 21/22, 2 SWS, Language: German, Open in study portal

Content

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

Learning objectives:

Students

- know the basics of XML and generate XML documents,
- are able to use XML database systems and to formulate queries to XML documents,
- know to assess the use of XML in operational practice in different application contexts.

Workload:

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

Literature

- M. Klettke, H. Meyer: XML & Datenbanken: Konzepte, Sprachen und Systeme. dpunkt.verlag 2003
- H. Schöning: XML und Datenbanken: Konzepte und Systeme. Carl Hanser Verlag 2003
- W. Kazakos, A. Schmidt, P. Tomchyk: Datenbanken und XML. Springer-Verlag 2002
- R. Elmasri, S. B. Navathe: Grundlagen der Datenbanksysteme. 2009
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2008

Weitere Literatur wird in der Vorlesung bekannt gegeben.

T 5.79 Course: Deep Learning and Neural Networks [T-INFO-109124]

Responsible: Prof. Dr. Alexander Waibel
Organisation: KIT Department of Informatics
Part of: M-INFO-104460 - Deep Learning and Neural Networks

Type Written examination	Credits 6	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2400024	Deep Learning and Neural Networks	4 SWS	Lecture / 📱	Waibel, Pham
Exams					
ST 2021	7500044	Deep Learning and Neural Networks			Waibel

Legend: 📱 Online, ♻ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.80 Course: Deep Learning for Computer Vision I: Basics [T-INFO-111491]

Responsible:	Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101239 - Machine Vision
	M-INFO-101239 - Machine Vision

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Exams				
WT 21/22	7500258	Deep Learning for Computer Vision I: Basics		Stiefelhagen

Recommendation

Basic knowledge of pattern recognition as taught in the module Cognitive Systems, is expected.

Annotation

The course is partially given in German and English.

T   5.81 Course: Demand-Driven Supply Chain Planning [T-WIWI-110971]

Responsible:	Josef Packowski
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102805 - Service Operations

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Exams			
WT 21/22	7900291	Demand-Driven Supply Chain Planning	Packowski

Competence Certificate

The assessment consists of a written exam.

Annotation

Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course. The course is planned to be held every winter term. The planned lectures and courses for the next three years are announced online.

T 5.82 Course: Deployment of Database Systems [T-INFO-101317]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-100780 - Deployment of Database Systems
                     M-INFO-101208 - Innovative Concepts of Data and Information Management
                     M-INFO-101256 - Theory and Practice of Data Warehousing and Mining

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Exams			
ST 2021	7500090	Deployment of Database Systems	Böhm

T 5.83 Course: Derivatives [T-WIWI-102643]

Responsible: Prof. Dr. Marliese Uhrig-Homburg
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
                M-WIWI-101482 - Finance 1
                M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2530550	Derivatives	2 SWS	Lecture / 🗔	Uhrig-Homburg
ST 2021	2530551	Übung zu Derivate	1 SWS	Practice / 🗔	Uhrig-Homburg, Eska
Exams					
ST 2021	7900111	Derivatives			Uhrig-Homburg
WT 21/22	7900051	Derivatives			Uhrig-Homburg

Legend: 🗔 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

Recommendation
None

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

V	**Derivatives** 2530550, SS 2021, 2 SWS, Language: German, Open in study portal	**Lecture (V) Online**

Organizational issues
Veranstaltungskonzept umfasst vollständige Aufzeichnungen von Vorlesung und Übung. Ergänzend bieten wir zweiwöchig freiwillige Live-Fragerunden zum fachlichen und organisatorischen Austausch an.

Literature

- Hull (2012): Options, Futures, & Other Derivatives, Prentice Hall, 8th Edition

Weiterführende Literatur:

Cox/Rubinstein (1985): Option Markets, Prentice Hall

T   5.84 Course: Design Thinking [T-WIWI-102866]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

| Type
Examination of another type | Credits
3 | Grading scale
Grade to a third | Recurrence
Each term | Version
1 |
|---|---|---|---|---|

Events					
ST 2021	2545008	Design Thinking (Track 1)	2 SWS	Seminar / 🖥	González, Abraham, Csernalabics, Manthey
WT 21/22	2545008	Design Thinking (Track 1)	2 SWS	Seminar / 🖥	Abraham, Csernalabics
Exams					
ST 2021	7900053	Design Thinking (Track 1)			Terzidis
WT 21/22	7900084	Design Thinking (Track 1)			Terzidis

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessments (§4(2), 3 SPO).

Prerequisites
None

Recommendation
None

Annotation
The seminar content will be published on the website of the institute.

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

V   Design Thinking (Track 1)
2545008, WS 21/22, 2 SWS, Language: English, Open in study portal

Seminar (S)
Online

Content
Course Content:

Design Thinking is a user-centric innovation management method. The iterative process first analyzes the problem space and builds a sound understanding of the future users. Subsequently, ideas for the solution are generated, prototypes are created and tested by the user group. The result is a proven and validated product.

During the seminar, the students learn basic procedures for achieving user-centric innovations. These are concrete methods that start with the potential user of certain products and services. The method is problem-oriented and emphasizes the specific customer situation. After attending the seminar, the students have a clear understanding of the need to explore end-user needs and are able to independently apply the methods of Design Thinking for developing market-driven innovations at a basic level.

Credentials:

Registration is via the Wiwi portal.

ATTENTION: Creditability in the seminar module: The seminar is NOT credited in the seminar module! Crediting is only possible in the EXPERT MODULE ENTREPRENEURSHIP.

T 5.85 Course: Designing Interactive Systems [T-WIWI-110851]

Responsible:	Prof. Dr. Alexander Mädche
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-104068 - Information Systems in Organizations
	M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540558	Designing Interactive Systems	3 SWS	Lecture / 📱	Mädche, Gnewuch
Exams					
ST 2021	00009	Designing Interactive Systems			Mädche
WT 21/22	7900205	Designing Interactive Systems			Mädche

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🔵 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Annotation
This course replaces T-WIWI-108461 "Interactive Information Systems" starting summer term 2020.

The course is held in english.

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

V	**Designing Interactive Systems** 2540558, SS 2021, 3 SWS, Language: English, Open in study portal	Lecture (V) Online

Content
Description

Computers have evolved from batch processors towards highly interactive systems. This offers new possibilities but also challenges for the successful design of the interaction between human and computer. Interactive system are socio-technical systems in which users perform tasks by interacting with technology in a specific context in order to achieve specified goals and outcomes.

The aim of this course is to introduce advanced concepts and theories, interaction technologies as well as current practice of contemporary interactive systems.

The course is complemented with a design capstone project, where students in a team select and apply design methods & techniques in order to create an interactive prototype

Learning objectives

- Get an advanced understanding of conceptual foundations of interactive systems from a human and computer perspective

- explore the theoretical grounding of Interactive Systems leveraging theories from reference disciplines such as psychology

- know specific design principles for the design of advanced interactive systems

- get hands-on experience in conceptualizing and designing advanced Interactive Systems to solve a real-world challenge from an industry partner by applying the lecture contents.

Prerequisites

No specific prerequisites are required for the lecture

Literature

Die Vorlesung basiert zu einem großen Teil auf

· Benyon, D. (2014). Designing interactive systems: A comprehensive guide to HCI, UX and interaction design (3. ed.). Harlow: Pearson.

Weiterführende Literatur wird in der Vorlesung bereitgestellt.

T 5.86 Course: Digital Circuits Design [T-INFO-103469]

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

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2021	24007	Digital Circuits Design	3 SWS	Lecture / 🖥	Tahoori
Exams					
ST 2021	7500254	Digital Circuits Design			Henkel, Karl, Tahoori

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.87 Course: Digital Health [T-WIWI-109246]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104403 - Critical Digital Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	3

Events					
WT 21/22	2511402	Digital Health	2 SWS	Lecture	Sunyaev, Thiebes, Schmidt-Kraepelin
Exams					
ST 2021	7900062	Digital Health			Sunyaev
WT 21/22	7900068	Digital Health			Sunyaev

Competence Certificate
Alternative exam assessment (written elaboration, presentation, peer review, oral participation) according to §4(2),3 of the examination regulation. Details of the grading will be announced at the beginning of the course. The examination is only offered to first-time writers in the winter semester, but can be repeated in the following summer semester.

Prerequisites
None.

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

V	**Digital Health**	Lecture (V)
	2511402, WS 21/22, 2 SWS, Language: English, Open in study portal	

Content

The master course Digital Health introduces master students to the subject of digitization in health care. Students will learn about the theoretical foundations and practical implications of various topics surrounding the digitization in health care, including health information systems, telematics, big health care data, and patient-centered health care.

After an introduction to the challenge of digitization in health care, the following sessions will focus on an in-depth exploration of selected cases that represent current challenges in research and practice. Students will work (in a group of 3-4) on a selected topic and have to write a course paper. Students can choose a topic from a variety of topics. To answer the research questions, students can use literature reviews but also interviews, surveys, programming tasks, and other research methods are possible.

There will be a short introduction to the topics for the course paper in the following topic areas. In addition, it will be possible to propose your own topics as a group in the topic areas:

- Mobile Health (mHealth) / Gamification
- Distributed Ledger Technology / Blockchain
- Artificial Intelligence / Machine Learning
- Genomics / Biomedical Data

Since we offer topics in this course that also correspond to the research interests in our research group, there may be the opportunity to work on the topics in more depth in the course of a final thesis.

Learning objectives:

Students know about the challenges of digitization in health care and can leverage relevant concepts and technologies to address these challenges. Students learn to work in teams and critically discuss digital health topics with fellow students, researchers, and practitioners.

Notes:

The number of participants is limited to 30 students. Please register here. The registration will be opened from September 7, 2021 until October 12, 2021.

Please make sure that you are available at the following dates if you want to take the course:

- 21.10.2021, 16:00–17:30 - 1. Introduction to Digital Health
- 28.10.2021, 16:00–17:30 - 2. Topic Area Presentation #1
- 04.11.2021, 16:00–17:30 - 3. Topic Area Presentation #2
- 11.11.2021, 16:00–17:30 - 4. Guest Lecture
- 10.02.2022, 10:00–17:00 - Final Presentation

Further information on the course structure will be announced in the first session. Depending on the number of participants the individual sessions can have a shorter duration.

The meetings will take place online via MS Teams. We will provide a link to join the team if your registration was approved.

If you have any questions regarding course registration, please contact scott.thiebes@kit.edu or manuel.schmidt-kraepelin@kit.edu

T	5.88 Course: Digital Marketing and Sales in B2B [T-WIWI-106981]

Responsible: Prof. Dr. Martin Klarmann
Anja Konhäuser

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Events					
ST 2021	2571156	Digital Marketing and Sales in B2B	1 SWS	Others (sons /📱	Konhäuser
Exams					
ST 2021	7900297	Digital Marketing and Sales in B2B			Klarmann

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✖ Cancelled

Competence Certificate
Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation. (team presentation of a case study with subsequent discussion totalling 30 minutes).

Prerequisites
None.

Annotation
Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing and Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless attendance can not be guaranteed.For further information please contact Marketing and Sales Research Group (marketing.iism.kit.edu).Please note that only one of the 1.5-ECTS courses can be attended in this module.

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

V	Digital Marketing and Sales in B2B	Others (sonst.)
	2571156, SS 2021, 1 SWS, Language: English, Open in study portal	Online

Content
Learning Sessions:

The class gives insights into digital marketing strategies as well as the effects and potential of different channels (e.g., SEO, SEA, Social Media). After an overview of possible activities and leverages in the digital marketing field, including their advantages and limits, the focus will turn to the B2B markets. There are certain requirements in digital strategy specific to the B2B market, particularly in relation to the value chain, sales management and customer support. Therefore, certain digital channels are more relevant for B2B marketing than for B2C marketing.

Once the digital marketing and tactics for the B2B markets are defined, further insights will be given regarding core elements of a digital strategy: device relevance (mobile, tablet), usability concepts, website appearance, app decision, market research and content management. A major advantage of digital marketing is the possibility of being able to track many aspects of of user reactions and user behaviour. Therefore, an overview of key performance indicators (KPIs) will be discussed and relationships between these KPIs will be explained. To measure the effectiveness of digital activities, a digital report should be set up and connected to the performance numbers of the company (e.g. product sales) – within the course the setup of the KPI dashboard and combination of digital and non-digital measures will be shown to calculate the Return on Investment (RoI).

Presentation Sessions:

After the learning sessions, the students will form groups and work on digital strategies within a case study format. The presentation of the digital strategy will be in front of the class whereas the presentation will take 20 minutes followed by 10 minutes questions and answers.

- Understand digital marketing and sales approaches for the B2B sector
- Recognise important elements and understand how-to-setup of digital strategies
- Become familiar with the effectiveness and usage of different digital marketing channels
- Understand the effect of digital sales on sales management, customer support and value chain
- Be able to measure and interpret digital KPIs
- Calculate the Return on Investment (RoI) for digital marketing by combining online data with company performance data

time of presentness = 15 hrs.

private study = 30 hrs.

Organizational issues
Blockveranstaltung, Raum 115, Geb. 20.21, Termine werden noch bekannt gegeben

Literature
-

T   5.89 Course: Digital Services: Business Models and Transformation [T-WIWI-110280]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101448 - Service Management
M-WIWI-102754 - Service Economics and Management
M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2595484	Digital Services: Business Models and Transformation	2 SWS	Lecture	Satzger, Schüritz
WT 21/22	2595485		1 SWS	Practice	Schüritz, Heinz
Exams					
ST 2021	7900304	Digital Services: Business Models and Transformation			Satzger
WT 21/22	7900329	Digital Services: Business Models and Transformation (01.03.22) - Hauptklausur			Satzger

Competence Certificate
The assessment of this course is a written examination (60 min.) (following §4(2), 1 SPOs) and by submitting written papers as part of the exercise.

Prerequisites
None

Recommendation
None

Annotation
former name until winter semester 2019/2020: "Business and IT Service Management" (T-WIWI-102881)

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

V   Digital Services: Business Models and Transformation
2595484, WS 21/22, 2 SWS, Language: English, Open in study portal
                                                                    Lecture (V)

Content
While the digitalization creates new opportunities for organizations, it also comes with its challenges: formerly proven business models become obsolete and need to be refined, internal processes cannot keep up with the requirements of the market and need to reassessed in any way.

The shift towards a service-based economy enables and requires companies to leverage advances in information technology to create added value for their customers. In particular, the emergence of big data and analytics enables better decision-making. The lecture teaches approaches that enable organizations to adapt their business models to new market requirements and showcases how to plan and execute a successful transformation to the desired organizational setup.

The lecture links academic content with practical examples and excises. Students are asked to actively engage in the discussion and contribute their knowledge. Invited guest speakers from industry and case studies emphasize the practical character of this lecture.

Literature

Böhmann, T./ Leimeister, J.M./ Möslein, K. (2014), Service Systems Engineering, Business & Information Systems Engineering, Vol. 6, No.2, 73-79

Cardoso et al. (Hrsg.) (2015), Fundamentals on Service Systems

Hartmann/ Zaki/ Feldmann/ Neely (2016), Capturing value from big data - a taxonomy of data-driven business models used by start-up firms, IJPOR, 36 (10), 1382-1406.

Schüritz R./Seebacher S./Satzger G./Schwartz L. (2017), Datatization as the Next Frontier of Servitization; in Proceedings of International Conference on Information Systems 2017

Vargo S. / Lusch R. (2017) Service-dominant logic 2025, in: IJRM 34, 46-67

Weill, P.; Woerner, S.L. (2018): "What's your Digital Business Model? – Six Questions to Help you Build the Next-Generation Enterprise". Boston, Massachusetts: Harvard Business Review Press.

Wirtz, B.(2019): "Digital Business Models – Concepts, Models, and the Alphabet Case Study". Springer.

T   5.90 Course: Digital Signatures [T-INFO-101280]

Responsible: Prof. Dr. Dennis Hofheinz
Organisation: KIT Department of Informatics
Part of: M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

T   5.91 Course: Digital Transformation and Business Models [T-WIWI-108875]

Responsible:	Dr. Daniel Jeffrey Koch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2021	2545103	Digital Transformation and Business Models	2 SWS	Seminar / 🖥	Koch
Exams					
ST 2021	7900284	Digital Transformation and Business Models			Weissenberger-Eibl

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), 🎤 On-Site, ✘ Cancelled

Competence Certificate
Non exam assessment (following §4(2) 3 of the examination regulation). The final grade is composed 75% of the grade of the written paper and 25% of the presentation.

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

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

V	**Digital Transformation and Business Models** 2545103, SS 2021, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Online**

Content
The seminar "Digital Transformation and Business Models" aims at the development of thematic aspects of digital transformation with simultaneous application of different business model methodologies. Established companies face the challenge of digital transformation. The digital transformation is particularly relevant for the business models of industrial enterprises. As part of innovation management, the examination of business model changes against the background of digital transformation is one of the main challenges facing the German economy. At the beginning, seminar topics will be assigned. These will be presented and discussed at the end of the seminar. In the first seminar date impulses to business model methodologies and the digital transformation take place, which are to be discussed then, in order to provide an understanding for the topic complex and to ensure the purposeful development of the seminar topics.

T   5.92 Course: Discrete-Event Simulation in Production and Logistics [T-WIWI-102718]

Responsible:	Prof. Dr. Stefan Nickel
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102805 - Service Operations
	M-WIWI-102832 - Operations Research in Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2550488	Ereignisdiskrete Simulation in Produktion und Logistik	3 SWS	Lecture / 📱	Spieckermann
Exams					
ST 2021	7900267	Discrete-Event Simulation in Production and Logistics			Spieckermann

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written paper and an oral exam of about 30-40 min (alternative exam assessment).

Prerequisites

None

Recommendation

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

Annotation

Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

The course is planned to be held every summer term.

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

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

V   Ereignisdiskrete Simulation in Produktion und Logistik
2550488, SS 2021, 3 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content

Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

Literature

- Banks J., Carson II J. S., Nelson B. L., Nicol D. M. (2010) Discrete-event system simulation, 5.Aufl., Pearson, Upper Saddle River.
- Eley, M. (2012): Simulation in der Logistik - Einführung in die Erstellung ereignisdiskreter Modelle unter Verwendung des Werkzeuges "Plant Simulation", Springer, Berlin und Heidelberg
- Kosturiak, J. und M. Gregor (1995): Simulation von Produktionssystemen. Springer, Wien und New York.
- Law, A. M. (2015): Simulation Modeling and Analysis. 5th Edition, McGraw-Hill, New York usw.
- Liebl, F. (1995): Simulation. 2. Auflage, Oldenbourg, München.
- Noche, B. und S. Wenzel (1991): Marktspiegel Simulationstechnik. In: Produktion und Logistik. TÜV Rheinland, Köln.
- Pidd, M. (2004): Computer Simulation in Management Science. 5th Edition, Wiley, Chichester.
- Robinson S (2004) Simulation: the practice of model development and use. John Wiley & Sons, Chichester
- VDI (2014): Simulation von Logistik-, Materialfluß- und Produktionssystemen. VDI Richtlinie 3633, Blatt 1, VDI-Verlag, Düsseldorf.

T	5.93 Course: Distributed Computing [T-INFO-101298]

Responsible: Prof. Dr. Achim Streit
Organisation: KIT Department of Informatics
Part of: M-INFO-101210 - Dynamic IT-Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each winter term	2

Events					
WT 21/22	2400050	Distributed Computing	2 SWS	Lecture /	Streit, Krauß, Fischer

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

| **T** | **5.94 Course: Dynamic Macroeconomics [T-WIWI-109194]** |

Responsible: Prof. Dr. Johannes Brumm
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101478 - Innovation and Growth
M-WIWI-101496 - Growth and Agglomeration

Type Oral examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 3

Events					
WT 21/22	2560402	Dynamic Macroeconomics	2 SWS	Lecture / 📱	Brumm
WT 21/22	2560403	Übung zu Dynamic Macroeconomics	1 SWS	Practice / 📱	Krause
Exams					
ST 2021	7900245	Dynamic Macroeconomics			Brumm

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ◕ On-Site, ✖ Cancelled

Competence Certificate
The assessment consists of a oral exam (30 min.).

Prerequisites
None.

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

| **V** | **Dynamic Macroeconomics** 2560402, WS 21/22, 2 SWS, Language: English, Open in study portal | **Lecture (V)** **Online** |

Literature
Literatur und Skripte werden in der Veranstaltung angegeben.

T   5.95 Course: Efficient Energy Systems and Electric Mobility [T-WIWI-102793]

Responsible:	PD Dr. Patrick Jochem
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101452 - Energy Economics and Technology

Type Written examination	Credits 3,5	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2581006	Efficient Energy Systems and Electric Mobility	2 SWS	Lecture / 🗎	Jochem
Exams					
ST 2021	7981006	Efficient Energy Systems and Electric Mobility			Fichtner

Legend: 🗎 Online, ⚃ Blended (On-Site/Online), ◕ On-Site, ✕ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V   Efficient Energy Systems and Electric Mobility
2581006, SS 2021, 2 SWS, Language: English, Open in study portal   **Lecture (V)**
Online

Content
This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.

- Understand the concept of energy efficiency as applied to specific systems

- Obtain an overview of the current trends in energy efficiency

- Be able to determine and evaluate alternative methods of energy efficiency improvement

- Overview of technical and economical stylized facts on electric mobility

- Judging economical, ecological and social impacts through electric mobility

Organizational issues
Freitag 09:45-11:15 Uhr

Literature
Wird in der Vorlesung bekanntgegeben.

| T | **5.96 Course: eFinance: Information Systems for Securities Trading [T-WIWI-110797]** |

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101446 - Market Engineering
	M-WIWI-101480 - Finance 3
	M-WIWI-101483 - Finance 2

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2540454	eFinance: Information Systems for Securities Trading	2 SWS	Lecture	Weinhardt, Notheisen
WT 21/22	2540455	Übungen zu eFinance: Wirtschaftsinformatik für den Wertpapierhandel	1 SWS	Practice	Jaquart

Competence Certificate

Success is monitored by means of ongoing elaborations and presentations of tasks and an examination (60 minutes) at the end of the lecture period. The scoring scheme for the overall evaluation will be announced at the beginning of the course.

Annotation

The course"eFinance: Information Systems for Securities Trading" covers different actors and their function in the securities industry in-depth, highlighting key trends in modern financial markets, such as Distributed Ledger Technology, Sustainable Finance, and Artificial Intelligence. Security prices evolve through a large number of bilateral trades, performed by market participants that have specific, well-regulated and institutionalized roles. Market microstructure is the subfield of financial economics that studies the price formation process. This process is significantly impacted by regulation and driven by technological innovation. Using the lens of theoretical economic models, this course reviews insights concerning the strategic trading behaviour of individual market participants, and models are brought market data. Analytical tools and empirical methods of market microstructure help to understand many puzzling phenomena in securities markets.

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

| V | **eFinance: Information Systems for Securities Trading** 2540454, WS 21/22, 2 SWS, Language: English, Open in study portal | **Lecture (V)** |

Literature

- Picot, Arnold, Christine Bortenlänger, Heiner Röhrl (1996): "Börsen im Wandel". Knapp, Frankfurt
- Harris, Larry (2003): "Trading and Exchanges - Market Microstructure for Practitioners"". Oxford University Press, New York

Weiterführende Literatur:

- Gomber, Peter (2000): "Elektronische Handelssysteme - Innovative Konzepte und Technologien". Physika Verlag, Heidelberg
- Schwartz, Robert A., Reto Francioni (2004): "Equity Markets in Action - The Fundamentals of Liquidity, Market Structure and Trading". Wiley, Hoboken, NJ

T	**5.97 Course: Emerging Trends in Digital Health [T-WIWI-110144]**

Responsible:　Prof. Dr. Ali Sunyaev
Organisation:　KIT Department of Economics and Management
Part of:　M-WIWI-104403 - Critical Digital Infrastructures

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2513404	Seminar Emerging Trends in Digital Health (Bachelor)	2 SWS	Seminar / 📱	Lins, Sunyaev, Thiebes
ST 2021	2513405	Seminar Emerging Trends in Digital Health (Master)	2 SWS	Seminar / 📱	Lins, Sunyaev, Thiebes
Exams					
ST 2021	7900146	Seminar Emerging Trends in Digital Health (Master)			Sunyaev

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

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

T 5.98 Course: Emerging Trends in Internet Technologies [T-WIWI-110143]

Responsible:	Prof. Dr. Ali Sunyaev
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-104403 - Critical Digital Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2513402	Seminar Emerging Trends in Internet Technologies (Bachelor)	2 SWS	Seminar / 📱	Sunyaev, Thiebes, Lins
ST 2021	2513403	Seminar Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar / 📱	Lins, Sunyaev, Thiebes
Exams					
ST 2021	7900128	Seminar Emerging Trends in Internet Technologies (Master)			Sunyaev

Legend: 📱 Online, ⛶ Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate
The alternative exam assessment consists of a final thesis.

Prerequisites
None.

Annotation
The course is usually held as a block course.

T	**5.99 Course: Emissions into the Environment [T-WIWI-102634]**

Responsible:	Ute Karl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III
	M-WIWI-101471 - Industrial Production II

Type Written examination	**Credits** 3,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2581962	Emissions into the Environment	2 SWS	Lecture / 🖥	Karl
Exams					
ST 2021	7981962	Emissions into the Environment			Schultmann

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🌢 On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Recommendation

None

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

V	**Emissions into the Environment** 2581962, WS 21/22, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **Online**

Content

Emission sources/emission monitoring/emission reduction: The lecture gives an overview of relevant emissions of air pollutants and greenhouse gases, emission monitoring and pollutant abatement options together with relevant legal regulations at national and international level. In addition, the fundamentals of circular economy, waste management and recycling are explained.

Structure:

Air pollution control

- Introduction, terms and definitions
- Sources of air pollutants
- Legal framework of air quality control
- Technical measures to reduce air pollutant emissions

Circular economy, recycling and waste management

- Waste collection and logistics
- Dual systems for packaging waste
- Recycling
- Thermal and biological waste treatment
- Final waste disposal

Literature

Wird in der Veranstaltung bekannt gegeben.

T 5.100 Course: Employment Law [T-INFO-111436]

Responsible: Dr. Alexander Hoff
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

T   5.101 Course: Energy and Environment [T-WIWI-102650]

Responsible:	Ute Karl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101452 - Energy Economics and Technology
	M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events

ST 2021	2581003	Energy and Environment	2 SWS	Lecture / 🖥	Karl
ST 2021	2581004	Übungen zu Energie und Umwelt	1 SWS	Practice / 🖥	Fraunholz, Langenmayr, Fichtner

Exams

ST 2021	7981003	Energy and Environment	Fichtner

Legend: 🖥 Online, ⚄ Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None.

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

V   Energy and Environment
2581003, SS 2021, 2 SWS, Language: German, Open in study portal

      Lecture (V)
      Online

Content
The lecture focuses on the environmental impacts arising from fossil fuels use and on the methods for the evaluation of such impacts. The first part of the lecture describes the environmental impacts of air pollutants and greenhouse gases as well as technical measures for emission control. The second part covers methods of impact assessment and their use in environmental communication as well as methods for the scientific support of emission control strategies.

The topics include:

- Fundamentals of energy conversion
- Formation of air pollutants during combustion
- Technical measures to control emissions from fossil-fuel combustion processes
- External effects of energy supply (life cycle analyses of selected energy systems)
- Environmental communication on energy services (e.g. electricity labelling, carbon footprint)
- Integrated Assessment Modelling to support the European Clean Air Strategy
- Cost-effectiveness analyses and cost-benefit analyses for emission control strategies
- Monetary valuation of external effects (external costs)

Literature
Die Literaturhinweise sind in den Vorlesungsunterlagen enthalten (vgl. ILIAS)

T 5.102 Course: Energy Market Engineering [T-WIWI-107501]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101446 - Market Engineering
	M-WIWI-101451 - Energy Economics and Energy Markets
	M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540464	Energy Market Engineering	2 SWS	Lecture / 📱	Staudt
ST 2021	2540465	Übung zu Energy Market Engineering	1 SWS	Practice / 📱	Staudt, Meinke
Exams					
ST 2021	79852	Energy Market Engineering			Weinhardt

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🌑 On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites

None

Recommendation

None

Annotation

Former course title until summer term 2017: T-WIWI-102794 "eEnergy: Markets, Services, Systems".

The lecture has also been added in the IIP Module *Basics of Liberalised Energy Markets.*

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

V Energy Market Engineering
2540464, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Literature

- Erdmann G, Zweifel P. *Energieökonomik, Theorie und Anwendungen*. Berlin Heidelberg: Springer; 2007.
- Grimm V, Ockenfels A, Zoettl G. Strommarktdesign: Zur Ausgestaltung der Auktionsregeln an der EEX *. *Zeitschrift für Energiewirtschaft*. 2008:147-161.
- Stoft S. *Power System Economics: Designing Markets for Electricity*. IEEE; 2002.,
- Ströbele W, Pfaffenberger W, Heuterkes M. *Energiewirtschaft: Einführung in Theorie und Politik*. 2nd ed. München: Oldenbourg Verlag; 2010:349.

T 5.103 Course: Energy Networks and Regulation [T-WIWI-107503]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101446 - Market Engineering
	M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2540494	Energy Networks and Regulation	2 SWS	Lecture	Rogat
WT 21/22	2540495	Übung zu Energy Networks and Regulation	1 SWS	Practice	Rogat

Competence Certificate

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

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

Prerequisites
None

Recommendation
None

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

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

V Energy Networks and Regulation
2540494, WS 21/22, 2 SWS, Open in study portal

Lecture (V)

Content
Learning Goals

The student,

- understands the business model of a network operator and knows its central tasks in the energy supply system,
- has a holistic overview of the interrelationships in the network economy,
- understands the regulatory and business interactions,
- is in particular familiar with the current model of incentive regulation with its essential components and understands its implications for the decisions of a network operator
- is able to analyse and assess controversial issues from the perspective of different stakeholders.

Content of teaching

The lecture "Energy Networks and Regulation" provides insights into the regulatory framework of electricity and gas. It touches upon the way the grids are operated and how regulation affects almost all grid activities. The lecture also addresses approaches of grid companies to cope with regulation on a managerial level. We analyze how the system influences managerial decisions and strategies such as investment or maintenance. Furthermore, we discuss how the system affects the operator's abilities to deal with the massive challenges lying ahead ("Energiewende", redispatch, European grid integration, electric vehicles etc.). Finally, we look at current developments and major upcoming challenges, e.g., the smart meter rollout. Covered topics include:

- Grid operation as a heterogeneous landscape: big vs. small, urban vs. rural, TSO vs. DSO
- Objectives of regulation: Fair price calculation and high standard access conditions
- The functioning of incentive regulation
- First major amendment to the incentive regulation: its merits, its flaws
- The revenue cap and how it is adjusted according to certain exogenous factors
- Grid tariffs: How are they calculated, what is the underlying rationale, do we need a reform (and which)?
- Exogenous costs shifted (arbitrarily?) into the grid, e.g. feed-in tariffs for renewable energy or decentralized supply.

Literature

Averch, H.; Johnson, L.L (1962). Behavior of the firm under regulatory constraint, in: American Economic Review, 52 (5), S. 1052 – 1069.

Bundesnetzagentur (2006): Bericht der Bundesnetzagentur nach § 112a EnWG zur Einführung der Anreizregulierung nach § 21a EnWG, http://www.bundesnetzagentur.de/SharedDocs/Downloads/DE/Sachgebiete/Energie/Unternehmen_Institutionen/Netzentgelte/Anreizregulierung/BerichtEinfuehrgAnreizregulierung.pdf?__blob=publicationFile&v=3.

Bundesnetzagentur (2015): Evaluierungsbericht nach § 33 Anreizregulierungsverordnung, https://www.bmwi.de/Redaktion/DE/Downloads/A/anreizregulierungsverordnung-evaluierungsbericht.pdf?__blob=publicationFile&v=1.

Filippini, M.; Wild, J.; Luchsinger, C. (2001): Regulierung der Verteilnetzpreise zu Beginn der Marktöffnung. Erfahrungen in Norwegen und Schweden, Bundesamt für Energie, Bern, http://www.iaea.org/inis/collection/NCLCollectionStore/_Public/34/066/34066585.pdf.

Gómez, T. (2013): Monopoly Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 151 – 198, Springer-Verlag, London.

Gómez, T. (2013): Electricity Distribution, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 199 – 250, Springer-Verlag, London.

Pérez-Arriaga, I.J. (2013): Challenges in Power Sector Regulation, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 647 – 678, Springer-Verlag, London.

Rivier, M.; Pérez-Arriaga, I.J.; Olmos, L. (2013): Electricity Transmission, in: Pérez-Arriaga, I.J. (Hg.): Regulation of the Power Sector, S. 251 – 340, Springer-Verlag, London.

T   5.104 Course: Energy Systems Analysis [T-WIWI-102830]

Responsible:	Dr. Armin Ardone
	Prof. Dr. Wolf Fichtner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101452 - Energy Economics and Technology

Type Written examination	Credits 3	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2581002	Energy Systems Analysis	2 SWS	Lecture	Fichtner, Ardone, Dengiz, Yilmaz
Exams					
ST 2021	7981002	Energy Systems Analysis			Fichtner

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

Annotation

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

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

V   Energy Systems Analysis   Lecture (V)
2581002, WS 21/22, 2 SWS, Language: English, Open in study portal

Content

1. Overview and classification of energy systems modelling approaches

2. Usage of scenario techniques for energy systems analysis

3. Unit commitment of power plants

4. Interdependencies in energy economics

5. Scenario-based decision making in the energy sector

6. Visualisation and GIS techniques for decision support in the energy sector

Learning goals:

The student

- has the ability to understand and critically reflect the methods of energy system analysis, the possibilities of its application in the energy industry and the limits and weaknesses of this approach
- can use select methods of the energy system analysis by her-/himself

Organizational issues

Bitte Institutsaushang beachten.

Literature
Weiterführende Literatur:

- Möst, D. und Fichtner, W.: **Einführung zur Energiesystemanalyse**, in: Möst, D., Fichtner, W. und Grunwald, A. (Hrsg.): Energiesystemanalyse, Universitätsverlag Karlsruhe, 2009
- Möst, D.; Fichtner, W.; Grunwald, A. (Hrsg.): **Energiesystemanalyse** - Tagungsband des Workshops "Energiesystemanalyse" vom 27. November 2008 am KIT Zentrum Energie, Karlsruhe, Universitätsverlag Karlsruhe, 2009 [PDF: http://digbib.ubka.uni-karlsruhe.de/volltexte/documents/928852]

T 5.105 Course: Energy Trade and Risk Management [T-WIWI-102691]

Responsible:	N.N.
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2021	2581020	Energy Trade and Risk Management	2 SWS	Lecture / 🖥	Kraft, Fraunholz, Fichtner
Exams					
ST 2021	7981020	Energy Trade and Risk Management			Fichtner

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate

The lecture "Energiehandel und Risikomanagement" will be held in English under the title "Energy Trading and Risk Management" from the summer semester 2022. The examination for the English-language lecture will be offered in English from the summer semester 2022.

Examination offer for the previous German-language lecture: Last first attempt in winter semester 21/22; last examination offer for repeaters in summer semester 2022.

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V Energy Trade and Risk Management
2581020, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content

1. Introduction to Markets, Mechanisms and Interaction
2. Electricity Trading (platforms, products, mechanisms)
3. Balancing Energy Markets and Congestion Management
4. Coal Markets (reserves, supply, demand, and transport)
5. Investments and Capacity Markets
6. Oil and Gas Markets (supply, demand, trade, and players)
7. Trading Game
8. Risk Management in Energy Trading

Organizational issues
Termine siehe Institutsaushang, freitags 14:00-15:30 Uhr

Literature
Weiterführende Literatur:

Burger, M., Graeber, B., Schindlmayr, G. (2007): *Managing energy risk: An integrated view on power and other energy markets*, Wiley&Sons, Chichester, England

EEX (2010): *Einführung in den Börsenhandel an der EEX auf Xetra und Eurex*, www.eex.de

Erdmann, G., Zweifel, P. (2008), Energieökonomik, Theorie und Anwendungen, Springer, ISBN: 978-3-540-71698-3

Hull, J.C. (2006): *Options, Futures and other Derivatives*, 6. Edition, Pearson Prentice Hall, New Jersey, USA

Borchert, J., Schlemm, R., Korth, S. (2006): *Stromhandel: Institutionen, Marktmodelle, Pricing und Risikomanagement (Gebundene Ausgabe)*, Schäffer-Poeschel Verlag

www.riskglossary.com

T	5.106 Course: Engineering FinTech Solutions [T-WIWI-106193]

Responsible:	Prof. Dr. Maxim Ulrich
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103247 - Intelligent Risk and Investment Advisory

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	9	Grade to a third	Each term	5

Events					
ST 2021	2530357	Advanced Machine Learning and Data Science	4 SWS	Practical course / 📱	Ulrich
WT 21/22	2530357	Advanced Machine Learning and Data Science	4 SWS	Practical course / 📱	Ulrich

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

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

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

V	**Advanced Machine Learning and Data Science** 2530357, SS 2021, 4 SWS, Language: English, Open in study portal	**Practical course (P)** **Online**

Content
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning.

Organizational issues
14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

V	**Advanced Machine Learning and Data Science** 2530357, WS 21/22, 4 SWS, Language: English, Open in study portal	**Practical course (P)** **Online**

Content
The course is targeted to students with a major in Data Science and/or Machine Learning. It offers students the opportunity to develop hands-on knowledge on new developments in data science and machine learning.

Organizational issues
14-tägig, tba

Literature
Literatur wird in der ersten Vorlesung bekannt gegeben.

T 5.107 Course: Engineering Interactive Systems [T-WIWI-110877]

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102806 - Service Innovation, Design & Engineering
M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Exams			
ST 2021	00006	Engineering Interactive Systems	Mädche
WT 21/22	7900195	Engineering Interactive Systems	Mädche

Competence Certificate
Alternative exam assessment. The assessment consists of a one-hour exam and the implementation of a Capstone project. Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Annotation
The course is held in English.

T 5.108 Course: Entrepreneurial Leadership & Innovation Management [T-WIWI-102833]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	3

Competence Certificate
Please note: The seminar cannot be offered in the winter semester 2019/2020 due to organizational reasons.
Alternative exam assessment.

Prerequisites
None

Recommendation
None

T   5.109 Course: Entrepreneurship [T-WIWI-102864]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each term	**Version** 1

Events					
ST 2021	2545001	Entrepreneurship	2 SWS	Lecture / 🖥	Terzidis
Exams					
ST 2021	7900002	Entrepreneurship			Terzidis
ST 2021	7900192	Entrepreneurship			Terzidis
WT 21/22	7900045	Entrepreneurship			Terzidis

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Students are offered the opportunity to earn a grade bonus through separate assignments. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by a maximum of one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the lecture.

Prerequisites
None

Recommendation
None

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

V	**Entrepreneurship** 2545001, SS 2021, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **Online**

Literature

Füglistaller, Urs, Müller, Christoph und Volery, Thierry (2008): Entrepreneurship

Ries, Eric (2011): The Lean Startup

Osterwalder, Alexander (2010): Business Model Generation

T 5.110 Course: Entrepreneurship Research [T-WIWI-102894]

Responsible:	Prof. Dr. Orestis Terzidis
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2021	2545002	Entrepreneurship Research	2 SWS	Seminar / 🖥	Henn, Manthey, Terzidis
Exams					
ST 2021	7900052	Entrepreneurship Research			Terzidis

Legend: 🖥 Online, ⠿ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

The performance review is done via a so called other methods of performance review (term paper) (alternative exam assessment). The final grade is a result from both, the grade of the term paper and its presentation, as well as active participation during the seminar.

Prerequisites

None

Recommendation

None

Annotation

The topics will be prepared in groups. The presentation of the results is done during a a block period seminar at the end of the semester. Students have to be present all day long during the seminar.

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

V	**Entrepreneurship Research**	Seminar (S)
	2545002, SS 2021, 2 SWS, Language: German, Open in study portal	Online

Organizational issues

Block am 21.04., 05.05., 14.07.

Literature

Wird im Seminar bekannt gegeben.

T 5.111 Course: Environmental and Resource Policy [T-WIWI-102616]

Responsible: Rainer Walz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	2560548	Environmental and Ressource Policy	2 SWS	Lecture / Practice (/ 🖳	Walz
Exams					
ST 2021	7900277	Environmental and Resource Policy			Mitusch

Legend: 🖳 Online, ⚙ Blended (On-Site/Online), ⬤ On-Site, ✗ Cancelled

Competence Certificate
See German version

Recommendation
It is recommended to already have knowledge in the area of industrial organization and economic policy. This knowledge may be acquired in the courses*Introduction to Industrial Organization* [2520371] and*Economic Policy*[2560280].

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

V	**Environmental and Ressource Policy**	**Lecture / Practice (VÜ)**
	2560548, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Literature
Weiterführende Literatur:

Michaelis, P.: Ökonomische Instrumente in der Umweltpolitik. Eine anwendungsorientierte Einführung, Heidelberg
OECD: Environmental Performance Review Germany, Paris

T   5.112 Course: Environmental Economics and Sustainability [T-WIWI-102615]

Responsible:	Prof. Dr. Rainer Walz
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101468 - Environmental Economics

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

Events					
WT 21/22	2521547	Umweltökonomik und Nachhaltigkeit (mit Übung)	2 SWS	Lecture / Practice (	Walz
Exams					
ST 2021	7900273	Environmental Economics and Sustainability			Mitusch

Competence Certificate
See German version

Prerequisites
None

Recommendation
It is recommended to already have knowledge in the area of macro- and microeconomics. This knowledge may be acquired in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014].

T 5.113 Course: Environmental Law [T-BGU-111102]

Organisation: KIT Department of Civil Engineering, Geo- and Environmental Sciences
Part of: M-WIWI-101468 - Environmental Economics

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	3	Grade to a third	Each winter term	1 terms	1

Exams			
WT 21/22	8262111102_1	Environmental Law	Smeddinck
WT 21/22	8262111102_2	Environmental Law	Smeddinck

Competence Certificate
Written exam with 120 min

Prerequisites
None

Annotation
None

T 5.114 Course: European and International Law [T-INFO-101312]

Responsible:	Ulf Brühann
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101217 - Public Business Law

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each summer term	**Version** 1

Events					
ST 2021	24666	Europäisches und Internationales Recht	2 SWS	Lecture / 📱	Brühann
Exams					
ST 2021	7500084	European and International Law			Eichenhofer

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T	5.115 Course: Experimental Economics [T-WIWI-102614]

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101446 - Market Engineering
M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101505 - Experimental Economics
M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2540489	Experimental Economics	2 SWS	Lecture	Peukert, Knierim
WT 21/22	2540493	Übung zu Experimentelle Wirtschaftsforschung	1 SWS	Practice	Greif-Winzrieth, Knierim

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

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

V	**Experimental Economics** 2540489, WS 21/22, 2 SWS, Language: German, Open in study portal	**Lecture (V)**

Literature

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2. Aufl. 2006.
- Handbook of Experimental Economics; J. Kagel, A. Roth; Princeton University Press, 1995.
- Experiments in Economics; J.D. Hey; Blackwell Publishers, 1991.
- Experimental Economics; D.D. Davis, C.A. Holt; Princeton University Press, 1993.
- Experimental Methods: A Primer for Economists; D. Friedman, S. Sunder; Cambridge University Press, 1994.

T   5.116 Course: Extraordinary additional course in the module Cross-Functional Management Accounting [T-WIWI-108651]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each term	1

Competence Certificate

The assessment depends on which extraordinary course becomes part of the module "Cross-Functional Management Accounting".

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Prerequisites

None

Annotation

The pupose of this placeholder is to make it possible zu include an extraordinary course in the module "Cross-Functional Management Accounting". Proposals for specific courses have to be approved in advance by the module coordinator.

T 5.117 Course: Financial Analysis [T-WIWI-102900]

Responsible:	Dr. Torsten Luedecke
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101480 - Finance 3
	M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2530205	Financial Analysis	2 SWS	Lecture / 🖥	Luedecke
ST 2021	2530206	Übungen zu Financial Analysis	2 SWS	Practice / 🖥	Luedecke
Exams					
ST 2021	7900075	Financial Analysis			Luedecke
WT 21/22	7900059	Financial Analysis			Ruckes, Luedecke

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🎙 On-Site, ✗ Cancelled

Competence Certificate
See German version.

Prerequisites
None

Recommendation
Basic knowledge in corporate finance, accounting, and valuation is required.

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

V	**Financial Analysis**	Lecture (V)
	2530205, SS 2021, 2 SWS, Language: English, Open in study portal	Online

Literature

- Alexander, D. and C. Nobes (2017): Financial Accounting – An International Introduction, 6th ed., Pearson.
- Penman, S.H. (2013): Financial Statement Analysis and Security Valuation, 5th ed., McGraw Hill.

T	**5.118 Course: Financial Econometrics [T-WIWI-103064]**

Responsible: Prof. Dr. Melanie Schienle

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

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

Annotation
The course takes place each second summer term: 2018/2020....

T 5.119 Course: Financial Econometrics II [T-WIWI-110939]

Responsible: Prof. Dr. Melanie Schienle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	see Annotations	2

Competence Certificate
Alternative exam assessment (Takehome Exam). Details will be announced at the beginning of the course.

Prerequisites
None

Recommendation
Knowledge of the contents covered by the course "Financial Econometrics"

Annotation
Course language is English
The course takes place each second winter term starting in WS2020/21

T	**5.120 Course: Financial Intermediation [T-WIWI-102623]**

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2
M-WIWI-101502 - Economic Theory and its Application in Finance

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2530232	Financial Intermediation	2 SWS	Lecture	Ruckes
WT 21/22	2530233	Übung zu Finanzintermediation	1 SWS	Practice	Ruckes, Benz
Exams					
ST 2021	7900078	Financial Intermediation			Ruckes
WT 21/22	7900063	Financial Intermediation			Ruckes

Competence Certificate
The assessment of this course is a written examination (following §4(2), 1 SPO) of 60 mins.

The exam is offered each semester.

Prerequisites
None

Recommendation
None

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

V	**Financial Intermediation** 2530232, WS 21/22, 2 SWS, Language: German, Open in study portal	Lecture (V)

Literature
Weiterführende Literatur:

- Hartmann-Wendels/Pfingsten/Weber (2014): Bankbetriebslehre, 6. Auflage, Springer Verlag.
- Freixas/Rochet (2008): Microeconomics of Banking, 2. Auflage, MIT Press.

| T | **5.121 Course: Firm creation in IT security [T-WIWI-110374]** |

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate
Alternative exam assessment. The grade consists of the presentation and the written elaboration.

Prerequisites
None

T 5.122 Course: Fixed Income Securities [T-WIWI-102644]

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

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The examination is offered for first-time writers for the last time in the winter semester 2020/21 and (only) for repeaters in the summer semester 2021.

The assessment takes place in the form of a written examination (75 minutes) according to §4(2), 1 SPO. The examination takes place during the semester break. The examination is offered every semester and can be repeated at any regular examination date. A bonus can be acquired through successful participation in the excercises. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by up to one grade level (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites

None

Recommendation

Knowledge from the course "Derivatives" is very helpful.

Annotation

The course will no longer be offered from winter semester 2020/21.

| **T** | **5.123 Course: Formal Systems [T-INFO-101336]** |

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: M-INFO-100799 - Formal Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 21/22	24086	Formale Systeme	4 SWS	Lecture / Practice (	Beckert, Ulbrich, Weigl
Exams					
ST 2021	7500009	Formal Systems			Beckert
WT 21/22	7500036	Formal Systems			Beckert

T 5.124 Course: Formal Systems II: Application [T-INFO-101281]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: M-INFO-100744 - Formal Systems II: Application
M-INFO-101201 - Software Systems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2021	2400093	Formal Systems II: Application	3 SWS	Lecture / 📱	Ulbrich, Beckert
Exams					
ST 2021	7500006	Formale Systeme II: Anwendung			Beckert

Legend: 📱 Online, ❈ Blended (On-Site/Online), ◆ On-Site, ✗ Cancelled

T 5.125 Course: Formal Systems II: Theory [T-INFO-101378]

Responsible: Prof. Dr. Bernhard Beckert
Organisation: KIT Department of Informatics
Part of: M-INFO-100841 - Formal Systems II: Theory
                   M-INFO-101201 - Software Systems

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

T   5.126 Course: Fundamentals of National and International Group Taxation [T-WIWI-111304]

Responsible:	Prof. Dr. Berthold Wigger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101511 - Advanced Topics in Public Finance

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2560133	Grundlagen der nationalen und internationalen Konzernbesteuerung	3 SWS	Lecture / 📱	Wigger, Gutekunst
Exams					
ST 2021	790kobe	Fundamentals of National and International Group Taxation			Wigger
WT 21/22	790kobe	Fundamentals of National and International Group Taxation			Wigger

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
It is recommended to attend the course "Basics of German Company Tax Law and Tax Planning" beforehand.

T   5.127 Course: Geometric Optimzation [T-INFO-101267]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
    Part of: M-INFO-100730 - Geometric Optimization

Type Oral examination	Credits 3	Grading scale Grade to a third	Recurrence Irregular	Version 1

Exams			
ST 2021	7500230	Geometric Optimzation	Prautzsch

T 5.128 Course: Global Optimization I [T-WIWI-102726]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2550134	Globale Optimierung I	2 SWS	Lecture / 📱	Stein
Exams					
ST 2021	7900270_SS2021_HK	Global Optimization I			Stein

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

Success is in the form of a written examination (60 min.) (according to § 4(2), 1 SPO). The successful completion of the exercises is required for admission to the written exam.

The exam is offered in the lecture of semester and the following semester.

The success check can be done also with the success control for "Global optimization II". In this case, the duration of the written exam is 120 min.

Prerequisites
None

Recommendation
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

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

V	**Globale Optimierung I**	**Lecture (V)**
	2550134, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

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

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- 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
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

T 5.129 Course: Global Optimization I and II [T-WIWI-103638]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	9	Grade to a third	Each summer term	1

Events					
ST 2021	2550134	Globale Optimierung I	2 SWS	Lecture / 🖥	Stein
ST 2021	2550135	Übung zu Globale Optimierung I und II	2 SWS	Practice / 🖥	Stein, Schwarze, Beck
ST 2021	2550136	Globale Optimierung II	2 SWS	Lecture / 🖥	Stein
Exams					
ST 2021	7900272_SS2021_HK	Global Optimization I and II			Stein

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 📍 On-Site, ✗ Cancelled

Competence Certificate
The assessment of the lecture is a written examination (120 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites
None

Recommendation
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

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

V	**Globale Optimierung I**	Lecture (V)
	2550134, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Algorithms (Kelley's cutting plane method, Frank-Wolfe method, primal-dual interior point methods)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *nonconvex* optimization problems forms the contents of the lecture "Global Optimization II". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

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

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- 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
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

| V | **Globale Optimierung II**
2550136, SS 2021, 2 SWS, Language: German, Open in study portal | **Lecture (V)**
Online |

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- 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
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

| **T** | **5.130 Course: Global Optimization II [T-WIWI-102727]** |

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2550136	Globale Optimierung II	2 SWS	Lecture / 📱	Stein
Exams					
ST 2021	7900271_SS2021_HK	Global Optimization II			Stein

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✘ Cancelled

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of "Global optimization I". In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None

Annotation
Part I and II of the lecture are held consecutively in the **same** semester.

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

| **V** | **Globale Optimierung II**
2550136, SS 2021, 2 SWS, Language: German, Open in study portal | **Lecture (V)**
Online |

Content

In many optimization problems from economics, engineering and natural sciences, solution algorithms are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.

The lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via alphaBB method
- Branch-and-bound methods
- Lipschitz optimization

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of *convex* optimization problems forms the contents of the lecture "Global Optimization I". The lectures "Global Optimization I" and "Global Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands the fundamentals of deterministic global optimization in the nonconvex case,
- is able to choose, design and apply modern techniques of deterministic global optimization in the nonconvex case in practice.

Literature

O. Stein, Grundzüge der Globalen Optimierung, SpringerSpektrum, 2018.

Weiterführende Literatur:

- 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
- A. Neumaier, Interval Methods for Systems of Equations, Cambridge University Press, 1990

T   5.131 Course: Graph Theory and Advanced Location Models [T-WIWI-102723]

Responsible:	Prof. Dr. Stefan Nickel
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Irregular	**Version** 2

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

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

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

T 5.132 Course: Growth and Development [T-WIWI-111318]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101478 - Innovation and Growth
M-WIWI-101496 - Growth and Agglomeration

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as an open-book examination or as a 60-minute written examination.

Prerequisites
None

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

Annotation
Due to the research semester of Prof. Dr. Ingrid Ott, the course will not be offered in the winter semester 2021/22. The exam will take place. Preparation materials can be found in ILIAS.

T 5.133 Course: Heat Economy [T-WIWI-102695]

Responsible:	Prof. Dr. Wolf Fichtner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101452 - Energy Economics and Technology

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	2581001	Heat Economy	2 SWS	Lecture / 📱	Fichtner
Exams					
ST 2021	7981001	Heat Economy			Fichtner

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
The lecture will be suspended in summer semester 2021.
The assessment consists of a written (60 minutes) or oral exam (30 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None.

Recommendation
None

Annotation
See German version.

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

V	**Heat Economy** 2581001, SS 2021, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **Online**

Organizational issues
Seminarraum Standort West Mittwoch: 08:00 - 09:30

T	**5.134 Course: Human Factors in Security and Privacy [T-WIWI-109270]**

Responsible: Prof. Dr. Melanie Volkamer
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104520 - Human Factors in Security and Privacy

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** see Annotations	**Version** 3

Events					
WT 21/22	2511554	Human Factors in Security and Privacy	2 SWS	Lecture	Volkamer
WT 21/22	2511555	Übungen zu Human Factors in Security and Privacy	1 SWS	Practice	Volkamer, Berens
Exams					
WT 21/22	7900113	Human Factors in Security and Privacy			Volkamer

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (30 min) following §4, Abs. 2, 2 of the examination regulation. Only those who have successfully participated in the exercises and the lecture will be admitted to the examination.

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

Prerequisites
Both need to be done:

- Pass Quiz on Paper for Graphical Passwords
- Presentation of Results Exercise 2

+ 9 of the following 11 need to be done:

- Submit ILIAS certificate until Oct 24
- Pass Quiz on InfoSec Lecture
- Active participation exercise 1 Part 1 - Evaluation and analyses methods
- Pass Quiz Paper Discussion 1 - User Behaviour and motivation theories
- Active participation exercise 1 Part 2
- Pass Quiz Paper Discussion 2 - User Behaviour and motivation theories
- Pass Quiz Paper Discussion 3 - Security Awareness
- Active participation exercise 1 Part 3
- Pass Quiz Paper Discussion 4 - Graphical Authentication
- Pass Quiz Paper Discussion 5 - Shoulder Surfing Authentication
- Active participation exercise 2

Recommendation
The prior attendance of the lecture "Information Security" is strongly recommended.

Annotation
The lecture will not be offered in winter semester 2020/21.

Some lectures are in English, some in German.

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

V	**Human Factors in Security and Privacy** 2511554, WS 21/22, 2 SWS, Language: German/English, Open in study portal	**Lecture (V)**

Literature

- Usable Security: History, Themes, and Challenges (Synthesis Lectures on Information Security, Privacy, and Trust): Simson Garfinkel und Heather Richter Lipford. 2014
- Security and Usability: Designing Secure Systems that People Can Use von Lorrie Faith Cranor und Simson Garfinkel. 2005
- Melanie Volkamer, Karen Renaud: Mental Models - General Introduction and Review of Their Application to Human-Centred Security. In Number Theory and Cryptography (2013): 255-280: https://link.springer.com/chapter/10.1007/978-3-642-42001-6_18
- Paul Gerber, Marco Ghiglierie, Birgit Henhapl, Oksana Kulyk, Karola Marky, Peter Mayer, Benjamin Reinheimer, Melanie Volkamer: Human Factors in Security. In: Reuter C. (eds) Sicherheitskritische Mensch-Computer-Interaktion. Springer (2018) https://link.springer.com/chapter/10.1007/978-3-658-19523-6_5
- Bruce Schneier: Psychology of Security (2018): https://www.schneier.com/essays/archives/2008/01/the_psychology_of_se.html
- Ross Anderson: security /usability and psychology. In Security Engineering. http://www.cl.cam.ac.uk/~rja14/Papers/SEv2-c02.pdf
- Andrew Odlyzko: Economics, Psychology and Sociology of Security: http://www.dtc.umn.edu/~odlyzko/doc/econ.psych.security.pdf

T	**5.135 Course: Human-Machine-Interaction [T-INFO-101266]**

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-100729 - Human Computer Interaction

Type Written examination	**Credits** 6	**Grading scale** Grade to a third	**Recurrence** Each summer term	**Version** 2

Events					
ST 2021	24659	Human-Computer-Interaction	2 SWS	Lecture / 📱	Beigl
Exams					
ST 2021	7500048	Human-Machine-Interaction			Beigl
WT 21/22	7500076	Human-Machine-Interaction			Beigl

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

T 5.136 Course: Human-Machine-Interaction Pass [T-INFO-106257]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-100729 - Human Computer Interaction

Type Completed coursework	Credits 0	Grading scale pass/fail	Recurrence Each summer term	Version 1

Events					
ST 2021	2400095	Human-Computer-Interaction	1 SWS	Practice / ▯	Beigl
ST 2021	24659	Human-Computer-Interaction	2 SWS	Lecture / ▯	Beigl
Exams					
ST 2021	7500121	Human-Machine-Interaction			Beigl

Legend: ▯ Online, ⬚ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T 5.137 Course: Incentives in Organizations [T-WIWI-105781]

Responsible: Prof. Dr. Petra Nieken
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101453 - Applied Strategic Decisions
M-WIWI-101500 - Microeconomic Theory
M-WIWI-101505 - Experimental Economics
M-WIWI-101510 - Cross-Functional Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2573003	Incentives in Organizations	2 SWS	Lecture /	Nieken
ST 2021	2573004	Übung zu Incentives in Organizations	2 SWS	Practice /	Nieken, Mitarbeiter
Exams					
ST 2021	7900132	Incentives in Organizations			Nieken

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

Competence Certificate
The assessment of this course is a written examination (60 min). The exam takesplace in every semester. Re-examinations are offered at every ordinaryexamination date. In case of a small number of registrations, we might offer an oral exam instead of a written exam.

Prerequisites
None

Recommendation
Knowledge of microeconomics, game theory, and statistics is assumed.

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

V	**Incentives in Organizations**	Lecture (V)
	2573003, SS 2021, 2 SWS, Language: English, Open in study portal	Online

Content
The students acquire profound knowledge about the design and the impact of different incentive and compensation systems. Topics covered are, for instance, performance based compensation, team work, intrinsic motivation, multitasking, and subjective performance evaluations. We will use microeconomic or behavioral models as well as empirical data to analyze incentive systems. We will investigate several widely used compensation schemes and their relationship with corporate strategy. Students will learn to develop practical implications which are based on the acquired knowledge of this course.

Aim

The student

- develops a strategic understanding about incentives systems and how they work.
- analyzes models from personnel economics.
- understands how econometric methods can be used to analyze performance and compensation data.
- knows incentive schemes that are used in companies and is able to evaluate them critically.
- can develop practical implications which are based on theoretical models and empirical data from companies.
- understands the challenges of managing incentive and compensation systems and their relationship with corporate strategy.

Workload

The total workload for this course is: approximately 135 hours.

Lecture: 32 hours

Preparation of lecture: 52 hours

Exam preparation: 51 hours

Literature

Slides, Additional case studies and research papers will be announced in the lecture.

Literature (complementary):

Managerial Economics and Organizantional Architecture, Brickley / Smith / Zimmerman, McGraw-Hill Education, 2015

Behavioral Game Theory, Camerer, Russel Sage Foundation, 2003

Personnel Economics in Practice, Lazear / Gibbs, Wiley, 2014

Introduction to Econometrics, Wooldridge, Andover, 2014

Econometric Analysis of Cross Section and Panel Data, Wooldridge, MIT Press, 2010

Organizational issues
Die Vorlesungsinhalte sind als Aufzeichnungen verfügbar. An ausgewählten Vorlesungsterminen gibt es Live-Sessions. Diese werden zum Vorlesungsstart bekannt gegeben.
There are recordings of the lecture contents. There will be live sessions on selected lecture dates. These will be announced at the start of the lecture time.

T 5.138 Course: Information Service Engineering [T-WIWI-106423]

Responsible: Prof. Dr. Harald Sack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101456 - Intelligent Systems and Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2511606	Information Service Engineering	2 SWS	Lecture / 🖥	Sack
ST 2021	2511607	Exercises to Information Service Engineering	1 SWS	Practice / 🖥	Sack
Exams					
ST 2021	7900070	Information Service Engineering (Registration until 12 July 2021)			Sack
WT 21/22	7900071	Information Service Engineering			Sack

Legend: 🖥 Online, 🎲 Blended (On-Site/Online), ● On-Site, ✕ Cancelled

Competence Certificate

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

Prerequisites

None

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

V	**Information Service Engineering**	Lecture (V)
	2511606, SS 2021, 2 SWS, Language: English, Open in study portal	Online

Content
- Information, Natural Language and the Web
- Natural Language Processing

- NLP and Basic Linguistic Knowledge
- NLP Applications, Techniques & Challenges
- Evaluation, Precision and Recall
- Regular Expressions and Automata
- Tokenization
- Language Model and N-Grams
- Part-of-Speech Tagging

- Knowledge Graphs

- Knowledge Representations and Ontologies
- Resource Description Framework (RDF)
  as simple Data Model
- Creating new Models with RDFS
- Querying RDF(S) with SPARQL
- More Expressivity via Web Ontology Language (OWL)
- From Linked Data to Knowledge Graphs
- Wikipedia, DBpedia, and Wikidata
- Knowledge Graph Programming

- Basic Machine Learning

- Machine Learning Fundamentals
- Evaluation and Generalization Problems
- Linear Regression
- Decision Trees
- Unsupervised Learning
- Neural Networks and Deep Learning

- ISE Applications

- From Data to Knowledge
- Data Mining, Information Visualization and Knowledge Discovery
- Semantic Search
- Exploratory Search
- Semantic Recommender Systems

Learning objectives:

- The students know the fundamentals and measures of information theory and are able to apply those in the context of Information Service Engineering.
- The students have basic skills of natural language processing and are enabled to apply natural language processing technology to solve and evaluate simple text analysis tasks.
- The students have fundamental skills of knowledge representation with ontologies as well as basic knowledge of Semantic Web and Linked Data technologies. The students are able to apply these skills for simple representation and analysis tasks.
- The students have fundamental skills of information retrieval and are enabled to conduct and to evaluate simple information retrieval tasks.
- The students apply their skills of natural language processing, Linked Data engineering, and Information Retrieval to conduct and evaluate simple knowledge mining tasks.
- The students know the fundamentals of recommender systems as well as of semantic and exploratory search.

Literature

- D. Jurafsky, J.H. Martin, Speech and Language Processing, 2nd ed. Pearson Int., 2009.
- A. Hogan, The Web of Data, Springer, 2020.
- G. Rebala, A. Ravi, S. Churiwala, An Introduction to Machine Learning, Springer, 2019.

T   5.139 Course: Innovation Management: Concepts, Strategies and Methods [T-WIWI-102893]

Responsible: Prof. Dr. Marion Weissenberger-Eibl
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	2545100	Innovation Management: Concepts, Strategies and Methods	2 SWS	Lecture / 📱	Weissenberger-Eibl
Exams					
ST 2021	7900144	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl
ST 2021	7900145	Innovation Management: Concepts, Strategies and Methods			Weissenberger-Eibl

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every summer semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None

Recommendation
None

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

V   Innovation Management: Concepts, Strategies and Methods
2545100, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
The course 'Innovation Management: Concepts, Strategies and Methods' offers scientific concepts which facilitate the understanding of the different phases of the innovation process and resulting strategies and appropriate methodologies suitable for application. The concepts refer to the entire innovation process so that an integrated perspective is made possible. This is the basis for the teaching of strategies and methods which fulfil the diverse demands of the complex innovation process. The course focuses particularly on the creation of interfaces between departments and between various actors in a company's environment and the organisation of a company's internal procedures. In this context a basic understanding of knowledge and communication is taught in addition to the specific characteristics of the respective actors. Subsequently methods are shown which are suitable for the profitable and innovation-led implementation of integrated knowledge.

Aim: Students develop a differentiated understanding of the different phases and concepts of the innovation process, different strategies and methods in innovation management.

Organizational issues
Die **Vorlesung** wird als interaktive **online Veranstaltung** durchgeführt. Die Vorlesung startet am 15.04.2021 und findet donnerstags 10:00-11:30 Uhr statt. **Wichtig!** Bitte treten Sie dem **ILIAS-Kurs zur Vorlesung** bei, damit wir Ihnen weitere Informationen mittteilen können.

Literature
Eine ausführliche Literaturliste wird mit den Vorlesungsunterlagen zur Verfügung gestellt.

Eine Einführung bei: Vahs,D./Brem,A. (2013): Innovationsmanagement. Von der Idee zur erfolgreichen Vermarktung, 4. Auflage, Stuttgart 2013.

T 5.140 Course: Innovation Processes Live [T-WIWI-110234]

Responsible:	Dr. Daniela Beyer
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate

Alternative exam assessments (§4(2), 3 SPO). The grade consists of an exposé (15%), a guideline interview or an analysis tool (25%), a group presentation of the results (20%) and a seminar paper (40%).

Prerequisites

None.

Recommendation

Prior attendance of the course Innovation Management [2545015] is recommended.

T 5.141 Course: Innovation Theory and Policy [T-WIWI-102840]

Responsible:	Prof. Dr. Ingrid Ott
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101478 - Innovation and Growth
	M-WIWI-101514 - Innovation Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2560236	Innovationtheory and -policy	2 SWS	Lecture / 🖥	Ott
ST 2021	2560237		1 SWS	Practice / 🖥	Ott
Exams					
ST 2021	7900107	Innovationtheory and -Policy			Ott
WT 21/22	7900077	Innovationtheory and -Policy			Ott

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🔵 On-Site, ✗ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites

None

Recommendation

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

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

V	**Innovationtheory and -policy**	**Lecture (V)**
	2560236, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Online**

Content
Learning objectives:

Students shall be given the ability to

- identify the importance of alternative incentive mechanisms for the emergence and dissemination of innovations
- understand the relationships between market structure and the development of innovation
- explain, in which situations market interventions by the state, for example taxes and subsidies, can be legitimized, and evaluate them in the light of economic welfare

Course content:

The course covers the following topics:

- Incentives for the emergence of innovations
- Patents
- Diffusion
- Impact of technological progress
- Innovation Policy

Recommendations:

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

Workload:

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

Exam description:

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

Students will be given the opportunity of writing and presenting a short paper during the lecture time to achieve a bonus on the exam grade. If the mandatory credit point exam is passed, the awarded bonus points will be added to the regular exam points. A deterioration is not possible by definition, and a grade does not necessarily improve, but is very likely to (not every additional point improves the total number of points, since a grade can not become better than 1). The voluntary elaboration of such a paper can not countervail a fail in the exam.

Literature
Auszug:

- Aghion, P., Howitt, P. (2009), The Economics of Growth, MIT Press, Cambridge MA.
- de la Fuente, A. (2000), Mathematical Methods and Models for Economists. Cambridge University Press, Cambridge, UK.
- Klodt, H. (1995), Grundlagen der Forschungs- und Technologiepolitik. Vahlen, München.
- Linde, R. (2000), Allokation, Wettbewerb, Verteilung - Theorie, UNIBUCH Verlag, Lüneburg.
- Ruttan, V. W. (2001), Technology, Growth, and Development. Oxford University Press, Oxford.
- Scotchmer, S. (2004), Incentives and Innovation, MIT Press.
- Tirole, Jean (1988), The Theory of Industrial Organization, MIT Press, Cambridge MA.

T   5.142 Course: Integrated Network and Systems Management [T-INFO-101284]

Responsible:	Prof. Dr. Bernhard Neumair
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101210 - Dynamic IT-Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	2400004	Integrated Network and Systems Management	2 SWS	Lecture / 📱	Neumair
Exams					
ST 2021	7500144	Integrated Network and Systems Management			Neumair

Legend: 📱 Online, ⚃ Blended (On-Site/Online), 🎙 On-Site, ✗ Cancelled

T   5.143 Course: Intelligent Agent Architectures [T-WIWI-111267]

Responsible: Prof. Dr. Andreas Geyer-Schulz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101470 - Data Science: Advanced CRM
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Exams			
ST 2021	7900295	Intelligent Agent Architectures	Geyer-Schulz
ST 2021	7900318	Intelligent Agent Architectures (Nachklausur WS 2020/2021)	Geyer-Schulz

Competence Certificate
Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
It is recommended to additionally review the Bachelor-level lecture "Customer Relationship Management" from the module "CRM and Servicemanagement".

T 5.144 Course: Intelligent Agents and Decision Theory [T-WIWI-110915]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101470 - Data Science: Advanced CRM
	M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540537	Intelligent Agents and Decision Theory		Lecture / 🖥	Geyer-Schulz
ST 2021	2540538	Übung zu Intelligent Agents and Decision Theory	1 SWS	Practice / 🖥	Schweizer
Exams					
ST 2021	7900306	Intelligent Agents and Decision Theory			Geyer-Schulz

Legend: 🖥 Online, ⚁ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate

Oral (30 minutes) or written examination (60 minutes). The exam is held in each semester and can be repeated at any regular examination date.Details of the grading system and any exam bonus that may be achieved from the practice are announced in the course.

Prerequisites

None

Recommendation

We assume knowledge in statistics, operations research and microeconomics as taught in the Bachelor program (VWL I, Operations Research I + II, Statistics I + II) and a familiarity with preferably the Python programming language.

Annotation

new lecture starting summer semester 2020

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

V	**Intelligent Agents and Decision Theory**	Lecture (V)
	2540537, SS 2021, SWS, Language: English, Open in study portal	**Online**

Content

The key assumption of this lecture is that the concept of artificial intelligence is inseparably linked to the economic concept of rationality of agents. We consider different classes of decision problems - decisions under certainty, risk and uncertainty - from an economic, managerial and AI-engineering perspective:

From an economic point of view, we analyze how to act rationally in these situations based on classic utility theory. In this regard, the course also introduces the relevant parts of decision theory for dealing with

- multiple conflicting objectives,
- incomplete, risky and uncertain information about the world,
- assessing utility functions, and
- quantifying the value of information ...

From an engineering perspective, we discuss how to develop practical solutions for these decision problems, using appropriate AI components. We introduce

- a general, agent-based design framework for AI systems,

as well as AI methods from the fields of

- search (for decisions under certainty),
- inference (for decons under risk) and
- learning (for decisions under uncertainty).

Where applicable, the course highlights the theoretical ties of these methods with decision theory.

We conclude with a discussion of ethical and philosophical issues concerning the development and use of AI.

Learning objectives

Students are able to design, analyze, implement, and evaluate intelligent agents.

Lecture Outline

1. Introduction: Artificial intelligence and the economic concept of rationality
2. Intelligent Agents: A general, agent-based design framework for AI systems
3. Decision under certainty: Assessing utility functions for decisions with multiple objectives
4. Search: Linear programming for decisions under certainty
5. Decisions under risk: The expected utility principle
6. Information systems: Improving economic decisions under risk
7. Inference: Bayesian networks for decisions under risk
8. Information Learning objectives value: When should an agent gather new information?
9. Decisions under uncertainty: Complete lack of information
10. Learning: Statistical learning of bayesian networks
11. Learning: Supervised learning with neural networks
12. Learning: Reinforcement learning
13. Learning: Preference-based reinforcement learning
14. Discussion: Ethical and philosophical issues

Note: This rough outline may be subject to change.

Literature
Basic literature (by lecture):

1. Russell & Norvig (2016, chapter 1), Bamberg et al. (2019, chapters 1 & 2)
2. Russell & Norvig (2016, chapter 2)
3. Keeney & Raiffa (1993, chapter 3)
4. Nickel et al. (2014, chapter 1) [German], Russell & Norvig (2016, chapter 3)
5. Bamberg et al. (2019, chapter 4), Fishburn (1988)
6. Bamberg et al. (2019, chapter 6)
7. Russell & Norvig (2016, chapters 13, 14, 16)
8. Russell & Norvig (2016, chapter 16), Bamberg et al. (2019, chapter 6)
9. Bamberg et al. (2019, chapter 5)
10. Russell & Norvig (2016, chapter 20)
11. Goodfellow et al. (2016, chapter 6)
12. Sutton & Barto (2018, chapter 3)
13. Wirth et al. (2017)
14. Russell & Norvig (2016, chapter 26)

Detailed references:

Bamberg, Coenenberg & Krapp (2019). Betriebswirtschaftliche Entscheidungslehre (16th ed.). Verlag Franz Vahlen GmbH.

Fishburn (1988). Nonlinear preference and utility theory. Baltimore: Johns Hopkins University Press.

Goodfellow, Bengio & Courville (2016). Deep learning. Cambridge: MIT press.

Keeney & Raiffa (1993). Decisions with multiple objectives: preferences and value trade-offs. Cambridge University Press.

Nickel, S., Stein, O., & Waldmann, K.-H. (2014). Operations Research (2nd ed.). Springer Berlin Heidelberg.

Russell & Norvig (2016). Artificial Intelligence: A Modern Approach (3rd Global Edition). Pearson.

Sutton & Barto (2018). Reinforcement learning: An introduction. Cambridge: MIT press.

Wirth, Akrour, Neumann & Fürnkranz (2017). A Survey of Preference-Based Reinforcement Learning Methods. Journal of Machine Learning Research, 18(1), 1–46.

| T | 5.145 Course: International Business Development and Sales [T-WIWI-110985] |

Responsible:	Erice Casenave
	Prof. Dr. Martin Klarmann
	Prof. Dr. Orestis Terzidis
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-105312 - Marketing and Sales Management

Type Examination of another type	**Credits** 6	**Grading scale** Grade to a third	**Recurrence** see Annotations	**Version** 1

Events					
WT 21/22	2572189	International Business Development and Sales	4 SWS	Block / 🗣	Klarmann, Terzidis, Casernave

Legend: 🗐 Online, 🥨 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate
Non exam assessment. The grade is based on the presentation, the subsequent discussion and the written elaboration.

Annotation
Due to the Corona situation it is currently unclear whether the seminar can be offered in WS20 / 21.

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

| V | **International Business Development and Sales** 2572189, WS 21/22, 4 SWS, Language: English, Open in study portal | **Block (B) On-Site** |

Content
This course is offered as part of the EUCOR programme in cooperation with EM Strasbourg. Max. 10 students of KIT and max. 10 students of EM Strasbourg will develop a sales presentation in tandems (teams of 2). This is based on the value proposition of a business model.

- An application is required to participate in this event. The application phase usually takes place at the beginning of the lecture period. Further information on the application process can be found on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the start of the lecture period.

Total workload for 6 ECTS: about 180 hours.

T 5.146 Course: International Finance [T-WIWI-102646]

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

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	see Annotations	1

Events					
ST 2021	2530570	International Finance	2 SWS	Lecture / 🖥	Walter, Uhrig-Homburg
Exams					
ST 2021	7900097	International Finance			Uhrig-Homburg
WT 21/22	7900052	International Finance			Uhrig-Homburg

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

Recommendation
None

Annotation
The course is offered as a 14-day or block course.

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

V	**International Finance**	Lecture (V)
	2530570, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Organizational issues
nach dem 21.04. nach Absprache

Literature
Weiterführende Literatur:

- Eiteman, D. et al., Multinational Business Finance, 13. Auflage, 2012.
- Solnik, B. und D. McLeavey, Global Investments, 6. Auflage, 2008.

T 5.147 Course: International Management in Engineering and Production [T-WIWI-102882]

Responsible:	Dr. Henning Sasse
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III
	M-WIWI-101471 - Industrial Production II

Type	Credits	Grading scale	Recurrence	Version
Written examination	3,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2581956	International Management in Engineering and Production	2 SWS	Lecture / 🖥	Sasse
Exams					
ST 2021	7981956	International Management in Engineering and Production			Schultmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

Annotation
The lecture will be renamed "Global Manufacturing" from WS 2022/23.

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

V International Management in Engineering and Production
2581956, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content

- Fundamentals of international business
- Forms of international cooperation and value creation
- Site selection
- Cost driven internationalization and site selection
- Sales and customer driven internationalization and site selection
- Challenges, risks and risk mitigation
- Management of international production sites
- Types and case studies of international production

Organizational issues
Blockveranstaltung, siehe Homepage

Literature
Wird in der Veranstaltung bekannt gegeben.

T   5.148 Course: Internet Law [T-INFO-101307]

Responsible: Prof. Dr. Thomas Dreier
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

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

Events					
WT 21/22	24354	Internet Law	2 SWS	Lecture / 📱	Dreier
Exams					
ST 2021	7500057	Internet Law			Dreier, Matz

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎙 On-Site, ✗ Cancelled

T	5.149 Course: Internet of Everything [T-INFO-101337]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: M-INFO-101203 - Wireless Networking
M-INFO-101205 - Future Networking

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 21/22	24104	Internet of Everything	2 SWS	Lecture	Friebe, Jung, Neumeister, Zitterbart
Exams					
ST 2021	7500071	Internet of Everything			Zitterbart
WT 21/22	7500009	Internet of Everything			Zitterbart

T 5.150 Course: Introduction in Computer Networks [T-INFO-102015]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: M-INFO-101178 - Communication and Database Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	24519	Einführung in Rechnernetze	2 SWS	Lecture / ▤	Kopmann, Neumeister, Schneider, Friebe, Jung, Zitterbart
ST 2021	24521	Übung zu Einführung in Rechnernetze	1 SWS	Practice / ▤	Kopmann, Neumeister, Schneider, Friebe, Jung, Zitterbart
Exams					
ST 2021	7500116	Introduction to Computer Networking			Zitterbart
WT 21/22	7500201	Introduction to Computer Networking			Zitterbart

Legend: ▤ Online, ⚅ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

T 5.151 Course: Introduction to Bayesian Statistics for Analyzing Data [T-WIWI-110918]

Responsible: Prof. Dr. Benjamin Scheibehenne
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

Competence Certificate
Grades will be based on active participation (50%) and homework assignments (50%).

Prerequisites
Participants should already have a basic knowledge of R and standard frequentist statistical tests. Please bring your own Laptop with you as we will be using R for several hands-on examples and exercises during the class. We will mainly work with the book "Statistical Rethinking. A Bayesian Course with Examples in R and Stan" by Richard McElrath. Students are advised to obtain the book before the class starts.

Annotation
Due to its interactive nature, participation will be limited to 10 students. If you want to participate, please send a short email to scheibehenne@kit.edu until Thursday, the 23rd of April in which you outline why you are interested in this class and what your expectations are.

The class will consist of three day-long sessions from 9:00 (s.t.) to 18:00. The first session will be held on Thursday, the 7th of May 2020. The second session will be on Thursday, the 28th of May. The third session will be on Thursday, the 18th of June. The classroom will be communicated to registered students in advance. In case classrooms will be closed due to the Corona virus, the class will be taught online and the schedule will be adapted.

T   5.152 Course: Introduction to Stochastic Optimization [T-WIWI-106546]

Responsible:	Prof. Dr. Steffen Rebennack
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2550470	Einführung in die Stochastische Optimierung	2 SWS	Lecture / ▯	Rebennack
ST 2021	2550471	Übung zur Einführung in die Stochastische Optimierung	1 SWS	Practice / ▯	Rebennack, Sinske
ST 2021	2550474	Rechnerübung zur Einführung in die Stochastische Optimierung	2 SWS	Practice / ▯	Rebennack, Sinske
Exams					
ST 2021	7900311	Introduction to Stochastic Optimization			Rebennack

Legend: ▯ Online, ✣ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate

Alternative exam assessment (open book exam). The exam takes place in every semester.

Prerequisites

None.

T 5.153 Course: Introduction to Video Analysis [T-INFO-101273]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: M-INFO-100736 - Introduction to Video Analysis
M-INFO-101239 - Machine Vision

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	24684	Introduction to Video Analysis	2 SWS	Lecture / ▤	Arens
Exams					
ST 2021	7500031	Introduction to Video Analysis			Beyerer, Arens
WT 21/22	7500099	Introduction to Video Analysis			Beyerer, Arens

Legend: ▤ Online, ⬙ Blended (On-Site/Online), ◗ On-Site, ✗ Cancelled

T 5.154 Course: IT-Security Management for Networked Systems [T-INFO-101323]

Responsible:	Prof. Dr. Hannes Hartenstein
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101204 - Networking Labs
	M-INFO-101207 - Networking Security - Theory and Praxis
	M-INFO-101210 - Dynamic IT-Infrastructures
	M-WIWI-101458 - Ubiquitous Computing

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 21/22	24149	IT-Security Management for Networked Systems	3 SWS	Lecture / Practice (/ 🗣	Hartenstein, Grundmann, Westermeyer
Exams					
ST 2021	7500311	IT-Security Management for Networked Systems			Hartenstein
WT 21/22	7500599	IT-Security Management for Networked Systems			Hartenstein

Legend: 📱 Online, 🎲 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

T 5.155 Course: Joint Entrepreneurship Summer School [T-WIWI-109064]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
ST 2021	2545021	Joint Entrepreneurship School	4 SWS	Seminar / 🖥	Kleinn, Mohammadi, Terzidis

Exams			
ST 2021	7900346	Joint Entrepreneurship Summer School	Terzidis

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
The learning control of the program (Summer School) consists of two parts:
A) **Investor Pitch**:
Based on a presentation (investor pitch) in front of a jury, the insights gained and developed during the course of the event are presented and the business idea presented. Among other things, the presentation performance of the team, the structured content and the logical consistency of the business idea are evaluated. The exact evaluation criteria will be announced in the course.

B) **Written elaboration:**
The second part of the assessment is a written report. The iterative knowledge gain of the entire event is systematically logged and can be further supplemented by the contents of the presentation. The report documents key action steps, applied methods, findings, market analyzes and interviews and prepares them in writing. The exact structure and requirements will be announced in the course.

The grade consists of 50% presentation performance and 50% written preparation.

Prerequisites
The Summer School is aimed at master students of KIT. Prerequisite is the participation in the selection process.

Recommendation
We recommend basic business knowledge, the lecture Entrepreneurship as well as openness and interest in intercultural exchange. Solid knowledge of the English language is an advantage.

Annotation
The working language during the Summer School is English. A one-week stay in China is part of the Summer School.

T   5.156 Course: Judgment and Decision Making [T-WIWI-111099]

Responsible:	Prof. Dr. Benjamin Scheibehenne
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Expansion	Version
Written examination	4,5	Grade to a third	Each winter term	1 terms	1

Events					
WT 21/22	2540440	Judgment and Decision Making	3 SWS	Lecture / 📱	Scheibehenne
Exams					
ST 2021	7900322	Judgment and Decision Making			Scheibehenne

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
written exam (90min) at the end of the Semester

Annotation
The judgments and decisions that we make can have long ranging and important consequences for our (financial) well-being and individual health. Hence, the goal of this lecture is to gain a better understanding of how people make judgments and decisions and the factors that influences their behavior. We will look into simple heuristics and mental shortcuts that decision makers use to navigate their environment, in particular so in an economic context. Following this the lecture will provide an overview into social and emotional influences on decision making. In the second half of the semester we will look into some more specific topics including self-control, nudging, and food choice. The last part of the lecture will focus on risk communication and risk perception. We will address these questions from an interdisciplinary perspective at the intersection of Psychology, Behavioral Economics, Marketing, Cognitive Science, and Biology. Across all topics covered in class, we will engage with basic theoretical work as well as with groundbreaking empirical research and current scientific debates.

The workload of the class is 4.5 ECTS. This consists of 3 ETCS for the lecture and 1.5 ETCS for the Übung. Details about the Übung will be communicated at the first day of the class.

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

V   Judgment and Decision Making   Lecture (V)
2540440, WS 21/22, 3 SWS, Language: English, Open in study portal   **Online**

Content
In this lecture, students will be introduced to fundamental theories and key insights on human judgment and decision making. Topics include decision making under uncertainty, choice biases, simple heuristics, risk perception and -communication, as well as social and emotional influences on decision making, to name but a few. In the Wintersemester 20/21 this class will be held online. The lecture videos will be available for download and there will be regular online meetings to discuss the topics. The lecture will be held in English.

T 5.157 Course: KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics [T-WIWI-111109]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101446 - Market Engineering
	M-WIWI-103118 - Data Science: Data-Driven User Modeling
	M-WIWI-104080 - Designing Interactive Information Systems

Type	Credits	Grading scale	Recurrence	Expansion	Version
Examination of another type	4,5	Grade to a third	Each summer term	1 terms	1

Exams			
ST 2021	7900368	KD²Lab Hands-On Research Course: New Ways and Tools in Experimental Economics	Weinhardt

Competence Certificate

Non exam assessment. Grading will be based on a continuous basis throughout the semester. The assessment consists of:

- A written paper, and
- a group presentation with subsequent discussion and question and answer session of 30 minutes.

For particularly active and constructive participation in the discussions of other papers during the final presentation, a bonus of one grade level (0.3 or 0.4) can be achieved on the passed exam. Details on the grading will be announced at the beginning of the event.

Annotation

Due to the laboratory capacity and in order to ensure an optimal supervision of the project groups, the number of participants is limited. Places are allocated according to preferences and suitability for the topics. In particular, previous knowledge in the field of experimental economics plays a role.
The course will be offered starting in the summer semester 2021.

T 5.158 Course: Knowledge Discovery [T-WIWI-102666]

Responsible:	Michael Färber
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101456 - Intelligent Systems and Services
	M-WIWI-105366 - Artificial Intelligence
	M-WIWI-105368 - Web and Data Science

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 2

Events					
WT 21/22	2511302	Knowledge Discovery	2 SWS	Lecture	Färber
WT 21/22	2511303	Exercises to Knowledge Discovery	1 SWS	Practice	Färber, Saier
Exams					
ST 2021	7900039	Knowledge Discovery (Registration until 12 July 2021)			Färber
WT 21/22	7900013	Knowledge Discovery			Färber

Competence Certificate

The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation.

Students can be awarded a bonus on their final grade if they successfully complete special assignments.

Prerequisites

None

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

V Knowledge Discovery
2511302, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content

The lecture gives an overview of approaches of machine learning and data mining for knowledge acquisition from large data sets. These are examined especially with respect to algorithms, applicability to different data representations and the use in real application scenarios.

Knowledge Discovery is an established research area with a large community that investigates methods for discovering patterns and regularities in large amounts of data, including unstructured text. A variety of methods exist to extract patterns and provide previously unknown insights. This information can be predictive or descriptive.

The lecture gives an overview of Knowledge Discovery. Specific techniques and methods, challenges and current and future research topics in this research area will be taught.

Contents of the lecture cover the entire machine learning and data mining process with topics on supervised and unsupervised learning and empirical evaluation. Covered learning methods range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning obectives:

Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Workload:

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

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (http://www-stat.stanford.edu/~tibs/ElemStatLearn/)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

V	**Exercises to Knowledge Discovery** 2511303, WS 21/22, 1 SWS, Language: English, Open in study portal	**Practice (Ü)**

Content

The exercises are based on the lecture Knowledge Discovery. Several exercises are covered, which take up and discuss in detail the topics covered in the lecture Knowledge Discovery. Practical examples are demonstrated to the students to enable a knowledge transfer of the theoretical aspects learned into practical application.

Contents of the lecture cover the entire machine learning and data mining process with topics on monitored and unsupervised learning processes and empirical evaluation. The learning methods covered range from classical approaches like decision trees, support vector machines and neural networks to selected approaches from current research. Learning problems considered include feature vector-based learning and text mining.

Learning objectives:

Students

- know fundamentals of Machine Learning, Data Mining and Knowledge Discovery.
- are able to design, train and evaluate adaptive systems.
- conduct Knowledge Discovery projects in regards to algorithms, representations and applications.

Literature

- T. Hastie, R. Tibshirani, J. Friedman. The Elements of Statistical Learning: Data Mining, Inference, and Prediction (http://www-stat.stanford.edu/~tibs/ElemStatLearn/)
- T. Mitchell. Machine Learning. 1997
- M. Berhold, D. Hand (eds). Intelligent Data Analysis - An Introduction. 2003
- P. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining, 2005, Addison Wesley

T 5.159 Course: Lab: Graph Visualization in Practice [T-INFO-106580]

Responsible: Prof. Dr. Dorothea Wagner
Organisation: KIT Department of Informatics
Part of: M-INFO-103302 - Lab: Graph Visualization in Practice

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Irregular	1

T 5.160 Course: Laboratory Course Algorithm Engineering [T-INFO-104374]

Responsible: Prof. Dr. Peter Sanders
Dr. rer. nat. Torsten Ueckerdt
Prof. Dr. Dorothea Wagner

Organisation: KIT Department of Informatics

Part of: M-INFO-101199 - Advanced Algorithms: Design and Analysis
M-INFO-101200 - Advanced Algorithms: Engineering and Applications
M-INFO-102072 - Laboratory Course Algorithm Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Irregular	1

Events					
WT 21/22	2424305	Practical Course in Algorithm Design	4 SWS	Practical course / 🧩	Wagner, Zeitz, Sauer, Ueckerdt, Gottesbüren, Feilhauer

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

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

V Practical Course in Algorithm Design
2424305, WS 21/22, 4 SWS, Language: German, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content
In the practical course *Algorithm Engineering* the students are given miscallaneous questions from algorithmics, which they have to implement independently in small working groups. The main focus lies on object oriented programming with Java or C++. Linear programming may also occur.

Prerequisites: Knowledge of the lecture Algorithms II is recommended.

Learning Goals:
The purpose of the practical course in algorithm design is to make learned knowledge work. The students are given varying topics from algorithmics, which they have to implement in small working groups. Possible Topics are, for exmaple, algorithms for flow problems, shortest path problems, or clustering techniques. In this way students learn to write efficient code.

Workload: Praktikum mit 4SWS, 6 LP
6 LP entspricht ca. 180 Arbeitsstunden

T 5.161 Course: Language Technology and Compiler [T-INFO-101343]

Responsible: Prof. Dr.-Ing. Gregor Snelting
Organisation: KIT Department of Informatics
Part of: M-INFO-100806 - Language Technology and Compiler

Type	Credits	Grading scale	Recurrence	Version
Oral examination	8	Grade to a third	Each summer term	1

Events					
ST 2021	24661	Language Technology and Compiler	4 SWS	Lecture / 📱	Snelting
Exams					
ST 2021	7500068	Language Technology and Compiler			Snelting
WT 21/22	7500107	Language Technology and Compiler			Snelting

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

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

V	**Language Technology and Compiler**	Lecture (V)
	24661, SS 2021, 4 SWS, Language: German, Open in study portal	**Online**

T 5.162 Course: Large-scale Optimization [T-WIWI-106549]

Responsible:	Prof. Dr. Steffen Rebennack
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2550475	Large-Scale Optimization	2 SWS	Lecture / 🖥	Rebennack
ST 2021	2550476	Übung zu Large-Scale Optimization	1 SWS	Practice / 🖥	Rebennack, Sinske
ST 2021	2550477	Rechnerübung zu Large-scale Optimization	2 SWS	Practice / 🖥	Rebennack, Sinske
Exams					
ST 2021	7900310	Large-scale Optimization			Rebennack

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

Alternative exam assessment (open book exam). The exam takes place in every semester.

Prerequisites

None.

T 5.163 Course: Liberalised Power Markets [T-WIWI-107043]

Responsible:	Prof. Dr. Wolf Fichtner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101451 - Energy Economics and Energy Markets
	M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each winter term	1

Events					
WT 21/22	2581998	Liberalised Power Markets	2 SWS	Lecture	Fichtner, Kraft
Exams					
ST 2021	7900253	Liberalised Power Markets			Fichtner

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V	**Liberalised Power Markets** 2581998, WS 21/22, 2 SWS, Language: English, Open in study portal	**Lecture (V)**

Content

1. Power markets in the past, now and in future

2. Designing liberalised power markets

2.1.   Unbundling Dimensions of liberalised power markets

2.2.   Central dispatch versus markets without central dispatch

2.3.   The short-term market model

2.4.   The long-term market model

2.5.   Market flaws and market failure

2.6.   Regulation in liberalised markets

3. The power (sub)markets

3.1   Day-ahead market

3.2   Intraday market

3.3   (Long-term) Forwards and futures markets

3.4   Emission rights market

3.5   Market for ancillary services

3.6   The "market" for renewable energies

3.7   Future market segments

4. Grid operation and congestion management

4.1.   Grid operation

4.2.   Congestion management

5. Market power

5.1.   Defining market power

5.2.   Indicators of market power

5.3.   Reducing market power

6. Future market structures in the electricity value chain

1. Power markets in the past, now and in future

2. Designing liberalised power markets

2.2.   Unbundling Dimensions of liberalised power markets

2.3.   Central dispatch versus markets without central dispatch

2.4.   The short-term market model

2.5.   The long-term market model

2.6.   Market flaws and market failure

2.7.   Regulation in liberalised markets

3. The power (sub)markets

3.1   Day-ahead market

3.2   Intraday market

3.3   (Long-term) Forwards and futures markets

3.4   Emission rights market

3.5   Market for ancillary services

3.6   The "market" for renewable energies

3.7   Future market segments

4. Grid operation and congestion management

4.1.   Grid operation

4.2.   Congestion management

5. Market power

5.1.   Defining market power

5.2.   Indicators of market power

5.3.   Reducing market power

6. Future market structures in the electricity value chain

Literature
Weiterführende Literatur:

Power System Economics; Steven Stoft, IEEE Press/Wiley-Interscience Press, 0-471-15040-1

| T | **5.164 Course: Life Cycle Assessment [T-WIWI-110512]** |

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type Written examination	**Credits** 3,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2581995	Life Cycle Assessment	2 SWS	Lecture / 📱	Maier
Exams					
ST 2021	7981995	Life Cycle Assessment			Schultmann

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None.

Recommendation
None

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

| V | **Life Cycle Assessment** 2581995, WS 21/22, 2 SWS, Language: English, Open in study portal | **Lecture (V) Online** |

Content
Introduction to life cycle assessment. The lecture describes structure and individual steps of life cycle assessment in detail.

Literature
werden in der Veranstaltung bekannt gegeben

T 5.165 Course: Machine Learning - Foundations and Algorithms [T-INFO-111558]

Responsible:	Prof. Dr. Gerhard Neumann
Organisation:	KIT Department of Informatics
Part of:	M-INFO-105778 - Machine Learning - Foundations and Algorithms

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	1

Events					
WT 21/22	2400104	Machine Learning – Foundations and Algorithms	3 SWS	Lecture / Practice (/ ⚙	Neumann
Exams					
WT 21/22	7500292	Machine Learning - Foundations and Algorithms			Neumann

Legend: 🔲 Online, ⚙ Blended (On-Site/Online), 🔴 On-Site, ✗ Cancelled

T   5.166 Course: Machine Learning 1 - Basic Methods [T-WIWI-106340]

Responsible: Prof. Dr.-Ing. Johann Marius Zöllner
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103356 - Machine Learning

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 3

Events					
WT 21/22	2511500	Machine Learning 1 - Fundamental Methods	2 SWS	Lecture	Zöllner
WT 21/22	2511501	Exercises to Machine Learning 1 - Fundamental Methods	1 SWS	Practice	Zöllner, Daaboul, Polley
Exams					
ST 2021	7900154	Machine Learning 1 - Basic Methods (Registration until 12 July 2021)			Zöllner
WT 21/22	7900076	Machine Learning 1 - Basic Methods			Zöllner

Competence Certificate

Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min):

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

Prerequisites

The course T-INFO-101354 "Machine Learning 1 - Basic Methods" must not be chosen.

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

V   Machine Learning 1 - Fundamental Methods
2511500, WS 21/22, 2 SWS, Language: German, Open in study portal   **Lecture (V)**

Content

The field of knowledge acquisition and machine learning is a rapidly expanding field of knowledge and the subject of numerous research and development projects. The acquisition of knowledge can take place in different ways. Thus a system can benefit from experiences already made, it can be trained, or it draws conclusions from extensive background knowledge.

The lecture covers symbolic learning methods such as inductive learning (learning from examples, learning by observation), deductive learning (explanation-based learning) and learning from analogies, as well as sub-symbolic techniques such as neural networks, support vector machines and genetic algorithms. The lecture introduces the basic principles and structures of learning systems and examines the algorithms developed so far. The structure and operation of learning systems is presented and explained with some examples, especially from the fields of robotics and image processing.

Learning obectives:

- Students acquire knowledge of the fundamental methods in the field of machine learning.
- Students can classify, formally describe and evaluate methods of machine learning.
- Students can use their knowledge to select suitable models and methods for selected problems in the field of of machine learning.

Literature
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.

T   5.167 Course: Machine Learning 2 – Advanced Methods [T-WIWI-106341]

Responsible:	Prof. Dr.-Ing. Johann Marius Zöllner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101637 - Analytics and Statistics
	M-WIWI-103356 - Machine Learning

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2511502	Machine Learning 2 - Advanced methods	2 SWS	Lecture / 📱	Zöllner
ST 2021	2511503	Exercises for Machine Learning 2 - Advanced Methods	1 SWS	Practice / 📱	Zöllner
Exams					
ST 2021	7900080	Machine Learning 2 – Advanced Methods (Registration until 12 July 2021)			Zöllner
WT 21/22	7900050	Machine Learning 2 – Advanced Methods			Zöllner

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎙 On-Site, ✗ Cancelled

Competence Certificate

Depending on further pandemic developments, the exam will be offered either as an open-book exam, or as a written exam (60 min).

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

Prerequisites

The course T-INFO-101392 "Machine Learning 2 – Advanced Methods" must not be chosen.

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

V   Machine Learning 2 - Advanced methods
2511502, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content

The subject area of machine intelligence and, in particular, machine learning, taking into account real challenges of complex application domains, is a rapidly expanding field of knowledge and the subject of numerous research and development projects.

The lecture "Machine Learning 2" deals with advanced methods of machine learning such as semi-supervised and active learning, deep neural networks (deep learning), pulsed networks, hierarchical approaches, e.g. As well as dynamic, probabilistic relational methods. Another focus is the embedding and application of machine learning methods in real systems.

The lecture introduces the latest basic principles as well as extended basic structures and elucidates previously developed algorithms. The structure and the mode of operation of the methods and methods are presented and explained by means of some application scenarios, especially in the field of technical (sub) autonomous systems (robotics, neurorobotics, image processing, etc.).

Learning objectives:

- Students understand extended concepts of machine learning and their possible applications.
- Students can classify, formally describe and evaluate methods of machine learning.
- In detail, methods of machine learning can be embedded and applied in complex decision and inference systems.
- Students can use their knowledge to select suitable models and methods of machine learning for existing problems in the field of machine intelligence.

Recommendations:

Attending the lecture *Machine Learning 1* or a comparable lecture is very helpful in understanding this lecture.

Literature
Die Foliensätze sind als PDF verfügbar

Weiterführende Literatur

- Artificial Intelligence: A Modern Approach - Peter Norvig and Stuart J. Russell
- Machine Learning - Tom Mitchell
- Pattern Recognition and Machine Learning - Christopher M. Bishop
- Reinforcement Learning: An Introduction - Richard S. Sutton and Andrew G. Barto
- Deep Learning - Ian Goodfellow, Yoshua Bengio, Aaron Courville

Weitere (spezifische) Literatur zu einzelnen Themen wird in der Vorlesung angegeben.

T 5.168 Course: Management Accounting 1 [T-WIWI-102800]

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101498 - Management Accounting

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2579900	Management Accounting 1	2 SWS	Lecture / 📱	Wouters
ST 2021	2579901	Übung zu Management Accounting 1 (Bachelor)	2 SWS	Practice / 📱	Riar
ST 2021	2579902		2 SWS	Practice / 📱	Riar
Exams					
ST 2021	79-2579900-B	Management Accounting 1 (Bachelor)			Wouters
ST 2021	79-2579900-M	Management Accounting 1 (Mastervorzug und Master)			Wouters

Legend: 📱 Online, ⚃ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 120-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites

None

Annotation

Students in the Bachelor' program can only take the related tutorial and examination. Students in the Master's program (and Bachelor's students who are already completing examinations for their Master's program) can only take the related tuturial and examination.

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

V Management Accounting 1
2579900, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content

The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA1 are: short-term planning, investment decisions, budgeting and activity-based costing.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics.
- They can use financial information for various purposes in organizations.

Examination:

- The assessment consists of a written exam (120 minutes) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

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

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Publisher: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- In addition, several papers that will be available on ILIAS.

V	**Übung zu Management Accounting 1 (Bachelor)** 2579901, SS 2021, 2 SWS, Language: English, Open in study portal	**Practice (Ü) Online**

Content
see Module Handbook

V	2579902, SS 2021, 2 SWS, Language: English, Open in study portal	**Practice (Ü) Online**

Content
see Module Handbook

T	**5.169 Course: Management Accounting 2 [T-WIWI-102801]**

Responsible:	Prof. Dr. Marcus Wouters
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101498 - Management Accounting

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 2

Events					
WT 21/22	2579903	Management Accounting 2	2 SWS	Lecture	Wouters
WT 21/22	2579904		2 SWS	Practice	Ebinger
WT 21/22	2579905		2 SWS	Practice	Ebinger
Exams					
ST 2021	79-2579903-B	Management Accounting 2 (Bachelor)			Wouters
ST 2021	79-2579903-M	Management Accounting 2 (Mastervorzug und Master)			Wouters

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as a 120-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

Prerequisites
None

Recommendation
It is recommended to take part in the course "Management Accounting 1" before this course.

Annotation
Students in the Bachelor' program can only take the related tutorial and examination. Students in the Master's program (and Bachelor's students who are already completing examinations for their Master's program) can only take the related tuturial and examination.

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

V	**Management Accounting 2** 2579903, WS 21/22, 2 SWS, Language: English, Open in study portal	**Lecture (V)**

Content

The course covers topics in management accounting in a decision-making framework. Some of these topics in the course MA2 are: cost estimation, product costing and cost allocation, financial performance measures, transfer pricing, strategic performance measurement systems.

We will use international material written in English.

We will approach these topics primarily from the perspective of the users of financial information (not so much from the controller who prepares the information).

The course builds on an introductory level of understanding of accounting concepts from Business Administration courses in the core program. The course is intended for students in Industrial Engineering.

Learning objectives:

- Students have an understanding of theory and applications of management accounting topics. They can use financial information for various purposes in organizations.

Recommendations:

- It is recommended to take part in the course "Management Accounting 1" before this course.

Examination:

- The assessment consists of a written exam (120 min) at the end of each semester (following § 4 (2) No. 1 of the examination regulation).

Workload:

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

Literature

- Marc Wouters, Frank H. Selto, Ronald W. Hilton, Michael W. Maher: Cost Management – Strategies for Business Decisions, 2012, Verlag: McGraw-Hill Higher Education (ISBN-13 9780077132392 / ISBN-10 0077132394)
- Zusätzlich werden Artikel auf ILIAS zur Vergügung gestellt.

| V | 2579904, WS 21/22, 2 SWS, Language: English, Open in study portal | Practice (Ü) |

Content
see ILIAS

| V | 2579905, WS 21/22, 2 SWS, Language: English, Open in study portal | Practice (Ü) |

Content
see ILIAS

T 5.170 Course: Management of IT-Projects [T-WIWI-102667]

Responsible: Dr. Roland Schätzle
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101477 - Development of Business Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	3

Events					
ST 2021	2511214	Management of IT-Projects	2 SWS	Lecture / 📱	Schätzle
ST 2021	2511215	Übungen zu Management von Informatik-Projekten	1 SWS	Practice / 📱	Schätzle
Exams					
ST 2021	7900045	Management of IT-Projects (Registration until 12 July 2021)			Oberweis
WT 21/22	7900014	Management of IT-Projects			Oberweis

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🔘 On-Site, ✗ Cancelled

Competence Certificate

The assessment takes place in the form of a written examination (exam) in the amount of 60 minutes. The examination is offered every semester and can be repeated at any regular examination date.

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

The exact details will be announced in the lecture.

Prerequisites

Prerequisite for the participation in the examination is the successful participation in the exercise, which takes place in the summer semester, starting from summer semester 2020. The number of participants in the exercise is limited.

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

| V | **Management of IT-Projects**
2511214, SS 2021, 2 SWS, Language: German, Open in study portal | **Lecture (V)**
Online |
|---|---|---|

Content

The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
    - plan of the project structure
    - flow chart
    - project schedule
    - plan of resources
- effort estimation
- project infrastructur
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Learning objectives:

Students

- explain the terminology of IT project management and typical used methods for planning, handling and controlling,
- apply methods appropiate to current project phases and project contexts,
- consider organisational and social impact factors.

Recommendations:

Knowledge from the lecture Software Engineering is helpful.

Workload:

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

Literature

- B. Hindel, K. Hörmann, M. Müller, J. Schmied. Basiswissen Software-Projektmanagement. dpunkt.verlag 2004
- Project Management Institute Standards Committee. A Guide to the Project Management Body of Knowledge (PMBoK guide). Project Management Institute. Four Campus Boulevard. Newton Square. PA 190733299. U.S.A.

V	**Übungen zu Management von Informatik-Projekten** 2511215, SS 2021, 1 SWS, Language: German, Open in study portal	**Practice (Ü)** **Online**

Content

The general conditions, influencing factors and methods in the planning, execution and control of IT projects are dealt with. In particular, the following topics will be dealt with: Project environment, project organization, project structure plan, effort estimation, project infrastructure, project control, decision-making processes, negotiation, time management. The lecture is accompanied by exercises in the form of tutorials. The date of the exercise will be announced later.

T 5.171 Course: Managing New Technologies [T-WIWI-102612]

Responsible: Dr. Thomas Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type Written examination	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2545003	Managing New Technologies	2 SWS	Lecture / 🗎	Reiß
Exams					
ST 2021	7900169	Managing New Technologies			Reiß

Legend: 🗎 Online, ⚙ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

Competence Certificate
Written exam 100% following §4, Abs. 2.

Prerequisites
None

Recommendation
None

Annotation
The credit points for T-WIWI-102612 "Management of New Technologies" were reduced to 3 credit points in the 2019 summer semester.

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

V	**Managing New Technologies** 2545003, SS 2021, 2 SWS, Language: German, Open in study portal	Lecture (V) Online

Literature

- Hausschildt/Salomo: Innovationsmanagement; Borchert et al.: Innovations- und Technologiemanagement;
- Specht/Möhrle; Gabler Lexikon Technologiemanagement

Die relevanten Auszüge und zusätzlichen Quellen werden in der Veranstaltung bekannt gegeben.

T   5.172 Course: Market Engineering: Information in Institutions [T-WIWI-102640]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101409 - Electronic Markets
	M-WIWI-101446 - Market Engineering
	M-WIWI-101453 - Applied Strategic Decisions
	M-WIWI-102754 - Service Economics and Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540460	Market Engineering: Information in Institutions	2 SWS	Lecture / 🖥	Weinhardt, Straub
ST 2021	2540461	Übungen zu Market Engineering: Information in Institutions	1 SWS	Practice / 🖥	Golla
Exams					
ST 2021	7910804	Market Engineering: Information in Institutions			Weinhardt
ST 2021	7979235	Market Engineering: Information in Institutions			Weinhardt

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) up to 6 bonus points can be obtained. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by max. one grade level (0.3 or 0.4).

Prerequisites

None

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

V   Market Engineering: Information in Institutions
2540460, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Literature

- Roth, A., The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools for Design Economics. Econometrica 70(4): 1341-1378, 2002.
- Weinhardt, C. ,Holtmann, C., Neumann, D., Market Engineering. Wirtschaftsinformatik, 2003.
- Wolfstetter, E., Topics in Microeconomics - Industrial Organization, Auctions, and Incentives. Cambridge, Cambridge University Press, 1999.
- Smith, V. "Theory, Experiments and Economics", The Journal of Economic Perspectives,Vol. 3, No. 1, 151-69 1989

T 5.173 Course: Market Research [T-WIWI-107720]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101510 - Cross-Functional Management Accounting
M-WIWI-101647 - Data Science: Evidence-based Marketing
M-WIWI-105312 - Marketing and Sales Management

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 3

Events					
ST 2021	2571150	Market Research	2 SWS	Lecture / 🖥	Klarmann
ST 2021	2571151	Market Research Tutorial	1 SWS	Practice / 🖥	Honold
Exams					
ST 2021	7900015	Market Research			Klarmann

Legend: 🖥 Online, ⚉ Blended (On-Site/Online), ◑ On-Site, ✗ Cancelled

Competence Certificate
The assessment of success takes place through a written exam (according to SPO § 4 Abs. 2, Pkt. 1) with additional aids in the sense of an open book exam.
In the winter term 2021/22, the written exam will either take place in the lecture hall or online, depending on further pandemic developments. Further details will be announced during the lecture.

Prerequisites
None

Recommendation
None

Annotation
Please note that this course has to be completed successfully by students interested in master thesis positions at the Marketing & Sales Research Group.

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

V **Market Research**	**Lecture (V)**
2571150, SS 2021, 2 SWS, Language: English, Open in study portal	**Online**

Content

Within the lecture, essential statistical methods for measuring customer attitudes (e.g. satisfaction measurement), understanding customer behavior and making strategic decisions will be discussed. The practical use as well as the correct handling of different survey methods will be taught, such as experiments and surveys. To analyze the collected data, various analysis methods are presented, including hypothesis tests, factor analyses, cluster analyses, variance and regression analyses. Building on this, the interpretation of the results will be discussed.

Topics addressed in this course are for example:

- Theoretical foundations of market research
- Statistical foundations of market research
- Measuring customer attitudes
- Understanding customer reactions
- Strategical decision making

The aim of this lecture is to give an overview of essential statistical methods. In the lecture students learn the practical use as well as the correct handling of different statistical survey methods and analysis procedures. In addition, emphasis is put on the interpretation of the results after the application of an empirical survey. The derivation of strategic options is an important competence that is required in many companies in order to react optimally to customer needs.

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

The total workload for this course is approximately 135.0 hours.

Presence time: 30 hours

Preparation and wrap-up of the course: 45.0 hours

Exam and exam preparation: 60.0 hours

Please note that this course has to be completed successfully by students interested in master thesis positions at the chair of marketing.

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.174 Course: Marketing Analytics [T-WIWI-103139]

Responsible: Prof. Dr. Martin Klarmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101647 - Data Science: Evidence-based Marketing

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	5

Events					
WT 21/22	2572170	Marketing Analytics	2 SWS	Lecture / 🧩	Klarmann
WT 21/22	2572171		1 SWS	Practice / 🗣	Honold

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

Competence Certificate
Alternative (according to §4(2), 3 of the examination regulation) exam assessment (working on tasks in groups during the lecture).

Prerequisites
The prerequisite for taking the course is the successful completion of the course "Market Research".

Recommendation
It is strongly recommended to complete the course "Market Research" prior to taking the "Marketing Analytics" course.

Annotation
"Marketing Analytics" will be offered as a block course in the winter term 20/21 with an alternative exam assessment.
For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu). Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

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

V Marketing Analytics
2572170, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)
Blended (On-Site/Online)

Content
In this course various relevant market research questions are addressed, as for example measuring and understanding customer attitudes, preparing strategic decisions and sales forecasting. In order to analyze these questions, students learn to handle social media data, panel data, nested observations and experimental design. To analyze the data, advanced methods, as for example multilevel modeling, structural equation modeling and return on marketing models are taught. Also, problems of causality are addressed in-depth. The lecture is accompanied by a computer-based exercise, in the course of which the methods are applied practically.

Students

- receive based on the course market research an overview of advanced empirical methods
- learn in the course of the lecture to handle advanced data collection and data analysis methods
- are based on the acquired knowledge able to interpret results and derive strategic implications

Total workload for 4.5 ECTS: ca. 135 hours.

In order to attend Marketing Analytics, students are required to have passed the course Market Research.

Exchange students can bypass the requirement of passing Market Research if they can prove that they possess sufficient statistical knowledge based on courses attended at their home institution. This will be examined individually by the Marketing & Sales Research Group.

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

Organizational issues
Präsenztermine: 05.11.2021 / 19.11.2021 / 03.12.2021 / 17.12.2021

Die anderen Termine finden online statt.

Literature

- Hanssens, Dominique M., Parsons, Leonard J., Schultz, Randall L. (2003), Market response models: Econometric and time series analysis, 2nd ed, Boston.
- Gelman, Andrew, Hill, Jennifer (2006), Data analysis using regression and multilevel/hierarchical models, New York.
- Cameron, A. Colin, Trivedi, Pravin K. (2005), Microeconometrics: methods and applications, New York.
- Chapman, Christopher, Feit, Elea M. (2015), R for Marketing Research and Analytics, Cham.
- Ledolter, Johannes (2013), Data mining and business analytics with R, New York.

T   5.175 Course: Marketing Strategy Business Game [T-WIWI-102835]

Responsible:	Prof. Dr. Martin Klarmann
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101510 - Cross-Functional Management Accounting
	M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Events					
ST 2021	2571183	Marketing Strategy Business Game	1 SWS	Block / 🖳	Klarmann, Mitarbeiter
Exams					
ST 2021	7900022	Marketing Strategy Business Game			Klarmann

Legend: 🖳 Online, ⚄ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
The assessment (alternative exam assessment) consists of a group presentation and a subsequent round of questions totalling 20 minutes.

Prerequisites
None

Recommendation
None

Annotation
Please note that only one of the courses from the election block can be chosen in the module.
Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS points in the respective module to all students. Participation in a specific course cannot be guaranteed.
In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

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

V	**Marketing Strategy Business Game** 2571183, SS 2021, 1 SWS, Language: German, Open in study portal	**Block (B)** **Online**

Content

Using Markstrat, a marketing strategy business game, students work in groups representing a company that competes on a simulated market against the other groups' companies.

Students

- are able to operate the strategic marketing simulation software "Markstrat"

- are able to take strategic marketing decisions in groups

- know how to apply strategic marketing concepts to practical contexts (e.g. for market segmentation, product launches, coordination of the marketing mix, market research, choice of the distribution channel or competitive behavior)

- are capable to collect and to select information usefully with the aim of decision-making

- are able to react appropriately to predetermined market conditions

- know how to present their strategies in a clear and consistent way

- are able to talk about the success, problems, critical incidents, external influences and strategy changes during the experimental game and to reflect and present their learning success

Non exam assessment (following §4(2), 3 of the examination regulation).

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

- Please note that only one of the courses from the election block can be chosen in the module.
- Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1.5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.
- In order to participate in this course, you need to apply. Applications are usually accepted at the start of the lecture period in summer term. Detailed information on the application process is usually provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in summer term starts.

Organizational issues

Termine werden bekannt gegeben

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T 5.176 Course: Master Thesis [T-WIWI-103142]

Responsible: Studiendekan der KIT-Fakultät für Informatik
                     Studiendekan des KIT-Studienganges
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101656 - Module Master Thesis

Type	Credits	Grading scale	Version
Final Thesis	30	Grade to a third	1

Competence Certificate
see module description

Prerequisites
see module description

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

Submission deadline	6 months
Maximum extension period	3 months
Correction period	8 weeks

T 5.177 Course: Mathematics for High Dimensional Statistics [T-WIWI-111247]

Responsible:	Prof. Dr. Oliver Grothe
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-101637 - Analytics and Statistics
	M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	Irregular	1

Events					
ST 2021	2550562	Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Lecture / 🗎	Grothe
ST 2021	2550563	Übung zu Mathematische Grundlagen hochdimensionaler Statistik	2 SWS	Practice / 🗎	Rieger
Exams					
ST 2021	7900362	Mathematics for High Dimensional Statistics			Grothe

Legend: 🗎 Online, ⚄ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an oral exam (30 min.) taking place in the recess period.

Prerequisites
None

Recommendation
Basic knowledge of mathematics and statistics is assumed.
Knowledge in multivariate statistics is an advantage, but not necessary for the course.

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

V Mathematische Grundlagen hochdimensionaler Statistik
2550562, SS 2021, 2 SWS, Open in study portal

Lecture (V)
Online

Content
Content:
The lecture focuses on modelling statistical objects (random vectors, random matrices and random graphs) in high dimensions. It deals with concentration inequalities that limit the fluctuations of such objects as well as complexity measures for quantities and functions. The theory is transferred to well-known and widespread applications such as neighbourhood detection in networks, statistical learning theory and LASSO.

Learning objectives:

Students are able to

- name and justify statistical properties of high-dimensional objects (vectors, matrices, functions).
- describe and explain differences in the behaviour between low- and high-dimensional random objects.
- name procedures for assess uncertainties in statistical models and apply them in simple examples.
- decide well-founded which modeling of high-dimensional structures is best suited in a specific situation.
- transform data into lower dimensions and quantify approximation errors.
- understand basic proofs in high-dimensional statistics using examples.
- develop, implement and evaluate smaller simulations in a programming language of their choice.

T 5.178 Course: Meshes and Point Clouds [T-INFO-101349]

Responsible: Prof. Dr. Hartmut Prautzsch
Organisation: KIT Department of Informatics
     Part of: M-INFO-100812 - Meshes and Point Clouds

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each term	1

Events					
ST 2021	2400029	Netze und Punktwolken	2 SWS	Lecture / 🗄	Prautzsch
Exams					
ST 2021	7500317	Meshes and Point Clouds			Prautzsch

Legend: 🗄 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.179 Course: Methods in Economic Dynamics [T-WIWI-102906]

Responsible:	Prof. Dr. Ingrid Ott
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101514 - Innovation Economics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	2

Events					
ST 2021	2560240	Methods in Economic Dynamics	1 SWS	Lecture / 📱	Ott, Scheu
Exams					
ST 2021	7900108	Methods in Economic Dynamics			Ott

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

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012] and Economics II [2600014]. Further, it is assumed that students have interest in using quantiative-mathematical methods.

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

V Methods in Economic Dynamics
2560240, SS 2021, 1 SWS, Language: German/English, Open in study portal

Lecture (V)
Online

Content
The economic exploitation of inventions is an important part of innovation economics. Intellectual property rights such as patents or trademarks play a central role. Within this workshop, the recording, processing and analysis of such intellectual property rights will be deepened, e.g. considering specific technologies. Students will learn how to work with relational databases, the econometric evaluation of recorded data, and methods for visualising them.

Learning objectives:
The student

- learns to query data sources.
- is able to analyse data with statistical methods.
- visualises and interprets data evaluations (e.g. using dashboards or methods of network analysis).

Recommendations:
An interest in working with data, basic knowledge on databases as well as basic knowledge in economics and statistics are advantageous.

Workload:
The total workload for this course is approximately 45 hours.

- Classes: ca. 5 h
- Self-study: ca. 40 h

Assessment:
Non exam assessment according to § 4 paragraph 3 of the examination regulation (SPO 2015).

Literature
Relevante Literatur wird in der Vorlesung bekanntgegeben.
(Relevant literature will be announced in the lecture.)

T 5.180 Course: Methods in Innovation Management [T-WIWI-110263]

Responsible:	Dr. Daniel Jeffrey Koch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2545107	Methoden im Innovationsmanagement	2 SWS	Seminar / 🖥	Koch

Legend: 🖥 Online, ♻ Blended (On-Site/Online), 📍 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessments (§4(2), 3 SPO). The final grade is composed 75% of the grade of the written paper and 25% of the grade of the presentation.

Prerequisites
None.

Recommendation
Prior attendance of the course "Innovation Management: Concepts, Strategies and Methods" is recommended.

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

V Methoden im Innovationsmanagement
2545107, WS 21/22, 2 SWS, Language: German, Open in study portal

Seminar (S)
Online

Content
The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

T   5.181 Course: Mixed Integer Programming I [T-WIWI-102719]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Irregular	Version 1

Events					
WT 21/22	2550138	Mixed-integer Programming I	2 SWS	Lecture	Stein
WT 21/22	2550139	Exercises Mixted Integer Programming I		Practice	Stein, Beck, Neumann

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Recommendation

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

Annotation

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

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

V	**Mixed-integer Programming I** 2550138, WS 21/22, 2 SWS, Language: German, Open in study portal	Lecture (V)

Content

Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as with discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, portfolio optimization with limitations on the number of securities, the choice of locations to serve customers at minimum cost, and the optimal design of vote allocations in election procedures. For the algorithmic identification of optimal points of such problems an interaction of ideas from discrete as well as continuous optimization is necessary.

The lecture focusses on mixed-integer *linear* optimization problems and is structured as follows:

- Introduction, solvability, and basic concepts
- LP relaxation and error bounds for roundings
- Branch-and-bound method
- Gomory's cutting plane method
- Benders decomposition

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of mixed-integer *nonlinear* optimization problems forms the contents of the lecture "Mixed-integer Programming II".

Learning objectives:

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.

Literature

- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- J. Kallrath: Gemischt-ganzzahlige Optimierung, Vieweg, 2002
- D. Li, X. Sun: Nonlinear Integer Programming, Springer, 2006
- G.L. Nemhauser, L.A. Wolsey, Integer and Combinatorial Optimization, Wiley, 1988
- M. Tawarmalani, N.V. Sahinidis, Convexification and Global Optimization in Continuous and Mixed-Integer Nonlinear Programming, Kluwer, 2002.

| T | 5.182 Course: Mixed Integer Programming II [T-WIWI-102720] |

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Irregular	**Version** 1

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of *Mixed Integer Programming I* [2550138]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

None

Recommendation

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

Annotation

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

T 5.183 Course: Mobile Communication [T-INFO-101322]

Responsible: Prof. Dr. Oliver Waldhorst
Prof. Dr. Martina Zitterbart

Organisation: KIT Department of Informatics

Part of: M-INFO-100785 - Mobile Communication
M-INFO-101203 - Wireless Networking
M-INFO-101205 - Future Networking

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each winter term	1

Events					
WT 21/22	24643	Mobile Communications	2 SWS	Lecture	Waldhorst, Jung
Exams					
ST 2021	7500073	Mobile Communication			Waldhorst, Zitterbart
WT 21/22	7500015	Mobile Communication			Waldhorst, Zitterbart

| T | **5.184 Course: Model Driven Software Development [T-INFO-101278]** |

Responsible: Prof. Dr. Ralf Reussner
Organisation: KIT Department of Informatics
Part of: M-INFO-101201 - Software Systems
       M-INFO-101202 - Software Methods

| **Type** Oral examination | **Credits** 3 | **Grading scale** Grade to a third | **Recurrence** Each winter term | **Version** 1 |

Events					
WT 21/22	24657	Model-Driven Software Engineering	2 SWS	Lecture / ⚙	Burger
Exams					
ST 2021	7500016	Model Driven Software Development			Burger, Reussner

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.185 Course: Modeling and Analyzing Consumer Behavior with R [T-WIWI-102899]

Responsible: Dr. Verena Dorner
Prof. Dr. Christof Weinhardt

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101448 - Service Management
M-WIWI-101506 - Service Analytics
M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540470	Modeling and Analyzing Consumer Behavior with R	2 SWS	Lecture / 🖥	Knierim
ST 2021	2540471	Übung zu Modeling and Analyzing Consumer Behaviour with R	1 SWS	Practice / 🖥	Knierim, Giebenhain
Exams					
ST 2021	7901391	Modeling and Analyzing Consumer Behavior with R			Weinhardt
ST 2021	79791391	Modeling and Analyzing Consumer Behavior with R			Weinhardt

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None

Recommendation
None

Annotation
Number of participants limited.

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

V Modeling and Analyzing Consumer Behavior with R
2540470, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Literature
Field, A., Miles, J., Field, Z., Discovering Statistics Using R, SAGE 2014

Jones, O., Maillardet, R., Robinson, A., Scientific Programming and Simulation Using R, Chapmann & Hall / CRC Press 2009

Venables, W.N., Smith, D.M. and the R Core Team, "An Introduction to R", 2012 (Version 2.15.2), http://cran.r-project.org/doc/manuals/R-intro.pdf

Wickham, Hadley, ggplot2: Elegant Graphics for Data Analysis (Use R!), Springer 2009 (2nd edition)

T   5.186 Course: Modeling and OR-Software: Advanced Topics [T-WIWI-106200]

Responsible:	Prof. Dr. Stefan Nickel
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102808 - Digital Service Systems in Industry
	M-WIWI-102832 - Operations Research in Supply Chain Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	2

Events					
WT 21/22	2550490	Modellieren und OR-Software: Fortgeschrittene Themen	3 SWS	Practical course / 📱	Pomes

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate

The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the software laboratory and the following term.

Prerequisites

None.

Recommendation

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

Successful completion of the course *Modeling and OR-Software: Introduction*.

Annotation

Due to capacity restrictions, registration before course start is required. For further information see the webpage of the course.

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

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

V   Modellieren und OR-Software: Fortgeschrittene Themen   Practical course (P)
2550490, WS 21/22, 3 SWS, Language: German, Open in study portal   Online

Content

The advanced course is designated for Master students that already attended the introductory course or gained equivalent experience elsewhere, e.g. during a seminar or bachelor thesis. We will work on advanced topics and methods in OR, among others cutting planes, column generation and constraint programming. The Software used for the exercises is IBM ILOG CPLEX Optimization Studio. The associated modelling progamming languages are OPL and ILOG Script.

Organizational issues

die genauen Termine werden auf der Homepage bekannt gegeben

Link zur Bewerbung:http://go.wiwi.kit.edu/OR_Bewerbung

01.09.2021 09:00 - 25.09.2021 23:55

T 5.187 Course: Models of Parallel Processing [T-INFO-101365]

Responsible: Thomas Worsch
Organisation: KIT Department of Informatics
Part of: M-INFO-100828 - Models of Parallel Processing

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each summer term	1

Events					
ST 2021	24606	Modelle der Parallelverarbeitung	3 SWS	Lecture / 🖥	Worsch, Vollmar
Exams					
ST 2021	75400003	Models of Parallel Processing			Worsch

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

T 5.188 Course: Multicriteria Optimization [T-WIWI-111587]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.
The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

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

Annotation

The course is offered every second winter semester (starting WiSe 22/23). The curriculum of the next three years is available online (www.ior.kit.edu).

T 5.189 Course: Multivariate Statistical Methods [T-WIWI-103124]

Responsible:	Prof. Dr. Oliver Grothe
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-101637 - Analytics and Statistics
	M-WIWI-101639 - Econometrics and Statistics II
	M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2550554	Multivariate Verfahren	2 SWS	Lecture / 🔲	Grothe
ST 2021	2550555	Übung zu Multivariate Verfahren	2 SWS	Practice / 🔲	Kächele
Exams					
ST 2021	7900351	Multivariate Statistical Methods			Grothe

Legend: 🔲 Online, ✳ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate

Depending on further pandemic developments, the examination will be offered either as a 60-minute written examination (written examination according to SPO § 4 Abs. 2, Pkt. 1) or as an open-book examination (alternative exam assessment according to SPO § 4 Abs. 2, Pkt. 3).

A bonus program can improve the grade by one grade level (i.e. by 0.3 or 0.4).

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

Prerequisites

None

Recommendation

The course covers highly advanced statistical methods with a quantitative focus. Hence, participants are necessarily expected to have advanced statistical knowledge, e.g. acquired in the course "Advanced Statistics". Without this, participation in the course is not advised.

Previous attendance of the course Analysis of Multivariate Data is recommended. Alternatively, the script can be provided to interested students.

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

V Multivariate Verfahren
2550554, SS 2021, 2 SWS, Open in study portal

Lecture (V)
Online

Literature

Skript zur Vorlesung

T 5.190 Course: Network Security: Architectures and Protocols [T-INFO-101319]

Responsible:	Prof. Dr. Martina Zitterbart
Organisation:	KIT Department of Informatics
Part of:	M-INFO-100782 - Network Security: Architectures and Protocols
	M-INFO-101203 - Wireless Networking
	M-INFO-101204 - Networking Labs
	M-INFO-101206 - Networking
	M-INFO-101207 - Networking Security - Theory and Praxis

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	24601	Netzsicherheit: Architekturen und Protokolle	2 SWS	Lecture / ▯	Baumgart, Bless, Heseding, Zitterbart
Exams					
ST 2021	7500072	Network Security: Architectures and Protocols			Zitterbart
WT 21/22	7500014	Network Security: Architectures and Protocols			Zitterbart

Legend: ▯ Online, ⚬ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

T 5.191 Course: Next Generation Internet [T-INFO-101321]

Responsible: Dr.-Ing. Roland Bless
                   Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: M-INFO-101205 - Future Networking
                   M-INFO-101206 - Networking

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	24674	Next Generation Internet	2 SWS	Lecture / 🔲	Bless
Exams					
ST 2021	7500074	Next Generation Internet			Bless, Zitterbart
WT 21/22	7500016	Next Generation Internet			Bless, Zitterbart

Legend: 🔲 Online, ⚃ Blended (On-Site/Online), ◆ On-Site, ✗ Cancelled

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

V Next Generation Internet
24674, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content

The lecture focuses on current developments in Internet-based network technologies. First, architectural principles of today's Internet are presented and discussed, subsequently nowadays and future challenges are motivated. Methods for quality-of-service support and transport of multi-media stream as well as newer transport protocols and group communication support are presented. Deployment of the presented technologies in IP-based networks are discussed. The lecture presents advanced approaches such as programmable networks and network virtualization as well as newer approaches and protocols for routing, satellite networking, and peer-to-peer networks.

Literature

James F. Kurose, and Keith W. Ross *Computer Networking* 6th edition, Addison-Wesley/Pearson, 2013, ISBN 978-0-273-76896-8, Chapters 1, 2.6 (P2P), 4 (Network Layer), 7.5 (Scheduling, IntServ, DiffServ, RSVP)
Weiterführende Literatur

wird in der Vorlesung bekanntgegeben.

T 5.192 Course: Non- and Semiparametrics [T-WIWI-103126]

Responsible:	Prof. Dr. Melanie Schienle
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101638 - Econometrics and Statistics I
	M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate

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

Prerequisites

None

Recommendation

Knowledge of the contents covered by the course *"Applied Econometrics"* [2520020]

Annotation

The course takes place every second winter semester: 2018/19 then 2020/21

T	**5.193 Course: Nonlinear Optimization I [T-WIWI-102724]**

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 4

Events					
WT 21/22	2550111	Nonlinear Optimization I	2 SWS	Lecture	Stein
WT 21/22	2550112	Exercises Nonlinear Optimization I + II		Practice	Stein, Beck, Schwarze, Neumann
Exams					
ST 2021	7900252_SS2021_NK	Nonlinear Optimization I			Stein

Competence Certificate

The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam. The exam takes place in the semester of the lecture and in the following semester.

The examination can also be combined with the examination of Nonlinear Optimization II [2550113]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites

The module component exam T-WIWI-103637 "Nonlinear Optimization I and II" may not be selected.

Annotation

Part I and II of the lecture are held consecutively in the *same* semester.

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

V	**Nonlinear Optimization I** 2550111, WS 21/22, 2 SWS, Language: German, Open in study portal	**Lecture (V)**

Content

The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality condtions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T   5.194 Course: Nonlinear Optimization I and II [T-WIWI-103637]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type Written examination	Credits 9	Grading scale Grade to a third	Recurrence Each winter term	Version 6

Events					
WT 21/22	2550111	Nonlinear Optimization I	2 SWS	Lecture	Stein
WT 21/22	2550112	Exercises Nonlinear Optimization I + II		Practice	Stein, Beck, Schwarze, Neumann
WT 21/22	2550113	Nonlinear Optimization II	2 SWS	Lecture	Stein
Exams					
ST 2021	7900266_SS2021_NK	Nonlinear Optimization I and II			Stein

Competence Certificate

The assessment consits of a written exam (120 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the **same** semester.

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

V   Nonlinear Optimization I
2550111, WS 21/22, 2 SWS, Language: German, Open in study portal
                                                                            Lecture (V)

Content

The lecture treats the minimization of smooth nonlinear functions without constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality condtions
- Algorithms (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *with* constraints forms the contents of the lecture "Nonlinear Optimization II". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of unconstrained nonlinear optimization,
- is able to choose, design and apply modern techniques of unconstrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

V   **Nonlinear Optimization II**
2550113, WS 21/22, 2 SWS, Language: German, Open in study portal   **Lecture (V)**

Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature
O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T   5.195 Course: Nonlinear Optimization II [T-WIWI-102725]

Responsible:	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 3

Events					
WT 21/22	2550112	Exercises Nonlinear Optimization I + II		Practice	Stein, Beck, Schwarze, Neumann
WT 21/22	2550113	Nonlinear Optimization II	2 SWS	Lecture	Stein
Exams					
ST 2021	7900258_SS2021_NK	Nonlinear Optimization II			Stein

Competence Certificate

The assessment consits of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The exam takes place in the semester of the lecture and in the following semester.

The exam can also be combined with the examination of *Nonlinear Optimization I* [2550111]. In this case, the duration of the written exam takes 120 minutes.

Prerequisites

None.

Annotation

Part I and II of the lecture are held consecutively in the same semester.

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

V   Nonlinear Optimization II
2550113, WS 21/22, 2 SWS, Language: German, Open in study portal   **Lecture (V)**

Content

The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, optimality conditions are derived and, based on them, solution algorithms are developed. The lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions
- Algorithms (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by exercises which, amongst others, offers the opportunity to implement and to test some of the methods on practically relevant examples.

Remark:

The treatment of optimization problems *without* constraints forms the contents of the lecture "Nonlinear Optimization I". The lectures "Nonlinear Optimization I" and "Nonlinear Optimization II" are held consecutively *in the same semester*.

Learning objectives:

The student

- knows and understands fundamentals of constrained nonlinear optimization,
- is able to choose, design and apply modern techniques of constrained nonlinear optimization in practice.

Literature

O. Stein, Grundzüge der Nichtlinearen Optimierung, SpringerSpektrum, 2018

Weiterführende Literatur:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- O. Güler, Foundations of Optimization, Springer, 2010
- H.Th. Jongen, K. Meer, E. Triesch, Optimization Theory, Kluwer, 2004
- J. Nocedal, S. Wright, Numerical Optimization, Springer, 2000

T   5.196 Course: Operations Research in Health Care Management [T-WIWI-102884]

Responsible: Prof. Dr. Stefan Nickel
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102805 - Service Operations

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Irregular	Version 2

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

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

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

T 5.197 Course: Operations Research in Supply Chain Management [T-WIWI-102715]

Responsible:	Prof. Dr. Stefan Nickel
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102805 - Service Operations
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	2

Exams			
ST 2021	7900283	Operations Research in Supply Chain Management	Nickel

Competence Certificate

The assessment is a 60 minutes written examination (according to §4(2), 1 of the examination regulation).

The examination is held in the term of the lecture and the following lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the module Introduction to Operations Research and in the lectures Facility Location and Strategic SCM,Tactical and operational SCMis assumed.

Annotation

The course is offered irregularly. Planned lectures for the next three years can be found in the internet at http://dol.ior.kit.edu/english/Courses.php.

| **T** | **5.198 Course: Optimization Models and Applications [T-WIWI-110162]** |

Responsible:	Dr. Nathan Sudermann-Merx
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101473 - Mathematical Programming
	M-WIWI-102832 - Operations Research in Supply Chain Management
	M-WIWI-103289 - Stochastic Optimization

Type	**Credits**	**Grading scale**	**Recurrence**	**Version**
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The examination will take place for the last time in the winter semester 2020/2021.

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

The prerequisite for participation in the exam is the achievement of a minimum number of points in delivery sheets. Details will be announced at the beginning of the course.

Prerequisites

None.

Annotation

The course will take place for the last time in the winter semester 20/21.

| T | **5.199 Course: Optimization Under Uncertainty [T-WIWI-106545]** |

Responsible: Prof. Dr. Steffen Rebennack
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103243 - Optimization under Uncertainty in Information Engineering and Management
                      M-WIWI-103289 - Stochastic Optimization

Type	Credits	Grading scale	Recurrence	Version
Written examination	5	Grade to a third	Each winter term	3

Exams				
ST 2021	7900309	Optimization under Uncertainty		Rebennack

Competence Certificate
The assessment consists of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation. The exam takes place in every the semester.

Prerequisites
None.

T 5.200 Course: Panel Data [T-WIWI-103127]

Responsible: apl. Prof. Dr. Wolf-Dieter Heller
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101638 - Econometrics and Statistics I
M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2520320	Panel Data	2 SWS	Lecture / 📱	Heller
ST 2021	2520321	Übungen zu Paneldaten	2 SWS	Practice / 📱	Heller
Exams					
ST 2021	7900115	Panel Data			Heller

Legend: 📱 Online, ⚉ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Prerequisites
None

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

V Panel Data
2520320, SS 2021, 2 SWS, Language: German, Open in study portal

**Lecture (V)
Online**

Content
Content:

Fixed-Effects-Models, Random-Effects-Models, Time-Demeaning

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Literature
Wooldridge, J. M. (2002). *Econometric analysis of cross section and panel data*. Cambridge and London: MIT Press.

Wooldridge, J. M. (2009). *Introductory Econometrics: A Modern Approach* (5th ed.). Mason, Ohio: South-Western Cengage Learning.

T   5.201 Course: Parallel Algorithms [T-INFO-101333]

Responsible:	Prof. Dr. Peter Sanders
Organisation:	KIT Department of Informatics
Part of:	M-INFO-100796 - Parallel Algorithms
	M-INFO-101199 - Advanced Algorithms: Design and Analysis
	M-INFO-101200 - Advanced Algorithms: Engineering and Applications

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 21/22	2400053	Parallel Algorithms	2/1 SWS	Lecture	Sanders, Hübner, Williams
Exams					
ST 2021	75489	Parallel Algorithms			Sanders

T   5.202 Course: Parallel Computer Systems and Parallel Programming [T-INFO-101345]

Responsible:	Prof. Dr. Achim Streit
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101210 - Dynamic IT-Infrastructures

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	24617	Parallel computer systems and parallel programming	2 SWS	Lecture / 📱	Streit, Häfner
Exams					
ST 2021	7500141	Parallel computer systems and parallel programming			Streit

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T   5.203 Course: Parametric Optimization [T-WIWI-102855]

Responsible: Prof. Dr. Oliver Stein
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101473 - Mathematical Programming

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Irregular	Version 1

Exams			
ST 2021	7900274_SS2021_NK	Parametric Optimization	Stein

Competence Certificate

The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation. The successful completion of the exercises is required for admission to the written exam.

The examination is held in the semester of the lecture and in the following semester.

Prerequisites

None

Recommendation

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

Annotation

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

T 5.204 Course: Pattern Recognition [T-INFO-101362]

Responsible: Prof. Dr.-Ing. Jürgen Beyerer
Organisation: KIT Department of Informatics
Part of: M-INFO-100825 - Pattern Recognition
M-INFO-101239 - Machine Vision

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	24675	Pattern Recognition	2 SWS	Lecture / 📱	Beyerer
Exams					
ST 2021	7500032	Pattern Recognition			Beyerer
WT 21/22	7500111	Pattern Recognition			Beyerer

Legend: 📱 Online, ⚯ Blended (On-Site/Online), ⬤ On-Site, ✗ Cancelled

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

V Pattern Recognition
24675, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Literature
Weiterführende Literatur

- Richard O. Duda, Peter E. Hart, Stork G. David. Pattern Classification. Wiley-Interscience, second edition, 2001
- K. Fukunaga. Introduction to Statistical Pattern Recognition. Academic Press, second edition, 1997
- R. Hoffman. Signalanalyse und -erkennung. Springer, 1998
- H. Niemann. Pattern analysis and understanding. Springer, second edition, 1990
- J. Schürmann. Pattern classification. Wiley & Sons, 1996
- S. Theodoridis, K. Koutroumbas. Pattern recognition. London: Academic, 2003
- V. N. Vapnik. The nature of statistical learning theory. Springer, second edition, 2000

T 5.205 Course: Personalization and Services [T-WIWI-102848]

Responsible:	Andreas Sonnenbichler
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101410 - Business & Service Engineering
	M-WIWI-101470 - Data Science: Advanced CRM
	M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	1

Competence Certificate

The exam is currently not offered.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

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

Prerequisites

None

Recommendation

None

Annotation

The course is currently not offered.

T 5.206 Course: Planning and Management of Industrial Plants [T-WIWI-102631]

Responsible:	Prof. Dr. Frank Schultmann
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101471 - Industrial Production II

Type Written examination	**Credits** 5,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2581952	Planning and Management of Industrial Plants	2 SWS	Lecture / 📱	Glöser-Chahoud, Schultmann
WT 21/22	2581953	Übungen Anlagenwirtschaft	2 SWS	Practice / 📱	Heck, Heinzmann, Glöser-Chahoud

Exams				
ST 2021	7981952	Planning and Management of Industrial Plants		Schultmann

Legend: 📱 Online, ⚄ Blended (On-Site/Online), 🌑 On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V Planning and Management of Industrial Plants
2581952, WS 21/22, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
Industrial plant management incorporates a complex set of tasks along the entire life cycle of an industrial plant, starting with the initiation and erection up to operating and dismantling.

During this course students will get to know special characteristics of industrial plant management. Students will learn important methods to plan, realize and supervise the supply, start-up, maintenance, optimisation and shut-down of industrial plants. Alongside, students will have to handle the inherent question of choosing between technologies and evaluating each of them. This course pays special attention to the specific characteristics of plant engineering, commissioning and investment.

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.207 Course: Portfolio and Asset Liability Management [T-WIWI-103128]

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2520357	Portfolio and Asset Liability Management	2 SWS	Lecture / 📱	Safarian
ST 2021	2520358	Übungen zu Portfolio and Asset Liability Management	2 SWS	Practice / 📱	Safarian
Exams					
ST 2021	7900116	Portfolio and Asset Liability Management			Safarian

Legend: 📱 Online, ✯ Blended (On-Site/Online), 🎙 On-Site, ✗ Cancelled

Competence Certificate
The assessment of this course consists of a written examination (following §4(2), 1 SPOs, 180 min.).

Prerequisites
None

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

V Portfolio and Asset Liability Management
2520357, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
Learning objectives:

Knowledge of various portfolio management techniques in the financial industry.

Content:

Portfolio theory: principles of investment, Markowitz- portfolio analysis, Modigliani-Miller theorems and absence of arbitrage, efficient markets, capital asset pricing model (CAPM), multi factorial CAPM, arbitragepricing theory (APT), arbitrage and hedging, multi factorial models, equity-portfolio management, passive strategies, active investment

Asset liability: statistical portfolio analysis in stock allocation, measures of success, dynamic multi seasonal models, models in building scenarios, stochastic programming in bond and liability management, optimal investment strategies, integrated asset liability management

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

Exam preparation: 40 hours

Exam preparation: 40 hours

Organizational issues
Blockveranstaltung

Literature
To be announced in the lecture

T 5.208 Course: Practical Course Computer Vision for Human-Computer Interaction [T-INFO-105943]

Responsible: Prof. Dr.-Ing. Rainer Stiefelhagen
Organisation: KIT Department of Informatics
Part of: M-INFO-101239 - Machine Vision

Type Examination of another type	Credits 6	Grading scale Grade to a third	Recurrence Each summer term	Version 3

Events					
ST 2021	2400123	Practical Course Computer Vision for Human-Computer Interaction	2 SWS	Practical course / ▯	Stiefelhagen, Seibold

Exams			
ST 2021	7500279	Practical Course Computer Vision for Human-Computer Interaction	Stiefelhagen

Legend: ▯ Online, ⬡ Blended (On-Site/Online), ● On-Site, ✕ Cancelled

T 5.209 Course: Practical Course Protocol Engineering [T-INFO-104386]

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: M-INFO-101206 - Networking

Type Examination of another type	Credits 4	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2400086	Protocol Engineering	4 SWS	Practical course	König, Zitterbart
Exams					
WT 21/22	7500002	Practical Course Protocol Engineering			Zitterbart

T   5.210 Course: Practical Course: Analysis of Complex Data Sets [T-INFO-105796]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
M-INFO-102807 - Practical Course: Analysis of Complex Data Sets

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Irregular	1

T 5.211 Course: Practical Course: Data Science [T-INFO-111262]

Responsible: Prof. Dr.-Ing. Klemens Böhm

Organisation: KIT Department of Informatics

Part of: M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
M-INFO-105632 - Practical Course: Data Science

Type Completed coursework (written)	Credits 6	Grading scale pass/fail	Recurrence Each summer term	Version 1

Exams			
ST 2021	7500307	Data Science - Laboratory Course	Böhm

T   5.212 Course: Practical Course: Database Systems [T-INFO-103201]

Responsible:	Prof. Dr.-Ing. Klemens Böhm
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
	M-INFO-101662 - Practical Course: Database Systems

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Each winter term	2

Events

WT 21/22	24286	Datenbankpraktikum	2 SWS	Practical course / ⚬	Böhm, Renftle

Legend: 🖥 Online, ⚬ Blended (On-Site/Online), 🔵 On-Site, ✗ Cancelled

T **5.213 Course: Practical Course: Geometric Modeling [T-INFO-103207]**

Responsible:	Prof. Dr. Hartmut Prautzsch
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101666 - Practical Course: Geometric Modeling

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
ST 2021	2400026	Praktikum Unterteilungsalgorithmen	2 SWS	Practical course / 🖥	Prautzsch, Xu
ST 2021	2400107	Praktikum Geometrisches Modellieren	2 SWS	Practical course / 🖥	Xu, Prautzsch
WT 21/22	2400024	Praktikum		Practical course / ⛄	Xu, Prautzsch
Exams					
ST 2021	7500212	Practical course: Geometric Modeling			Prautzsch

Legend: 🖥 Online, ⛄ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

5 COURSES

Course: Practical Course: Implementation and Evaluation of Advanced Data
Mining Approaches for Semi-Structured Data [T-INFO-106219]

T 5.214 Course: Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data [T-INFO-106219]

Responsible:	Prof. Dr.-Ing. Klemens Böhm
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101256 - Theory and Practice of Data Warehousing and Mining
	M-INFO-103128 - Practical Course: Implementation and Evaluation of Advanced Data Mining Approaches for Semi-Structured Data

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	4	pass/fail	Irregular	1

T   5.215 Course: Practical Course: Smart Data Analytics [T-INFO-106426]

Responsible:	Prof. Dr.-Ing. Michael Beigl
Organisation:	KIT Department of Informatics
Part of:	M-INFO-103235 - Practical Course: Smart Data Analytics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	6	Grade to a third	Each summer term	1

Events					
ST 2021	24895	Practical Course: Smart Data Analytics	4 SWS	Practical course /	Beigl, Riedel, Zhou, Bulut
Exams					
ST 2021	7500082	Practical Course: Smart Data Analytics			Beigl, Riedel

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

T 5.216 Course: Practical Course: Web Applications and Service-Oriented Architectures (II) [T-INFO-103121]

Responsible: Prof. Dr. Sebastian Abeck
Organisation: KIT Department of Informatics
Part of: M-INFO-104061 - Microservice-Based Web Applications

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	5	Grade to a third	Each summer term	3

Events					
ST 2021	24873	Practical Course: Web Applications and Service-Oriented Architectures (II)	2 SWS	Practical course / ▯	Abeck, Schneider, Sänger
Exams					
ST 2021	7500139	Practical Course: Web Applications and Service-Oriented Architectures (II)			Abeck

Legend: ▯ Online, ✲ Blended (On-Site/Online), ◖ On-Site, ✗ Cancelled

T 5.217 Course: Practical Seminar Digital Service Systems [T-WIWI-106563]

Responsible: Prof. Dr. Alexander Mädche
                   Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102808 - Digital Service Systems in Industry

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Events					
ST 2021	2540554	Practical Seminar: Information Systems & Service Design (Master)	3 SWS	Lecture / 📱	Mädche
WT 21/22	2540554	Practical Seminar: Information Systems & Service Design	3 SWS	Lecture	Mädche
Exams					
ST 2021	7900359	Practical Seminar Service Innovation			Satzger

Legend: 📱 Online, ⚃ Blended (On-Site/Online), ◆ On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according

to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

None

Annotation

New course title starting summer term 2017: "Practical Seminar Digital Service Systems".

The current range of seminar topics is announced on the KSRI website www.ksri.kit.edu.

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

V   Practical Seminar: Information Systems & Service Design (Master)   **Lecture (V)**
2540554, SS 2021, 3 SWS, Open in study portal   **Online**

Content

In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.

V   Practical Seminar: Information Systems & Service Design   **Lecture (V)**
2540554, WS 21/22, 3 SWS, Language: English, Open in study portal

T 5.218 Course: Practical Seminar: Advanced Analytics [T-WIWI-108765]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	1

Competence Certificate

The assessment consists of practical work in the field of advanced analytics, a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

At least one module offered by the institute should have been chosen before attending this seminar.

Annotation

The course is held in English. The course is not offered regularly.

T   5.219 Course: Practical Seminar: Data-Driven Information Systems [T-WIWI-106207]

Responsible:	Prof. Dr. Alexander Mädche
	Prof. Dr. Gerhard Satzger
	Prof.Dr. Thomas Setzer
	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103117 - Data Science: Data-Driven Information Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2021	7900373	Data Science for the Industrial Internet of Things	Satzger
WT 21/22	7900211	Practical Seminar: Data-Driven Information Systems	Weinhardt, Setzer

Competence Certificate

The assessment consists of a seminar paper, a presentation of the results and the contribution to the discussion (according to §4(2), 3 of the examination regulation). The final grade is based on the evaluation of each component (seminar paper, oral presentation, and active participation).

Prerequisites

None

Recommendation

At least one module offered by the institute should have been chosen before attending this seminar.

Annotation

The course is held in english. The course is not offered regularly.

T   5.220 Course: Practical Seminar: Health Care Management (with Case Studies) [T-WIWI-102716]

Responsible:	Prof. Dr. Stefan Nickel
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102805 - Service Operations

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Events					
ST 2021	2550498	Practical seminar: Health Care Management	3 SWS	Practical course / 🗔	Nickel, Mitarbeiter
WT 21/22	2500008	Practical seminar: Health Care Management	3 SWS	Practical course / 🗣	Nickel, Mitarbeiter
Exams					
ST 2021	7900014	Practical Seminar: Health Care Management (with Case Studies)			Nickel
WT 21/22	7900105	Practical Seminar: Health Care Management (with Case Studies)			Nickel

Legend: 🗔 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate

Due to a research semester of Professor Nickel in WS 19/20, the courses *Location Planning and Strategic SCM* and *Practice Seminar: Health Care Management* do NOT take place in WS 19/20. Please also refer to the information at https://dol.ior.kit.edu/Lehrveranstaltungen.php for further details.

The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

Prerequisites

None.

Recommendation

Basic knowledge as conveyed in the module *Introduction toOperations Research* is assumed.

Annotation

The credits have been reduced to 4,5 starting summer term 2016.

The lecture is offered every term.

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

T   5.221 Course: Practical Seminar: Information Systems and Service Design [T-WIWI-108437]

Responsible:	Prof. Dr. Alexander Mädche
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102806 - Service Innovation, Design & Engineering
	M-WIWI-104068 - Information Systems in Organizations
	M-WIWI-104080 - Designing Interactive Information Systems

Type Examination of another type	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each term	**Version** 2

Events					
ST 2021	2540554	Practical Seminar: Information Systems & Service Design (Master)	3 SWS	Lecture / 🖥	Mädche

Exams			
ST 2021	7900262	Practical Seminar: Information Systems and Service Design / Seminarpraktikum: Information Systems und Service Design	Mädche

Legend: 🖥 Online, ⧉ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted practical components and an active participation in class. Please take into account that, beside the written documentation, also a practical component (e.g. implementation of a prototype) is part of the course. Please examine the course description for the particular tasks. The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class). In the winter terms, the course is only offered as a seminar.

Prerequisites

None.

Recommendation

Attending the course „Digital Service Design" is recommended, but not mandatory.

Annotation

The course is held in English.

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

V   Practical Seminar: Information Systems & Service Design (Master)
2540554, SS 2021, 3 SWS, Open in study portal   **Lecture (V) Online**

Content

In this practical seminar, students get an individual assignment and develop a running software prototype. Beside the software prototype, the students also deliver a written documentation.

Prerequisites

Profound skills in software development are required

Literature

Further literature will be made available in the seminar.

T   5.222 Course: Practical Seminar: Service Innovation [T-WIWI-110887]

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-102806 - Service Innovation, Design & Engineering

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Exams			
ST 2021	7900359	Practical Seminar Service Innovation	Satzger
ST 2021	7900373	Data Science for the Industrial Internet of Things	Satzger

Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted pracitical components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites

None

Recommendation

Knowledge of Service Innovation Methods is assumed. Therefore it is recommended to attend the course Service Innovation [2540468] beforehand.

Annotation

Due to the project work, the number of participants is limited and participation requires knowledge about models, concepts and approaches that are taught in the Service Innovation lecture. Having taken the Service Innovation lecture or demonstrating equivalent knowledge is a prerequisite for participating in this Practical Seminar. Details for registration will be announced on the web pages for this course.

The seminar is not offered regularly.

T 5.223 Course: Predictive Mechanism and Market Design [T-WIWI-102862]

Responsible:	Prof. Dr. Johannes Philipp Reiß
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101453 - Applied Strategic Decisions
	M-WIWI-101505 - Experimental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Prerequisites
None

Annotation
The course is given every second fall term, e.g., WS2017/18, WS2019/20, ...

The retake exam is given in the summer term subsequent to the fall term where the course (lecture and final exam) is given.

T 5.224 Course: Predictive Modeling [T-WIWI-110868]

Responsible:	Jun.-Prof. Dr. Fabian Krüger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101638 - Econometrics and Statistics I
	M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2521311	Predictive Modeling	2 SWS	Lecture / 📱	Krüger
ST 2021	2521312	Predictive Modeling (Tutorial)	2 SWS	Practice / 📱	Krüger, Koster
Exams					
ST 2021	7900298	Predictive Modeling			Krüger
ST 2021	7900299	Predictive Modeling			Krüger

Legend: 📱 Online, 🔀 Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Open Book exam, online

Prerequisites
None

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

V Predictive Modeling
2521311, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
Contents
This course presents methods for making and evaluating statistical predictions based on data. We consider various types of predictions (mean, probability, quantile, and full distribution), all of which are practically relevant. In each case, we discuss selected modeling approaches and their implementation using R software. We consider various economic case studies. Furthermore, we present methods for absolute evaluation (assessing whether a given model is compatible with the data) and relative evaluation (comparing the predictive performance of alternative models).

Learning objectives
Students have a good conceptual understanding of statistical prediction methods. They are able to implement these methods using statistical software, and can assess which method is suitable in a given situation.

Prerequisites
Students should know econometrics on the level of the course `Applied Econometrics' [2520020]

Literature

- Elliott, G., und A. Timmermann (Hrsg.): "Handbook of Economic Forecasting", vol. 2A und 2B, 2013.
- Gneiting, T., und M. Katzfuss: "Probabilistic Forecasting", Annual Review of Statistics and Its Application 1, 125-151, 2014.
- Hastie, T., Tibshirani, R., and J. Friedman: "The Elements of Statistical Learning", 2. Ausgabe, Springer, 2009.
- Weitere Literatur wird in der Vorlesung bekanntgegeben.

V Predictive Modeling (Tutorial)
2521312, SS 2021, 2 SWS, Language: English, Open in study portal

Practice (Ü)
Online

T　5.225 Course: Price Management [T-WIWI-105946]

Responsible:	Prof. Dr. Andreas Geyer-Schulz
	Dr Paul Glenn
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101409 - Electronic Markets

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540529	Price Management	2 SWS	Lecture / ▯	Glenn
ST 2021	2540530	Exercise Price Management	1 SWS	Practice / ▯	Glenn
Exams					
ST 2021	7900139	Price Management			Geyer-Schulz

Legend: ▯ Online, ✧ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate

Lecture and exam will not be offered in summer semester 2019. The next examination is in the summer semester 2020.

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.
A bonus can be acquired through successful participation in the practice. If the grade of the written examination is between 4.0 and 1.3, the bonus improves the grade by one grade level (0.3 or 0.4). The exact criteria for awarding a bonus will be announced at the beginning of the course.

Prerequisites
None

Recommendation
None

Annotation
The lecture is offered for the first time in summer term 2016.

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

V　Price Management
2540529, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Literature

- H. Simon and M. Fassnacht, *Preismanagement*, vol. 4. Wiesbaden: Springer Gabler, 2016.
- T. T. Nagle, J. E. Hogan, und J. Zalee, *The Strategy and Tactics of Pricing: A guide to growing more profitably*. New Jersey: Prentice Hall, 2010.

T   5.226 Course: Price Negotiation and Sales Presentations [T-WIWI-102891]

Responsible:	Prof. Dr. Martin Klarmann
	Mark Schröder
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105312 - Marketing and Sales Management

Type Examination of another type	**Credits** 1,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 3

Events					
WT 21/22	2572198	Price Negotiation and Sales Presentations	1 SWS	Block / 🎤	Klarmann, Schröder

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

This alternative exam assessment consists of a presentation with a subsequent discussion totalling 25 minutes. Moreover learning contents are checked by realistic 30-minute price negotiations.

Prerequisites

None

Recommendation

None

Annotation

Participation requires an application. The application period starts at the beginning of the semester. More information can be obtained on the website of the research group Marketing & Sales (marketing.iism.kit.edu). Access to this course is restricted. Typically all students will be granted the attendance of one course with 1.5 ECTS. Nevertheless, participation for a specific course can not be guaranteed. For further information please contact the Marketing and Sales Research Group (marketing.iism.kit.edu). Please note that only one of the courses from the election block can be attended in the module.

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

V   Price Negotiation and Sales Presentations
2572198, WS 21/22, 1 SWS, Language: German, Open in study portal

Block (B) On-Site

Content

At first, theoretical knowledge about the behavior in selling contexts is discussed. Then, in a practical part, students will apply this knowledge in their own price negotiations.

Students

- gain a clear impression of the theoretical knowledge about price negotiations and sales presentations
- improve their own negotiation abilities

Non exam assessment (following §4(2), 3 of the examination regulation).

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

- In order to participate in this course, you need to apply. Applications usually start with the lecture period in the winter term. Detailed information on the application process is provided on the website of the Marketing and Sales Research Group (marketing.iism.kit.edu) shortly before the lecture period in winter term starts.
- Please note that only one of the 1.5 ECTS courses can be chosen in the module.
- Please note: The number of participants for this course is limited. The Marketing and Sales Research Group typically provides the possibility to attend a course with 1,5 ECTS in the respective module to all students. Participation in a specific course cannot be guaranteed.

Organizational issues

Blockveranstaltung

T 5.227 Course: Pricing Excellence [T-WIWI-111246]

Responsible:	Fabian Bill
	Prof. Dr. Martin Klarmann
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	1,5	Grade to a third	Each summer term	1

Events					
ST 2021	2571175	Pricing Excellence	1 SWS	Others (sons / 🖥	Bill
Exams					
ST 2021	7900300	Pricing Excellence			Klarmann

Legend: 🖥 Online, 🔀 Blended (On-Site/Online), ✤ On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment (team presentation of a case study with a duration of about 25 minutes and a subsequent discussion).

Prerequisites
None.

Annotation
Please note that only one of the courses in the module´s supplementary offering can be counted. This event has a restriction on participation. The Marketing and Sales Research Group typically allows all students to attend a 1.5 credit course in the corresponding module. A guarantee for the attendance of a certain event cannot be given. An application is required for participation in this event. The application phase usually takes place at the beginning of the lecture period in the summer semester. More information on the application process is usually available on the Marketing and Sales Research Group website (marketing.iism.kit.edu) shortly before the start of the lecture period in the summer semester.

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

V Pricing Excellence
2571175, SS 2021, 1 SWS, Language: English, Open in study portal

Others (sonst.)
Online

Content
In a theoretical part at the beginning of the course, students are taught the theoretical foundations of pricing. This includes an introduction to (1) price setting of product prices as well as (2) price setting of customer net prices (development of discount systems). Furthermore, theoretical foundations of price implementation and price monitoring are discussed.

Theoretical contents are applied and presented by teams within a case study format.

The learning objectives are as follows:
- Getting to know the theoretical foundations of price setting
- Getting to know the theoretical foundations of price execution and price monitoring
- Application of the acquired knowledge in a case study format
- Concise and structured presentation of the results

Alternative exam assessment according to § 4 paragraph 2 Nr. 3 of the examination regulation (presentation of a case study with subsequent discussion).

Total time required for 1.5 credit points: approx. 45.0 hours

Attendance time: 15 hours

Preparation and wrap-up of the course: 22.5 hours

Exam and exam preparation: 7.5 hours

Organizational issues
Blockveranstaltung, Raum 115, Geb. 20.21, Termine werden noch bekannt gegeben

T 5.228 Course: Probabilistic Time Series Forecasting Challenge [T-WIWI-111387]

Responsible:	Jun.-Prof. Dr. Fabian Krüger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101638 - Econometrics and Statistics I
	M-WIWI-101639 - Econometrics and Statistics II

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Irregular	1

Events					
WT 21/22	00080	Probabilistic Time Series Forecasting Challenge		Project (P	Bracher, Koster, Krüger, Lerch, Wolffram

Competence Certificate

The assessment of this course is an alternative exam assessment. In order to pass the course, students are required to submit forecasts for each week of the semester (excluding the Christmas break). At the end of the course, students are required to write a report (10-15 pages) that describes the forecasting methods as well as their performance. This report is the basis for the final course grade.

Prerequisites

The course requires good basic knowledge in statistics and data science as well as knowledge in R, Python, Matlab or similar. Knowledge in time series analysis is helpful but not mandatory.

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

V Probabilistic Time Series Forecasting Challenge
00080, WS 21/22, SWS, Language: English, Open in study portal

Project (PRO)

Content

Statistical forecasts are relevant across all fields of society. In this data science project, students make, evaluate and communicate their own statistical forecasts in a real-time setting. We consider probabilistic forecasts that involve a measure of uncertainty in addition to a point forecast. Students are asked to make forecasts of several real-world time series (including energy demand and the DAX stock market index). Historical data on all series are available from public sources that are updated as time proceeds. While the time series differ from each other in important ways, statistical methods can meaningfully be used for prediction in all cases. We focus on quantile forecasts which are useful to measure forecast uncertainty in a relatively simple way.

Organizational issues
Short description

In this data science project, students make and evaluate statistical forecasts in a realistic setup (involving real-time predictions and real-world time series data). In mid October, we'll have a kick-off meeting and several lectures covering relevant background knowledge. During the semester, there will be a weekly meeting in which students and instructors discuss the current state of the forecasting challenge. Details on the logistics (precise dates, online versus offline format) are TBA.

Prerequisites

Students should have a good working knowledge of statistics and data science, including proficiency in a programming language like R, Python, or Matlab. Knowledge of time series analysis is helpful but not strictly required. Motivation and curiosity are particularly important in this new course format that requires regular, active participation over the whole semester.

Examination rules

The project seminar counts for 4.5 credit points (Leistungspunkte). The examination rules are as follows:

- In order to pass the course, students are required to submit forecasts for each week of the semester (excluding the Christmas break). Each week's submission is due on Wednesday, 6 p.m., and covers the seven following days (Thursday to Wednesday).
- At the end of the course, students are required to write a report (10-15 pages) that describes the forecasting methods as well as their performance. This report is the basis for the final course grade.

T   5.229 Course: Product and Innovation Management [T-WIWI-109864]

Responsible:	Prof. Dr. Martin Klarmann
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101510 - Cross-Functional Management Accounting
	M-WIWI-101514 - Innovation Economics
	M-WIWI-105312 - Marketing and Sales Management

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	3

Events					
ST 2021	2571154	Product and Innovation Management	2 SWS	Lecture / 🖥	Klarmann
Exams					
ST 2021	7900024	Product and Innovation Management			Klarmann

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

Competence Certificate
The assessment of success takes place through a written exam (according to SPO § 4 Abs. 2, Pkt. 1) with additional aids in the sense of an open book exam.
In the winter term 2021/22, the written exam will either take place in the lecture hall or online, depending on further pandemic developments. Further details will be announced during the lecture.

Prerequisites
None

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

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

V	**Product and Innovation Management** 2571154, SS 2021, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **Online**

Content

This course addresses topics around the management of new as well as existing products. After the foundations of product management, especially the product choice behavior of customers, students get to know in detail different steps of the innovation process. Another section regards the management of the existing product portfolio.

Students

- know the most important terms of the product and innovation concept

- understand the models of product choice behavior (e.g., the Markov model, the Luce model)

- are familiar with the basics of network theory (e.g. the Triadic Closure concept)

- know the central strategic concepts of innovation management (especially the market driving approach, pioneer and successor, Miles/Snow typology, blockbuster strategy)

- master the most important methods and sources of idea generation (e.g. open innovation, lead user method, crowdsourcing, creativity techniques, voice of the customer, innovation games, conjoint analysis, quality function deployment, online toolkits)

- are capable of defining and evaluating new product concepts and know the associated instruments like focus groups, product testing, speculative sales, test market simulation Assessor, electronic micro test market

- have advanced knowledge about market introduction (e.g. adoption and diffusion models Bass, Fourt/Woodlock, Mansfield)

- understand important connections of the innovation process (cluster formation, innovation culture, teams, stage-gate process)

The assessment is carried out (according to §4(2), 3 SPO) in the form of a written open book exam.

Total effort for 3 credit points: approx. 90 hours

Presence time: 30 hours

Preparation and wrap-up of LV: 45.0 hours

Exam and exam preparation: 15.0 hours

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

Literature

Homburg, Christian (2016), Marketingmanagement, 6. Aufl., Wiesbaden.

T   5.230 Course: Production and Logistics Management [T-WIWI-102632]

Responsible: Dr.-Ing. Simon Glöser-Chahoud
                   Prof. Dr. Frank Schultmann

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101412 - Industrial Production III

Type	Credits	Grading scale	Recurrence	Version
Written examination	5,5	Grade to a third	Each summer term	1

Events					
ST 2021	2581954	Production and Logistics Management	2 SWS	Lecture / 📱	Schultmann, Glöser-Chahoud
ST 2021	2581955	Übung zu Produktions- und Logistikmanagement	2 SWS	Practice / 📱	Zimmer, Huster
Exams					
ST 2021	7981954	Production and Logistics Management			Schultmann

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✖ Cancelled

Competence Certificate
The assessment consists of a written exam (90 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V   Production and Logistics Management
2581954, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
This course covers central tasks and challenges of operative production and logistics management. Students get to know the set-up and mode of planning systems such as production planning and control systems, enterprise resource planning systems and advanced planning systems to cope with the accompanying planning tasks in supply chain management. Methods to solve these tasks from the field of operational research will be explored with respect to manufacturing program planning, material requirement planning, lot size problems and scheduling. Alongside to MRP II (Manufacturing Resources Planning), students will be introduced to integrated supply chain management approaches. Finally, commercially available planning systems will be presented and discussed.

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.231 Course: Project Lab Cognitive Automobiles and Robots [T-WIWI-109985]

Responsible:	Prof. Dr.-Ing. Johann Marius Zöllner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103356 - Machine Learning

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 2

Events					
ST 2021	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar / 📱	Zöllner
WT 21/22	2512501	Practical Course Cognitive automobiles and robots (Master)	3 SWS	Practical course	Zöllner, Daaboul
Exams					
WT 21/22	7900107	Advanced Lab Cognitive Automobile and Robots (Master)			Zöllner

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

The alternative exam assessment consists of:

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

Details of the grade formation will be announced at the beginning of the course.

Prerequisites

None

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

V Cognitive Automobiles and Robots
2513500, SS 2021, 2 SWS, Language: German/English, Open in study portal

Seminar (S)
Online

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

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

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

| V | **Practical Course Cognitive automobiles and robots (Master)**
2512501, WS 21/22, 3 SWS, Language: German/English, Open in study portal | **Practical course (P)** |

Content

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

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

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

Learning objectives:

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

Recommendations:

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

Workload:

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

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

T 5.232 Course: Project Lab Machine Learning [T-WIWI-109983]

Responsible:	Prof. Dr.-Ing. Johann Marius Zöllner
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103356 - Machine Learning

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2512500	Project Lab Machine Learning	3 SWS	Practical course / 🧩	Zöllner
Exams					
ST 2021	7900086	Project Lab Machine Learning			Zöllner

Legend: 📱 Online, 🧩 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate

The alternative exam assessment consists of:

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

Details of the grade formation will be announced at the beginning of the course.

Prerequisites

None

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

V Project Lab Machine Learning
2512500, SS 2021, 3 SWS, Language: German/English, Open in study portal

Practical course (P)
Blended (On-Site/Online)

Content

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

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

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

Learning objectives:

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

Recommendations:

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

Workload:

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

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

T 5.233 Course: Project Management [T-WIWI-103134]

Responsible: Prof. Dr. Frank Schultmann
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101412 - Industrial Production III
M-WIWI-101471 - Industrial Production II

Type Written examination	Credits 3,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2581963	Project Management	2 SWS	Lecture / 🖥	Schultmann, Volk, Rosenberg, Gehring
WT 21/22	2581964	Übung zu Project Management	1 SWS	Practice / 🖥	Volk, Rosenberg, Wehrle, Gehring
Exams					
ST 2021	7981963	Project Management			Schultmann

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ◕ On-Site, ✘ Cancelled

Competence Certificate

The assessment consists of a written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V Project Management
2581963, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content

1. Introduction
2. Principles of Project Management
3. Project Scope Management
4. Time Management and Resource Scheduling
5. Cost Management
6. Quality Management
7. Risk Management
8. Stakeholder
9. Communication, Negotiation and Leadership
10. Project Controlling
11. Agile Project Management

Literature
Wird in der Veranstaltung bekannt gegeben.

T   5.234 Course: Project Management in Practice [T-INFO-101976]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management

Type Completed coursework	Credits 1,5	Grading scale pass/fail	Recurrence Irregular	Version 1

Events					
ST 2021	2400019	Project Management in Practice	2 SWS	Lecture / ▯	Böhm, Schnober
Exams					
ST 2021	7500288	Project Management in Practice			Böhm

Legend: ▯ Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

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

V   Project Management in Practice
2400019, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
At the end of the course, the participants:

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

The following key skills are taught:

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

Organizational issues
Die Plätze sind begrenzt und die Anmeldung findet durch das Sekretariat Prof. Böhm statt.
Termine

FR, 16. 4. von 13:00 bis18:00 Uhr

SA, 17.4. von 9:00 bis 15:30 Uhr

FR, 23.4. von 13:00 bis 18:00 Uhr

SA, 24.4. von 9:00 bis 15:30 Uhr

T   5.235 Course: Provable Security in Cryptography [T-INFO-101259]

Responsible: Prof. Dr. Dennis Hofheinz
Organisation: KIT Department of Informatics
Part of: M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

T   5.236 Course: Public Management [T-WIWI-102740]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101504 - Collective Decision Making
M-WIWI-101511 - Advanced Topics in Public Finance

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2561127	Public Management	3 SWS	Lecture / Practice (/ 📱	Wigger

Exams				
ST 2021	790puma	Public Management		Wigger
WT 21/22	790puma	Public Management		Wigger

Legend: 📱 Online, ✥ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1.5h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Public Finance is required.

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

V   Public Management
2561127, WS 21/22, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
Online

Literature
Weiterführende Literatur:

- Damkowski, W. und C. Precht (1995): Public Management; Kohlhammer
- Richter, R. und E.G. Furubotn (2003): Neue Institutionenökonomik; 3. Auflage, Mohr
- Schedler, K. und I. Proeller (2003): New Public Management; 2. Auflage; UTB
- Mueller, D.C. (2009): Public Choice III; Cambridge University Press
- Wigger, B.U. (2006): Grundzüge der Finanzwissenschaft; 2. Auflage; Springer

T   5.237 Course: Public Revenues [T-WIWI-102739]

Responsible: Prof. Dr. Berthold Wigger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101511 - Advanced Topics in Public Finance

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2560120	Public Revenues	2 SWS	Lecture / ▤	Wigger
ST 2021	2560121	Übung zu Öffentliche Einnahmen	1 SWS	Practice / ▤	Wigger
Exams					
ST 2021	790oeff	Public Revenues			Wigger
WT 21/22	790oeff	Public Revenues			Wigger

Legend: ▤ Online, ⚙ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate
Depending on the further pandemic development the assessment will consist either of an open book exam (following Art. 4, para. 2, clause 3 of the examination regulation), or of an 1h written exam (following Art. 4, para. 2, clause 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Public Finance is required.

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

V   Public Revenues
2560120, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
The *Public Revenues* lecture is concerned with the theory and policy of taxation and public dept. In the first chapter, fundamental concepts of taxation theory are introduced, whereas the second chapter deals with key elements of the German taxation system. The allocative and distributive effects of different taxation types are examined in chapter three and four. Chapter five integrates both allocative and distributive components in order to derive a theory of optimal taxation. The core of the sixth chapter is represented by international aspects of taxation. The debt part begins with a description of the extent and structure of public dept in chapter seven. In the following chapter, macroeconomic theories of national dept are evolved, while chapter nine is concerned with its long term consequences when employed as a regular instrument of budgeting. Finally, the tenth chapter deals with constitutional limits to public debt-incurring.

Learning goals:
See German version.

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

Literature
Literatur:

- Homburg, S.(2000): *Allgemeine Steuerlehre*, Vahlen
- Rosen, H.S.(1995): *Public Finance*; 4. Aufl., Irwin
- Wellisch, D.(2000): *Finanzwissenschaft I* und *Finanzwissenschaft III*, Vahlen
- Wigger, B. U.(2006): *Grundzüge der Finanzwissenschaft*; 2. Aufl., Springer

T 5.238 Course: Python for Computational Risk and Asset Management [T-WIWI-110213]

Responsible:	Prof. Dr. Maxim Ulrich
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-105032 - Data Science for Finance

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	2

Competence Certificate

The examination takes the form of an alternative exam assessment.

The alternative exam assessment consists of a Python-based "Takehome Exam". At the end of the third week of January, the student is given a "Takehome Exam" which he processes and sends back independently within 4 hours using Python. Precise instructions will be announced at the beginning of the course. The alternative exam assessment can be repeated a maximum of once. A timely repeat option takes place at the end of the third week in March of the same year. More detailed instructions will be given at the beginning of the course.

Prerequisites

None.

Recommendation

Good knowledge of statistics and basic programming skills

T   5.239 Course: Quantitative Methods in Energy Economics [T-WIWI-107446]

Responsible: Dr. Patrick Plötz
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101451 - Energy Economics and Energy Markets

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

Events					
WT 21/22	2581007	Quantitative Methods in Energy Economics	2 SWS	Lecture	Plötz, Dengiz, Yilmaz
WT 21/22	2581008	Übung zu Quantitative Methods in Energy Economics	1 SWS	Practice	Plötz, Dengiz, Yilmaz
Exams					
ST 2021	7981007	Quantitative Methods in Energy Economics			Fichtner

Competence Certificate
The assessment consists of an oral (30 minutes) exam (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V   Quantitative Methods in Energy Economics
2581007, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)

Content
Energy economics makes use of many quantitative methods in exploration and analysis of data as well as in simulations and modelling. This lecture course aims at introducing students of energy economics into the application of quantitative methods and techniques as taught in elementary courses to real problems in energy economics. The focus is mainly on regression, simulation, time series analysis and related statistical methods as applied in energy economics.

Learning Goals:

The student

- knows and understands selected quantitative methods of energy economics
- is able to use selected quantitative methods of energy economics
- understands they range of usage, limits and is autonomously able to adress new problems by them.

Literature
Wird in der Vorlesung bekannt gegeben.

| T | 5.240 Course: Randomized Algorithms [T-INFO-101331] |

Responsible: Thomas Worsch
Organisation: KIT Department of Informatics
Part of: M-INFO-100794 - Randomized Algorithms
M-INFO-101199 - Advanced Algorithms: Design and Analysis
M-INFO-101200 - Advanced Algorithms: Engineering and Applications

| **Type** Oral examination | **Credits** 5 | **Grading scale** Grade to a third | **Recurrence** Each winter term | **Version** 1 |

Events					
WT 21/22	24171	Randomized Algorithms	3 SWS	Lecture / Practice (/ ⚙	Worsch
Exams					
ST 2021	75400002	Randomized Algorithms			Worsch

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 👤 On-Site, ✗ Cancelled

T   5.241 Course: Recommender Systems [T-WIWI-102847]

Responsible: Prof. Dr. Andreas Geyer-Schulz

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-101410 - Business & Service Engineering
M-WIWI-101470 - Data Science: Advanced CRM
M-WIWI-105661 - Data Science: Intelligent, Adaptive, and Learning Information Services

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2540506	Recommender Systems	2 SWS	Lecture / 📱	Geyer-Schulz
ST 2021	2540507	Exercise Recommender Systems	1 SWS	Practice / 📱	Nazemi
WT 21/22	2540506	Recommender Systems	2 SWS	Lecture	Geyer-Schulz
WT 21/22	2540507	Exercise Recommender Systems	1 SWS	Practice	Geyer-Schulz, Nazemi
Exams					
ST 2021	7900138	Recommender Systems			Geyer-Schulz

Legend: 📱 Online, ⚃ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

Written examination (60 minutes) according to §4(2), 1 SPO. The exam is considered passed if at least 50 out of a maximum of 100 possible points are achieved. The grades are graded in five steps (best grade 1.0 from 95 points). Details of the grade formation and scale will be announced in the course.

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

Prerequisites

None

Recommendation

None

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

V	**Recommender Systems** 2540506, SS 2021, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **Online**

Content

At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Learning objectives:

The student

- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Exam:

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from excersise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Literature

Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.

Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.

Asim Ansari, Skander Essegaier, and Rajeev Kohli. Internet recommendation systems. Journal of Marketing Research, 37:363 – 375, Aug 2000.

Christopher Avery, Paul Resnick, and Richard Zweckhauser. The market for evaluations. American Economic Review, 89(3):564 – 584, 1999.

Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.

Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints, volume 2356 of Lecture Notes in Artificial Intelligence LNAI, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. JACM, 46(5):604–632, sep 1999.

Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usernet News. Communications of the ACM, 40(3):77 – 87, Mar 1997.

Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.

Weiterführende Literatur:

Antoinette Alexander. The return of hardware: A necessary evil? Accounting Technology, 15(8):46 – 49, Sep 1999.

Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. Communications of the ACM, 40(3):88 – 89, Mar 1997.

Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. Communications of the ACM, 42(12):32 – 38, Dec 1999.

Thomas J. Blischok. Every transaction tells a story. Chain Store Age Executive with Shopping Center Age, 71(3):50–56, Mar 1995.

Hans Hermann Bock. Automatische Klassifikation. Vandenhoeck und Ruprecht, Göttingen, 1974.

Andrew S.C. Ehrenberg. Repeat-Buying: Facts, Theory and Applications. Charles Griffin & Company Ltd, London, 2 edition, 1988.

Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. Marketing ZFP, 24:47 – 55, 2002.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, Data Analysis – Scientific Modeling and Practical Applications, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.

Andreas Geyer-Schulz, Michael Hahsler, and Maximillian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. International Journal of Engineering Education, 17(2):153 – 163, 2001.

Mark-Edward Grey. Recommendersysteme auf Basis linearer Regression, 2004.

John A. Hartigan. Clustering Algorithms. John Wiley and Sons, New York, 1975.

Kevin Kelly. New Rules for the New Economy: 10 Radical Strategies for a Connected World. Viking, 1998.

Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France, volume 2455 of Lecture Notes in Computer Science, pages 254–261, Berlin, Sep 2002. Springer-Verlag.

Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. Data Mining and Knowledge Discovery, 6:5 – 8, 2002.

G. S. Maddala. Introduction to Econometrics. John Wiley, Chichester, 3 edition, 2001.

Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? Journal of Targeting, Measurement and Analysis for Marketing, 10(4):304 – 313, Jan 2002.

Andreas Mild and Thomas Reutterer. An improved collaborative filtering approach for predicting cross-category purchases based on binary market basket data. Journal of Retailing & Consumer Services, 10(3):123–133, may 2003.

Paul Resnick and Hal R. Varian. Recommender Systems. Communications of the ACM, 40(3):56 – 58, Mar 1997.

Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences, pages 345 – 354, New York, 1998. ACM Press.

J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.

Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating "word of mouth". In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

| V | **Recommender Systems**
2540506, WS 21/22, 2 SWS, Language: German, Open in study portal | Lecture (V) |

Content

At first, an overview of general aspects and concepts of recommender systems and its relevance for service providers and customers is given. Next, different categories of recommender systems are discussed. This includes explicit recommendations like customer reviews as well as implicit services based on behavioral data. Furthermore, the course gives a detailed view of the current research on recommender systems at the Chair of Information Services and Electronic Markets.

Learning objectives:

The student

- is proficient in different statistical, data-mining, and game theory methods of computing implicit and explicit recommendations
- evaluates recommender systems and compares these with related services

Workload:

The total workload for this course is approximately 135 hours (4.5 credits):

Time of attendance

- Attending the lecture: 15 x 90min = 22h 30m
- Attending the exercise classes: 7 x 90min = 10h 30m
- Examination: 1h 00m

Self-study

- Preparation and wrap-up of the lecture: 15 x 180min = 45h 00m
- Preparing the exercises: 25h 00m
- Preparation of the examination: 31h 00m

Sum: 135h 00m

Exam:

Assessment consists of a written exam of 1 hour length following §4 (2), 1 of the examination regulation and by submitting written papers as part of the exercise following §4 (2), 3 of the examination regulation.

The course is considered successfully taken, if at least 50 out of 100 points are acquired in the written exam. In this case, all additional points (up to 10) from excersise work will be added.

Grade: Minimum points

- 1,0: 95
- 1,3: 90
- 1,7: 85
- 2,0: 80
- 2,3: 75
- 2,7: 70
- 3,0: 65
- 3,3: 60
- 3,7: 55
- 4,0: 50
- 5,0: 0

Literature

Rakesh Agrawal, Tomasz Imielinski, and Arun Swami. Mining association rules between sets of items in large databases. In Sushil Jajodia Peter Buneman, editor, Proceedings of the ACM SIGMOD International Conference on Management of Data, volume 22, Washington, D.C., USA, Jun 1993. ACM, ACM Press.

Rakesh Agrawal and Ramakrishnan Srikant. Fast algorithms for mining association rules. In Proceedings of the 20th Very Large Databases Conference, Santiago, Chile, pages 487 – 499, Sep 1994.

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Ibrahim Cingil, Asuman Dogac, and Ayca Azgin. A Broader Approach to Personalization. Communications of the ACM, 43(8):136 – 141, Aug 2000.

Richard O. Duda, Peter E. Hart, and David G. Stork. Pattern Classification. Wiley-Interscience, New York, 2 edition, 2001.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. A customer purchase incidence model applied to recommender services. In R. Kohavi et al., editor, Proceedings of the WebKDD 2001 – Mining log data across all customer touchpoints, volume 2356 of Lecture Notes in Artificial Intelligence LNAI, pages 25–47, Berlin, 2002. ACM, Springer-Verlag.

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Joseph Konstan, Bradley Miller, David Maltz, Jonathan Herlocker, Lee Gordon, and John Riedl. Grouplens: Applying Collaborative Filtering to Usernet News. Communications of the ACM, 40(3):77 – 87, Mar 1997.

Paul Resnick, Neophytos Iacovou, Peter Bergstrom, and John Riedl. Grouplens: An open architecture for collaborative filtering of netnews. In Proceedings of the conference on Computer supported cooperative work, pages 175 – 186. ACM Press, 1994.

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Christopher Avery and Richard Zeckhauser. Recommender systems for evaluating computer messages. Communications of the ACM, 40(3):88 – 89, Mar 1997.

Steven Bellman, Gerald Lohse, and Eric Johnson. Predictors of Online Buying Behavior. Communications of the ACM, 42(12):32 – 38, Dec 1999.

Thomas J. Blischok. Every transaction tells a story. Chain Store Age Executive with Shopping Center Age, 71(3):50–56, Mar 1995.

Hans Hermann Bock. Automatische Klassifikation. Vandenhoeck und Ruprecht, Göttingen, 1974.

Andrew S.C. Ehrenberg. Repeat-Buying: Facts, Theory and Applications. Charles Griffin & Company Ltd, London, 2 edition, 1988.

Wolfgang Gaul, Andreas Geyer-Schulz, Michael Hahsler, and Lars Schmidt-Thieme. eMarketing mittels Recommendersystemen. Marketing ZFP, 24:47 – 55, 2002.

Andreas Geyer-Schulz, Michael Hahsler, and Maximilian Jahn. myvu: a next generation recommender system based on observed consumer behavior and interactive evolutionary algorithms. In W. Gaul, O. Opitz, and M. Schader, editors, Data Analysis – Scientific Modeling and Practical Applications, volume 18 of Studies in Classification, Data Analysis and Knowledge Organization, pages 447 – 457, Heidelberg, Germany, 2000. Springer.

Andreas Geyer-Schulz, Michael Hahsler, and Maximillian Jahn. Educational and scientific recommender systems: Designing the information channels of the virtual university. International Journal of Engineering Education, 17(2):153 – 163, 2001.

Mark-Edward Grey. Recommendersysteme auf Basis linearer Regression, 2004.

John A. Hartigan. Clustering Algorithms. John Wiley and Sons, New York, 1975.

Kevin Kelly. New Rules for the New Economy: 10 Radical Strategies for a Connected World. Viking, 1998.

Taek-Hun Kim, Young-Suk Ryu, Seok-In Park, and Sung-Bong Yang. An improved recommendation algorithm in collaborative filtering. In K. Bauknecht, A. Min Tjoa, and G. Quirchmayr, editors, E-Commerce and Web Technologies, Third International Conference, Aix-en-Provence, France, volume 2455 of Lecture Notes in Computer Science, pages 254–261, Berlin, Sep 2002. Springer-Verlag.

Ron Kohavi, Brij Masand, Myra Spiliopoulou, and Jaideep Srivastava. Web mining. Data Mining and Knowledge Discovery, 6:5 – 8, 2002.

G. S. Maddala. Introduction to Econometrics. John Wiley, Chichester, 3 edition, 2001.

Andreas Mild and Martin Natter. Collaborative filtering or regression models for Internet recommendation systems? Journal of Targeting, Measurement and Analysis for Marketing, 10(4):304 – 313, Jan 2002.

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Paul Resnick and Hal R. Varian. Recommender Systems. Communications of the ACM, 40(3):56 – 58, Mar 1997.

Badrul M. Sarwar, Joseph A. Konstan, Al Borchers, Jon Herlocker, Brad Miller, and John Riedl. Using filtering agents to improve prediction quality in the grouplens research collaborative filtering system. In Proceedings of ACM Conference on Computer-Supported Cooperative Work, Social Filtering, Social Influences, pages 345 – 354, New York, 1998. ACM Press.

J. Ben Schafer, Joseph Konstan, and Jon Riedl. Recommender Systems in E-commerce. In Proceedings of the 1st ACM conference on Electronic commerce, pages 158 – 166, Denver, Colorado, USA, Nov 1999. ACM.

Upendra Shardanand and Patti Maes. Social information filtering: Algorithms for automating "word of mouth". In Proceedings of ACM SIGCHI, volume 1 of Papers: Using the Information of Others, pages 210 – 217. ACM, 1995.

| T | **5.242 Course: Regulation Theory and Practice [T-WIWI-102712]** |

Responsible: Prof. Dr. Kay Mitusch
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101406 - Network Economics
M-WIWI-101451 - Energy Economics and Energy Markets

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4,5	Grade to a third	see Annotations	2

Competence Certificate
The lecture is not offered for an indefinite period of time.
Result of success is made by a 20-30 minutes oral examination. Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
None

Recommendation
Basic knowledge and skills of microeconomics from undergraduate studies (bachelor's degree) are expected.

Particularly helpful but not necessary: Industrial Economics and Principal-Agent- or Contract theories. Prior attendance of the lecture *Competition in Networks* [26240] is helpful in any case but not considered a formal precondition.

Annotation
The lecture is not offered for an indefinite period of time.

T 5.243 Course: Requirements Engineering [T-INFO-101300]

Responsible:	Prof. Dr.-Ing. Anne Koziolek
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101201 - Software Systems
	M-INFO-101202 - Software Methods

Type	Credits	Grading scale	Recurrence	Version
Written examination	3	Grade to a third	Each summer term	2

Events					
ST 2021	2400050	Requirements Engineering	2 SWS	Lecture / 📱	Koziolek, Werle
Exams					
ST 2021	7500059	Requirements Engineering			Koziolek
ST 2021	7500295	Requirements Engineering Second Exam VL 2400050			Koziolek

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Recommendation
Das Modul Softwaretechnik II wird empfohlen.

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

V Requirements Engineering
2400050, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
Information for summer term 2021: The lecture will not be held in the summer term 2021. You can still register for the course, prepare the material by watching the recordings of last years' lectures, and take the exam.

Having a good requirements specification is a critical prerequisite for any successful software project. This lecture gives an introduction to processes, methods and representation forms for specifying and managing requirements.

The topics include background and general overview, processes and methods for requirements elicitation, specification with natural language, object-oriented specification, use cases, UML, specification of quality requirements and constraints, as well as requirements validation and management.

General remarks: The lecture is held in English and all lecture material is in English. The lecture has been recorded and the recordings will be made available on the Ilias platform.

Literature
The lecture is based on slides and works by Martin Glinz, which is why there is no book that accompanies the lecture. Students are welcome to discuss differences between the lecture and the content of the course in class.

Main suggestion: Pohl, K. (2010). Requirements Engineering: Fundamentals, Principles, and Techniques. Springer Verlag. (will be available in library)

Further reading:

- I. Alexander, R. Stevens (2002). Writing Better Requirements. London: Addison-Wesley.
- A. Davis (2005). Just Enough Requirements Management. New York: Dorset House.
- D.C. Gause, G.M. Weinberg (1989). Exploring Requirements: Quality before Design. New York: Dorset House.
- M. Glinz (2013). A Glossary of Requirements Engineering Terminology, Version 1.5. International Requirements Engineering Board (IREB). Originally published in 2011. Available at http://www.ireb.org (check-out CPRE Glossary)
- E. Gottesdiener (2002). Requirements by Collaboration: Workshops for Defining Needs. Boston: Addison-Wesley.
- M.A. Jackson (1995). Software Requirements and Specifications: A Lexicon of Practice, Principles and Prejudices. Addison-Wesley (ACM Press books): Wokingham, etc.
- A. van Lamsweerde (2009). Requirements Engineering: From System Goals to UML Models to Software Specifications. Chichester: John Wiley & Sons.
- S. Robertson, J. Robertson (2006). Mastering the Requirements Process. 2nd edition. Boston: Addison-Wesley.
- K. Wiegers (2006). More About Software Requirements: Thorny Issues and Practical Advice. Redmond: Microsoft Press.

T	**5.244 Course: Responsible Artificial Intelligence [T-WIWI-111385]**

Responsible: Prof. Dr. Christof Weinhardt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103117 - Data Science: Data-Driven Information Systems
                     M-WIWI-103118 - Data Science: Data-Driven User Modeling

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each winter term	1

Competence Certificate
The final grade is based on an examination of other type according to § 4 Par. 2 No. 3. It consists of

- The completion of an exercise including a short presentation (15 min)(max. 30 points)
- The completion of a case study including an oral exam (max. 60 points).

Further details are explained during the lecture.

Prerequisites
Readings will be provided to work through before the lecture.

T 5.245 Course: Risk Management in Industrial Supply Networks [T-WIWI-102826]

Responsible:	Prof. Dr. Frank Schultmann
	PD Dr. Marcus Wiens
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III
	M-WIWI-101471 - Industrial Production II

Type Written examination	Credits 3,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2581992	Risk Management in Industrial Supply Networks	2 SWS	Lecture / 🖥	Klein
WT 21/22	2581993	Übung zu Risk Management in Industrial Supply Networks	1 SWS	Practice / 🖥	Klein
Exams					
ST 2021	7981992	Risk Management in Industrial Supply Networks			Schultmann

Legend: 🖥 Online, ⊞ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V Risk Management in Industrial Supply Networks
2581992, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content
Students learn methods and tools to manage risks in complex and dynamically evolving supply chain networks. Students learn the key terms and concepts of risk management and decision theory, in particular expected utility theory. Based on the theoretic prerequisites, students are able to determine and analyze risk diversification, risk pooling, insurance mechanisms and get an overview on statistical risk measures and real options. These approaches are adapted to analyze supply chain risks in a network context. In this manner, students gain knowledge in basic notions of network theory, network metrics and network-strategies for supply chain decisions.

- Introduction
- Risks in decisions under uncertainty: Expected Utility Theory & risk preferences
- The newsvendor model; multivariate risks and insurance
- Risk measures & evaluation techniques: Value-at-Risk, Conditional Value at Risk, Monte Carlo and Real Options
- Transparency in complex supply chains
- Network risk: network basics and criticality
- Risk in supply networks: empirical approaches and insights

Literature
Wird in der Veranstaltung bekannt gegeben.

T 5.246 Course: Roadmapping [T-WIWI-102853]

Responsible:	Dr. Daniel Jeffrey Koch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101488 - Entrepreneurship (EnTechnon)
	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each summer term	1

Events					
ST 2021	2545102	Roadmapping	2 SWS	Seminar / 📱	Koch
Exams					
ST 2021	7900055	Roadmapping			Weissenberger-Eibl

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
Non exam assessment (§4 (2), 3 SPO 2007) respectively alternative exam assessments (§4(2), 3 SPO).

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management is recommended.

Annotation
See German version.

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

V Roadmapping
2545102, SS 2021, 2 SWS, Language: German, Open in study portal

Seminar (S)
Online

Content
Technology Assessment can play a role at different points in the innovation process and can be considered as decision support for or against certain technological options. The seminar Technology Assessment will focus on the early phase "fuzzy front end" in innovation management. The technology assessment will take place here under a high degree of uncertainty regarding future technological developments. The evaluation of technologies can be done with methods such as Technology Readiness, Technology Lifecycle Analysis, Portfolio Analysis, etc.. The early evaluation of technologies is particularly important against the background of limited resources in companies and uncertainty about future developments.

T 5.247 Course: Robotics I - Introduction to Robotics [T-INFO-108014]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: M-INFO-100893 - Robotics I - Introduction to Robotics

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each winter term	1

Events					
WT 21/22	2424152	Robotics I - Introduction to Robotics	3/1 SWS	Lecture / ⚙	Asfour
Exams					
ST 2021	7500218	Robotik I - Einführung in die Robotik			Asfour
WT 21/22	7500106	Robotics I - Introduction to Robotics			Asfour

Legend: 📱 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T 5.248 Course: Robotics II: Humanoid Robotics [T-INFO-105723]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: M-INFO-101251 - Autonomous Robotics

Type Written examination	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 4

Events					
ST 2021	2400074	Robotics II: Humanoid Robotics	2 SWS	Lecture / 📱	Asfour
Exams					
ST 2021	7500086	Robotics II: Humanoid Robotics			Asfour
WT 21/22	7500211	Robotics II: Humanoid Robotics			Asfour

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

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

V Robotics II: Humanoid Robotics
2400074, SS 2021, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
Online

Content
The lecture presents current work in the field of humanoid robotics that deals with the implementation of complex sensorimotor and cognitive abilities. In the individual topics different methods and algorithms, their advantages and disadvantages, as well as the current state of research are discussed.

The topics addressed are: biomechanical models of the human body, biologically inspired and data-driven methods of grasping, active perception, imitation learning and programming by demonstration as well as semantic representations of sensorimotor experience

Learning Objectives:

The students have an overview of current research topics in autonomous learning robot systems using the example of humanoid robotics. They are able to classify and evaluate current developments in the field of cognitive humanoid robotics.

The students know the essential problems of humanoid robotics and are able to develop solutions on the basis of existing research.

Organizational issues
Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Arbeitsaufwand: 90 h

Voraussetzungen: Der Besuch der Vorlesungen *Robotik I – Einführung in die Robotik* und *Mechano-Informatik in der Robotik* wird vorausgesetzt

Zielgruppe: **Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik**

Literature
Weiterführende Literatur

Wissenschaftliche Veröffentlichungen zum Thema, werden auf der VL-Website bereitgestellt.

T   5.249 Course: Robotics III - Sensors and Perception in Robotics [T-INFO-109931]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Organisation: KIT Department of Informatics
Part of: M-INFO-101251 - Autonomous Robotics

Type Written examination	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2400067	Robotics III - Sensors and Perception in Robotics	2 SWS	Lecture / 🖥	Asfour
Exams					
ST 2021	7500242	Robotics III - Sensors and Perception in Robotics			Asfour
WT 21/22	7500207	Robotics III - Sensors and Perception in Robotics			Asfour

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

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

V   Robotics III - Sensors and Perception in Robotics
2400067, SS 2021, 2 SWS, Language: German/English, Open in study portal

Lecture (V) Online

Content

The lecture supplements the lecture Robotics I with a broad overview of sensors used in robotics. The lecture focuses on visual perception, object recognition, simultaneous localization and mapping (SLAM) and semantic scene interpretation. The lecture is divided into two parts:

In the first part a comprehensive overview of current sensor technologies is given. A basic distinction is made between sensors for the perception of the environment (exteroceptive) and sensors for the perception of the internal state (proprioceptive).

The second part of the lecture concentrates on the use of exteroceptive sensors in robotics. The topics covered include tactile exploration and visual data processing, including advanced topics such as feature extraction, object localization, simultaneous localization and mapping (SLAM) and semantic scene interpretation.

Learning Obejctives:

Students know the main sensor principles used in robotics and understand the data flow from physical measurement through digitization to the use of the recorded data for feature extraction, state estimation and environmental modeling.

Students are able to propose and justify suitable sensor concepts for common tasks in robotics.

Organizational issues
Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik

Voraussetzungen: **Der Besuch der Vorlesung** *Robotik I – Einführung in die Robotik* **wird vorausgesetzt**

Zielgruppe: Die Vorlesung richtet sich an Studierende der Informatik, der Elektrotechnik und des Maschinenbaus sowie an alle Interessenten an der Robotik.

Arbeitsaufwand: 90 h

Literature
Eine Foliensammlung wird im Laufe der Vorlesung angeboten.

Begleitende Literatur wird zu den einzelnen Themen in der Vorlesung bekannt gegeben.

T	**5.250 Course: Security [T-INFO-101371]**

Responsible: Prof. Dr. Dennis Hofheinz
Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: M-INFO-101207 - Networking Security - Theory and Praxis

Type	Credits	Grading scale	Recurrence	Version
Written examination	6	Grade to a third	Each summer term	1

Events					
ST 2021	24941	Security	3 SWS	Lecture / ▯	Müller-Quade, Strufe
Exams					
ST 2021	7500150	Security			Müller-Quade
ST 2021	7524941	Security			Müller-Quade, Strufe
WT 21/22	7500180	Security			Müller-Quade, Strufe

Legend: ▯ Online, ⚒ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

T 5.251 Course: Selected Issues in Critical Information Infrastructures [T-WIWI-109251]

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104403 - Critical Digital Infrastructures

Type Examination of another type	Credits 4,5	Grading scale Grade to a third	Recurrence Each summer term	Version 2

Events					
ST 2021	2512403	Advanced Lab Blockchain Hackathon (Master)		Practical course / 🖥	Sunyaev, Beyene, Kannengießer
WT 21/22	2513401	Seminar Selected Issues in Critical Information Infrastructures (Master)		Seminar	Sunyaev, Lins
Exams					
ST 2021	7900172	Lab Blockchain Hackathon (Master)			Sunyaev
WT 21/22	7900094	Seminar Selected Issues in Critical Information Infrastructures (Master)			Sunyaev

Legend: 🖥 Online, ⚒ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment (§ 4(2), 3 SPO). Details will be announced in the respective course.

Prerequisites
None.

Annotation
T-WIWI-109251 "Selected Issues in Critical Information Infrastructures" serves to credit an extracurricular course in the module "Critical Digital Infrastructures".

T   5.252 Course: Selected Legal Issues of Internet Law [T-INFO-108462]

Responsible: Prof. Dr. Thomas Dreier
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	24821	Selected legal issues of Internet law	2 SWS	Colloquium (K / 📱	Dreier
Exams					
ST 2021	7500226	Selected legal issues of Internet law			Dreier

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

T 5.253 Course: Selected Topics in Cryptography [T-INFO-101373]

Responsible: Prof. Dr. Jörn Müller-Quade
Organisation: KIT Department of Informatics
Part of: M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

T 5.254 Course: Selling IT-Solutions Professionally [T-INFO-101977]

Responsible: Prof. Dr.-Ing. Klemens Böhm
Organisation: KIT Department of Informatics
Part of: M-INFO-101208 - Innovative Concepts of Data and Information Management

Type	Credits	Grading scale	Recurrence	Version
Completed coursework	1,5	pass/fail	Irregular	1

T 5.255 Course: Semantic Web Technologies [T-WIWI-110848]

Responsible:	Tobias Christof Käfer
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101455 - Web Data Management
	M-WIWI-101456 - Intelligent Systems and Services
	M-WIWI-105366 - Artificial Intelligence

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2511310	Semantic Web Technologies	2 SWS	Lecture / 🖥	Färber, Käfer, Heling
ST 2021	2511311	Exercises to Semantic Web Technologies	1 SWS	Practice / 🖥	Färber, Käfer, Heling
Exams					
ST 2021	7900028	Semantic Web Technologies (Registration until 12 July 2021)			Färber
WT 21/22	7900022	Semantic Web Technologies			Sure-Vetter

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

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

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

Prerequisites
None

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

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

V	**Semantic Web Technologies** 2511310, SS 2021, 2 SWS, Language: English, Open in study portal	**Lecture (V)** **Online**

Content

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

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

The following topics are covered:

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

Learning objectives:

The student

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

Recommendations:

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

Workload:

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

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web – Grundlagen. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. Weaving the Web. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/
- Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.

V	**Exercises to Semantic Web Technologies** 2511311, SS 2021, 1 SWS, Language: English, Open in study portal	**Practice (Ü)** **Online**

Content

The exercises are related to the lecture Semantic Web Technologies.

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

The following topics are covered:

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

Learning objectives:

The student

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

Recommendations:

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

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web – Grundlagen. Springer, 2008.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer, 2011.

Weitere Literatur

- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer, 2003.
- Tim Berners-Lee. Weaving the Web. Harper, 1999 geb. 2000 Taschenbuch.
- Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/
- Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008.
- Tom Heath and Chris Bizer. Linked Data: Evolving the Web into a Global Data Space. Synthesis Lectures on the Semantic Web: Theory and Technology, 2011.

T   5.256 Course: Seminar in Business Administration A (Master) [T-WIWI-103474]

Responsible:	Professorenschaft des Fachbereichs Betriebswirtschaftslehre
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102736 - Seminar Module Economic Sciences

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each term	Version 1

Events					
ST 2021	2400121	Interactive Analytics Seminar	2 SWS	/ 🖥	Beigl, Mädche, Pescara
ST 2021	2500007	Food Choice	2 SWS	Seminar / 🖥	Seidler, Scheibehenne
ST 2021	2500043	Collaborative Development of Conversational Agents	3 SWS	Seminar / 🖥	Mädche, Gnewuch
ST 2021	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / ⚙	Mädche
ST 2021	2530372	Advances in Financial Machine Learning	2 SWS	Seminar / 🖥	Ulrich
ST 2021	2530580	Seminar in Finance (Master) - Corona crisis and the financial markets		Seminar / 🖥	Uhrig-Homburg
ST 2021	2540472	Digital Citizen Science	2 SWS	Seminar / 🖥	Weinhardt, Volkamer, Mayer, Knierim, Greif-Winzrieth, Mädche, Nieken, Scheibehenne, Szech, Woll
ST 2021	2540473	Business Data Analytics	2 SWS	Seminar / 🖥	Dann, Stoeckel, Grote, Badewitz
ST 2021	2540475	Electronic Markets & User Behavior		Seminar / 🖥	Knierim, Dann, Jaquart
ST 2021	2540477	Digital Experience & Participation	2 SWS	Seminar / 🖥	Peukert, Greif-Winzrieth
ST 2021	2540478	Smart Grid Economics & Energy Markets	2 SWS	Seminar / 🖥	Staudt, Huber, Richter, vom Scheidt, Golla, Henni, Schmidt, Meinke, Qu
ST 2021	2540510	Master Seminar in Data Science and Machine Learning	2 SWS	Seminar / 🖥	Geyer-Schulz
ST 2021	2540553	Interactive Analytics Seminar	2 SWS	Seminar / 🖥	Mädche, Beigl, Toreini, Pescara
ST 2021	2540557	Information Systems and Service Design Seminar	3 SWS	Seminar / 🖥	Mädche
ST 2021	2540559	Digital Service Design Seminar	3 SWS	Seminar / 🖥	Mädche
ST 2021	2540588	Economic Psychology in Action	2 SWS	Seminar / 🖥	Liu
ST 2021	2545002	Entrepreneurship Research	2 SWS	Seminar / 🖥	Henn, Manthey, Terzidis
ST 2021	2550493	Hospital Management	2 SWS	Block / 🖥	Hansis
ST 2021	2571180	Seminar in Marketing und Vertrieb (Master)	2 SWS	Seminar / 🖥	Klarmann, Mitarbeiter
ST 2021	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar / 🖥	Nieken, Mitarbeiter
ST 2021	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar / 🖥	Nieken, Mitarbeiter
ST 2021	2579909	Seminar Management Accounting	2 SWS	Seminar / 🖥	Wouters, Hammann, Disch

ST 2021	2579910	Entrepreneurial Strategy and Financing of Start-Ups	2 SWS	Seminar / 📱	Burkardt
ST 2021	2579919	Seminar in Management Accounting - Special Topics	2 SWS	Seminar / 📱	Ebinger
ST 2021	2581030	Seminar Energiewirtschaft IV	2 SWS	Seminar / 📱	Plötz
ST 2021	2581977	Seminar Produktionswirtschaft und Logistik II	2 SWS	Seminar / 📱	Volk, Schultmann
ST 2021	2581980	Seminar Energiewirtschaft II	2 SWS	Seminar / 📱	Fichtner
ST 2021	2581990		2 SWS	Seminar / 📱	Schultmann
WT 21/22	2500019	Digital Citizen Science	2 SWS	Seminar	Mädche, Nieken
WT 21/22	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / ⚙	Mädche
WT 21/22	2530293		2 SWS	Seminar	Ruckes, Hoang, Benz, Strych, Luedecke, Silbereis, Wiegratz
WT 21/22	2530372	Advances in Financial Machine Learning	2 SWS	Seminar / 📱	Ulrich
WT 21/22	2540473	Data Science in Service Management	2 SWS	Seminar	Stoeckel, Badewitz
WT 21/22	2540475	Electronic Markets & User behavior	2 SWS	Seminar	Knierim, Jaquart
WT 21/22	2540477	Digital Experience and Participation	2 SWS	Seminar	Peukert, Pusmaz, Fegert, Greif-Winzrieth, Hoffmann
WT 21/22	2540478	Smart Grids and Energy Markets	2 SWS	Seminar	Dinther, Staudt, Richter, vom Scheidt, Golla, Schmidt, Henni
WT 21/22	2540510	Masterseminar in Data Science and Machine Learning	2 SWS	Seminar	Geyer-Schulz, Nazemi, Schweizer
WT 21/22	2540557	Information Systems and Design (ISSD) Seminar	2 SWS	Seminar	Mädche
WT 21/22	2545107	Methoden im Innovationsmanagement	2 SWS	Seminar / 📱	Koch
WT 21/22	2571180	Seminar in Marketing und Vertrieb (Bachelor)	2 SWS	Seminar / 🗣	Klarmann, Mitarbeiter
WT 21/22	2573012	Seminar Human Resource Management (Master)	2 SWS	Seminar	Nieken, Mitarbeiter
WT 21/22	2573013	Seminar Human Resources and Organizations (Master)	2 SWS	Seminar	Nieken, Mitarbeiter
WT 21/22	2579910	Entrepreneurial Strategy and Financing of Start-Ups	2 SWS	Seminar / 📱	Burkardt
WT 21/22	2579919	Seminar Management Accounting - Special Topics	2 SWS	Seminar	Wouters, Ebinger
WT 21/22	2581030	Seminar Energiewirtschaft IV	2 SWS	Seminar	Dehler-Holland, Yilmaz, Fichtner, Britto
WT 21/22	2581976	Seminar in Production and Operations Management I	2 SWS	Seminar	Glöser-Chahoud, Schultmann
WT 21/22	2581977	Seminar in Production and Operations Management II	2 SWS	Seminar	Volk, Schultmann
WT 21/22	2581978	Seminar in Production and Operations Management III	2 SWS	Seminar	Schultmann, Diehlmann, Klein
WT 21/22	2581980		2 SWS	Seminar / 📱	Fichtner, Fraunholz, Kraft, Zimmermann
WT 21/22	2581981		2 SWS	Seminar	Ardone, Finck, Fichtner, Slednev
Exams					
ST 2021	7500148	Proseminar: Practical Seminar: Interactive Analytics			Beigl, Mädche
ST 2021	7900008	Hospital Management			Nickel

ST 2021	7900017	Innovationsprozesse analysieren & evaluieren	Weissenberger-Eibl
ST 2021	7900019	Master Seminar in Data Science and Machine Learning	Geyer-Schulz
ST 2021	7900036	Collaborative Development of Conversational Agents	Mädche
ST 2021	7900038	Seminar in Business Administration A (Master) - Design and Development of Innovative Explainable AI	Satzger
ST 2021	7900052	Entrepreneurship Research	Terzidis
ST 2021	7900055	Roadmapping	Weissenberger-Eibl
ST 2021	7900093	Seminar in Business Administration A	Weinhardt
ST 2021	7900101	Seminar Human Resource Management (Master)	Nieken
ST 2021	7900127	Seminar in Finance (Master) - Corona crisis and the financial markets	Uhrig-Homburg
ST 2021	7900179	Seminar in Business Administration A (Master)	Weinhardt
ST 2021	7900180	Seminar in Business Administration	Weinhardt
ST 2021	7900190	Current Topics in Digital Transformation Seminar	Mädche
ST 2021	7900214	Seminar Business Data Analytics (Master)	Weinhardt
ST 2021	7900219	Entrepreneurial Strategy and Financing of Start-Ups	Lindstädt
ST 2021	7900233	Seminar in Marketing and Sales	Klarmann
ST 2021	7900239	Economic Psychology in Action	Scheibehenne
ST 2021	7900244	Digital Service Design Seminar	Mädche
ST 2021	7900256	Seminar Electronic Markets & User Behavior	Weinhardt
ST 2021	7900261	Information Systems and Design (ISSD) Seminar	Mädche
ST 2021	7900265	Interactive Analytics Seminar	Mädche
ST 2021	7900284	Digital Transformation and Business Models	Weissenberger-Eibl
ST 2021	7900285	Seminar Digital Citizen Science	Weinhardt
ST 2021	7900288	Seminar Business Data Analytics	Weinhardt
ST 2021	7900323	Seminar in Business Administration A (Master)	Scheibehenne
ST 2021	7900372	Seminar Digital Citizen Science	Weinhardt
ST 2021	7900373	Data Science for the Industrial Internet of Things	Satzger
ST 2021	79-2579909-M	Seminar Management Accounting (Master)	Wouters
ST 2021	79-2579919-M	Seminar Management Accounting - Special Topics (Master)	Wouters
ST 2021	79-2579929-M	Seminar Management Accounting - Entrepreneurship Topics (Master)	Wouters
ST 2021	792581030	Seminar in Business Administration (Bachelor)	Plötz
ST 2021	7981976	Seminar in Production and Operations Management I	Schultmann
ST 2021	7981977	Seminar in Production and Operations Management II	Schultmann
ST 2021	7981978	Seminar in Production and Operations Management III	Schultmann
ST 2021	7981979	Seminar Energy Economics I	Fichtner
ST 2021	7981980	Seminar Energy Economics II	Fichtner
ST 2021	7981981	Seminar Energy Economics III	Fichtner
WT 21/22	7900017	Seminar Smart Grid and Energy Markets	Weinhardt
WT 21/22	7900069	Current Topics in Digital Transformation Seminar	Mädche
WT 21/22	7900106	Hospital Management	Nickel
WT 21/22	7900184	Seminar in Finance (Master)	Ruckes
WT 21/22	7900203	Seminar in Finance	Uhrig-Homburg
WT 21/22	7900233	Information Systems and Design (ISSD) Seminar	Mädche

Legend: ▯ Online, ✿ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate

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

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

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

Prerequisites
None.

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

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

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

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

V	**Interactive Analytics Seminar** 2400121, SS 2021, 2 SWS, Language: English, Open in study portal	**Online**

Content
Providing new and innovative ways for interacting with data is becoming increasingly important. In this seminar, an interdisciplinary team of students engineers a running software prototype of an advanced interactive system leveraging state-of-the-art hardware and software focusing on an analytical use case. The seminar is carried out in cooperation between Teco/Chair of Pervasive Computing Systems (Prof. Beigl) and the Institute of Information Systems and Marketing (Research Group ISSD, Prof. Mädche). This seminar follows an interdisciplinary approach. Students the fields of computer science, information systems and industrial engineering work together in teams.

Learning Objectives

- Explore and specify a data-driven interaction challenge
- Suggest and evaluate different design solutions for addressing the identified problem
- Build interactive analytics prototypes using advanced interaction concepts and pervasive computing technologies

Prerequisites

Strong analytic abilities and profound skills in SQL as wells as Python and/or R are required.

Literature

Further literature will be made available in the seminar.

Organizational issues
nach Vereinbarung

V	**Collaborative Development of Conversational Agents** 2500043, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:

- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

Requirements

- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

Literature

Relevant literature will be made available in the seminar.

V	**Advances in Financial Machine Learning** 2530372, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues

14-tägig, tba

Literature

Literatur wird in der ersten Vorlesung bekannt gegeben.

V	**Master Seminar in Data Science and Machine Learning** 2540510, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

V	**Information Systems and Service Design Seminar** 2540557, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group ISSD (Prof. Mädche). The research group "Information Systems & Service Design" (ISSD) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V	**Digital Service Design Seminar** 2540559, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
Description

In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype

Learningobjectives

The students

- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites

No specific prerequisites are required for the seminar

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V	**Economic Psychology in Action** 2540588, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
Description

This blocked event contains 3 stages.

In Stage 1, students meet online for one day and experience recent economic psychology research as participants. The research topics will mainly consist of novel economic games with certain level of strategic depth (i.e., we will not play simple games like rock paper scissors, nor we will play games that many people are familiar with like the prisoner's dilemma).

In Stage 2, students will receive the data from the games they played in Stage 1 along with a few journal articles assigned by the instructor on related topics. Based on reading, they choose one of the datasets from Stage 1 to write up a short report.

In Stage 3, students will try to design and conduct a study on a related topic themselves based on what they have learned in the previous stages. They will collect their own data and write a research report. The nature of this project is to be determined together by the students and instructor. It would either be ideas generated by the students themselves, or something assigned by the instructor.

English will be the language used in all discussions, course materials, and assessments.

Competence Certificate

The assessment is based on the short report in Stage 2 and the research report in Stage 3.

Workload

Students are expected to spend a total of 90 hours (30 hours per ECTS), including meeting and assignments, on this seminar.

Organizational issues
Blockveranstaltung, Temrine werden bekanntgegeben

V	**Entrepreneurship Research** 2545002, SS 2021, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Online**

Organizational issues
Block am 21.04., 05.05., 14.07.

Literature
Wird im Seminar bekannt gegeben.

V	**Hospital Management** 2550493, SS 2021, 2 SWS, Language: German, Open in study portal	**Block (B)** **Online**

Content
The seminar 'Hospital Management' presents internal organization structures, work conditions and work environments at the example of hospitals und relates this to common and expected conditions of other service industries.

Covered topics include normative environment, intra-organizational structure, personnel management, quality, external networking and market appearance. The course consists of two full-day sessions.

The assessment consists of attendance and a presentation or a case study.

Organizational issues
von Montag, 17. Mai bis Samstag, 22. Mai jeweils von 7:30 bis 9:15 Uhr

V	**Seminar Human Resource Management (Master)** 2573012, SS 2021, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Online**

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

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

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V	**Seminar Human Resources and Organizations (Master)** 2573013, SS 2021, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Online**

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

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

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues
Geb. 05.20, Raum 2A-12.1, Termine werden bekannt gegeben

V	**Seminar Management Accounting** 2579909, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. You are to a large extent free to select your own topic. The seminar course is concentrated in four meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Workload:

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

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:

- Maximum of 16 students.

Organizational issues

Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature

Will be announced in the course.

V	**Seminar in Management Accounting - Special Topics** 2579919, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Workload:

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

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Note:

- Maximum of 16 students.

Organizational issues

Geb.05.20, 2A-12.1; Termine werden bekannt gegeben

Literature

Will be announced in the course.

| **V** | **Digital Citizen Science**
2500019, WS 21/22, 2 SWS, Language: German/English, Open in study portal | **Seminar (S)** |

Content

Digital Citizen Science is an innovative approach to conduct field research - interactively and in the real world. Especially in times of social distancing measures essential questions about how private lives are changing are investigated. Who is experiencing more stress during HomeOffice hours? Who is flourishing while learning at home because flow is experienced more often? Which formats of digital cooperation are fostering social contacts and bonding? These and other questions that target the main topic: Well-being @Home are focused in these seminar projects.

The seminar theses are supervised by academics from multiple institutes that are working together on the topic of Digital Citizen Science arbeiten. Involved are the research groups of Prof. Mädche, Prof. Nieken, Prof. Scheibehenne, Prof. Szech, Prof. Volkamer, Prof. Weinhardt and Prof. Woll.

| **V** | **Advances in Financial Machine Learning**
2530372, WS 21/22, 2 SWS, Language: English, Open in study portal | **Seminar (S)**
Online |

Content

Machine learning (ML) is changing virtually every aspect of our lives. Today ML algorithms accomplish tasks that until recently only expert humans could perform. As it relates to finance, this is the most exciting time to adopt a disruptive technology that will transform how everyone invests for generations.

In this seminar we will apply modern machine learning techniques hands on to important computational risk and asset management problems. In particular we will use the state of the art Python programming language to implement investment related applications and/ or Finance 4.0 risk management solutions.

In a bi-weekly schedule you and your supervisor will first learn and discuss important machine learning concepts and then apply it within a practical FinTech project to real-world data. As a prerequisite students should already have some basic Python and data science skills.

Organizational issues

14-tägig, tba

Literature

Literatur wird in der ersten Vorlesung bekannt gegeben.

| **V** | **Data Science in Service Management**
2540473, WS 21/22, 2 SWS, Language: German/English, Open in study portal | **Seminar (S)** |

Content

wird auf deutsch und englisch gehalten

Organizational issues

Blockveranstaltung, siehe WWW

| **V** | **Masterseminar in Data Science and Machine Learning**
2540510, WS 21/22, 2 SWS, Language: German, Open in study portal | **Seminar (S)** |

| **V** | **Methoden im Innovationsmanagement**
2545107, WS 21/22, 2 SWS, Language: German, Open in study portal | **Seminar (S)**
Online |

Content

The seminar "Methods in Innovation Management" aims at the discussion and development of different methods for the structured generation of ideas in selected contexts. In a block seminar, methods and contexts are discussed, from which seminar topics are defined with the participants. These topics are to be worked on independently using methods and procedures. The results will be presented at a presentation date and then a written seminar paper will be prepared. This means that creativity methods and their combination will be presented and applied. The methods are worked on in a structured form and process-like sequence in order to clarify the advantages and disadvantages of different methods.

Literature

Werden in der ersten Veranstaltung bekannt gegeben.

| **V** | **Seminar Human Resource Management (Master)**
2573012, WS 21/22, 2 SWS, Language: German, Open in study portal | **Seminar (S)** |

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of Human Resource Management and Personnel Economics.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

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

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Blockveranstaltung siehe Homepage

| **V** | **Seminar Human Resources and Organizations (Master)**
2573013, WS 21/22, 2 SWS, Language: German, Open in study portal | **Seminar (S)** |

Content

The topics are redefined each semester on basis of current research topics. The topics will be announced on the website of the Wiwi-Portal.

Aim

The student

- looks critically into current research topics in the fields of human resources and organizations.
- trains his / her presentation skills.
- learns to get his / her ideas and insights across in a focused and concise way, both in oral and written form, and to sum up the crucial facts.
- cultivates the discussion of research approaches.

Workload

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

Lecture: 30h
Preparation of lecture: 45h
Exam preparation: 15h

Literature

Selected journal articles and books.

Organizational issues

Blockveranstaltung siehe Homepage

| **V** | **Seminar Management Accounting - Special Topics**
2579919, WS 21/22, 2 SWS, Language: English, Open in study portal | **Seminar (S)** |

Content
The course will be a mix of lectures, discussions, and student presentations. Students will write a paper in small groups, and present this in the final week. Topics are selectively prediscibed. The seminar course is concentrated in several meetings that are spread throughout the semester.

Learning objectives:

- Students are largely independently able to identify a distinct topic in Management Accounting,
- Students are capable to research the topic, analyze the information, to conceptualize and deduct fundamental principles and relationships from relatively unstructured information,
- Students can afterwards logically and systematically present the results in writing and as an oral presentation, following a scientific approach (structuring, terminology, sources.

Examination:

- The performance review is carried out in the form of a "Prüfungsleistung anderer Art" (following § 4 (2) No. 3 of the examination regulation), which in this case is an essay the seminar participants prepare in group work.
- The final grade of the course is the grade awarded to the paper.

Required prior Courses:

- The LV "Betriebswirtschaftslehre: Finanzwirtschaft und Rechnungswesen" (2600026) must have been completed before starting this seminar.

Workload:

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

Note:

- Maximum of 16 students.

Literature
Will be announced in the course.

T 5.257 Course: Seminar in Economic Policy [T-WIWI-102789]

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101514 - Innovation Economics

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Exams			
ST 2021	7900051	Seminar in Economic Policy	Ott

Competence Certificate
The assessment is carried out through a term paper within the range of 12 to 15 pages, a presentation of the results of the work in a seminar meeting, and active participation in the discussions of the seminar meeting (§ 4 (2), 3 SPO).

The final grade is composed of the weighted scored examinations (Essay 50%, 40% oral presentation, active participation 10%).

Prerequisites
None

Recommendation
At least one of the lectures "Theory of Endogenous Growth" or "Innovation Theory and Policy" should be attended in advance, if possible.

T   5.258 Course: Seminar in Economics A (Master) [T-WIWI-103478]

Responsible: Professorenschaft des Fachbereichs Volkswirtschaftslehre
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-102736 - Seminar Module Economic Sciences

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each term	Version 1

Events					
ST 2021	2500004	Introduction to Statistical Machine Learning	2 SWS	Seminar / 📱	Schienle, Lerch
ST 2021	2521310	Advanced Topics in Econometrics	2 SWS	Seminar / 📱	Schienle, Krüger, Görgen, Koster
ST 2021	2560233	Seminar zur Luftverkehrspoltik		Seminar / 📱	Mitusch, Wisotzky
ST 2021	2560282	Wirtschaftspolitisches Seminar	2 SWS	Seminar / 📱	Ott, Assistenten
ST 2021	2560552	Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)	2 SWS	Seminar / 📱	Szech, Zhao
ST 2021	2560555	Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)	2 SWS	Seminar / 📱	Szech, Huber
ST 2021	2560556	Social Preferences in Behavioral Economics /„Seminar on Topics in Political Economy"		Seminar / 📱	Szech, Rau
WT 21/22	2560142	Disruption and the Digital Economy - Topics in Political Economy (Master)	2 SWS	Seminar	Szech, Huber, Rosar
WT 21/22	2560143	Overcoming the Corona Crisis - Morals & Social Behavior (Master)	2 SWS	Seminar	Szech, Zhao, Huber
WT 21/22	2560282	Wirtschaftspolitisches Seminar	2 SWS	Seminar	Ott, Assistenten
WT 21/22	2561208	Selected aspects of European transport planning and -modelling	1 SWS	Seminar	Szimba
Exams					
ST 2021	7900033	Introduction to Statistical Machine Learning			Schienle
ST 2021	7900051	Seminar in Economic Policy			Ott
ST 2021	7900059	Markets for Attention and the Digital Economy (Master)			Szech
ST 2021	7900065	Seminar in Macroeconomics I			Brumm
ST 2021	7900131	Overcoming the Corona Crisis (Master)			Szech
ST 2021	7900221	Seminar in Macroeconomics II			Brumm
ST 2021	7900248	Social Preferences in Behavioral Economics			Szech
ST 2021	7900272	Do Groups Make Better Decisions? The "Wisdom of the Crowd" in Theory and Practice			Puppe
ST 2021	7900282	Digital IT-Solutions and Services Transforming the Field of Public Transportation			Mitusch
ST 2021	7900364	Seminar zur Luftverkehrspolitik			Mitusch
ST 2021	7900366	Seminar Strategic Decisions (Master)			Ehrhart
ST 2021	79sefi2	Seminar Death, Mistake & Fraud in Science A (Master)			Wigger
WT 21/22	7900139	Seminar in Economics (Bachelor/Master)			Mitusch

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🖥 On-Site, ✗ Cancelled

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

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

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

Prerequisites
None.

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

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

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

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

V	**Introduction to Statistical Machine Learning** 2500004, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

V	**Advanced Topics in Econometrics** 2521310, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

V	**Overcoming the Corona Crisis, Seminar Morals and Social Behavior (Master)** 2560552, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
Participation will be limited to 12 students.

Organizational issues
Blockveranstaltung

V	**Markets for Attention and the Digital Economy Seminar on Topics in Political Economy (Bachelor)** 2560555, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
For Bachelor students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

The acceptance of students for the seminar is based on preferences and suitability for the topics. This includes theoretical and practical experience with Behavioral Economics as well as English skills.

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Blockveranstaltung

V	**Disruption and the Digital Economy - Topics in Political Economy (Master)** 2560142, WS 21/22, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

Objective: The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

V	**Overcoming the Corona Crisis - Morals & Social Behavior (Master)** 2560143, WS 21/22, 2 SWS, Language: English, Open in study portal	**Seminar (S)**

Content
For Master students of the fields Industrial Engineering and Management, Information Engineering and Management, Economics Engineering or Economathematics.

The student develops an own idea for an economic experiment in this research direction. Students work in groups. Changing topics each semester. For current topics, see http://polit.econ.kit.edu or https://portal.wiwi.kit.edu/Seminare

Seminar Papers of 8–10 pages are to be handed in.

Recommendation: Knowledge in the field of experimental economic research or behavioral economics as well as in the field of microeconomics and game theory may be helpful.

Organizational issues
Application is possible via https://portal.wiwi.kit.edu/Seminare

T 5.259 Course: Seminar in Informatics B (Master) [T-WIWI-103480]

Responsible: Professorenschaft des Instituts AIFB
Organisation: KIT Department of Economics and Management
Part of: M-INFO-102822 - Seminar Module Informatics

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each term	Version 1

Events					
ST 2021	2513211	Seminar Business Information Systems (Master)	2 SWS	Seminar / ⚙	Oberweis, Fritsch, Frister, Schreiber, Schüler, Ullrich
ST 2021	2513309	Seminar Knowledge Discovery and Data Mining (Master)	3 SWS	Seminar / 🖥	Färber, Nguyen, Noullet, Saier, Bartscherer
ST 2021	2513311	Seminar Data Science & Real-time Big Data Analytics (Master)	2 SWS	Seminar / 🖥	Färber, Riemer, Heyden , Käfer
ST 2021	2513403	Seminar Emerging Trends in Internet Technologies (Master)	2 SWS	Seminar / 🖥	Lins, Sunyaev, Thiebes
ST 2021	2513405	Seminar Emerging Trends in Digital Health (Master)	2 SWS	Seminar / 🖥	Lins, Sunyaev, Thiebes
ST 2021	2513500	Cognitive Automobiles and Robots	2 SWS	Seminar / 🖥	Zöllner
WT 21/22	2400125	Security and Privacy Awareness	2 SWS	Seminar	Boehm, Seidel-Saul, Volkamer, Aldag
WT 21/22	2513313	Seminar Linked Data and the Semantic Web (Master)	3 SWS	Seminar	Färber, Käfer
WT 21/22	2513314	Seminar Real-World Challenges in Data Science and Analytics (Bachelor)	3 SWS		Nickel, Weinhardt, Färber, Brandt, Kulbach
WT 21/22	2513315	Seminar Real-World Challenges in Data Science and Analytics (Master)	3 SWS		Nickel, Weinhardt, Färber, Brandt, Kulbach
WT 21/22	2513500	Seminar Cognitive Automobiles and Robots (Master)	2 SWS	Seminar	Zöllner, Daaboul
WT 21/22	2513605	Seminar Representation Learning on Knowledge Graphs (Master)	2 SWS	Seminar / ⚙	Sack, Alam, Biswas
Exams					
ST 2021	7900044	Seminar in Informatics B (Master) - Design and Development of Innovative Explainable AI			Satzger
ST 2021	7900088	Seminar Business Information Systems (Master)			Oberweis
ST 2021	7900128	Seminar Emerging Trends in Internet Technologies (Master)			Sunyaev
ST 2021	7900146	Seminar Emerging Trends in Digital Health (Master)			Sunyaev
ST 2021	7900147	Cognitive Automobiles and Robots			Zöllner
ST 2021	7900198	Seminar Data Science & Real-time Big Data Analytics (Master)			Färber
ST 2021	7900202	Seminar Knowledge Discovery and Data Mining (Master)			Sure-Vetter
ST 2021	7900246	Seminar Advanced Methods in Natural Language Processing: Metaphors			Sack
WT 21/22	7500220	Seminar Ubiquitous Computing			Beigl
WT 21/22	7900094	Seminar Selected Issues in Critical Information Infrastructures (Master)			Sunyaev
WT 21/22	7900119	Seminar Cognitive Automobiles and Robots			Zöllner
WT 21/22	7900129	Security and Privacy Awareness			Volkamer
WT 21/22	7900304	Seminar Linked Data and the Semantic Web (Master)			Färber

WT 21/22	7900305	Seminar Representation Learning on Knowledge Graphs (Master)	Sack

Legend: ▯ Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

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

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

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

Prerequisites
None.

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

Annotation
Placeholder for seminars offered by the Institute AIFB.

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

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

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

V	**Seminar Knowledge Discovery and Data Mining (Master)** 2513309, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
In this seminar different machine learning and data mining methods are implemented.

The seminar includes different methods of machine learning and data mining. Participants of the seminar should have basic knowledge of machine learning and programming skills.

Domains of interest include, but are not limited to:

- Medicine
- Social Media
- Finance Market

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

Organizational issues
Die Anmeldung erfolgt über das WiWi Portal https://portal.wiwi.kit.edu/.

Für weitere Fragen bezüglich des Seminar und der behandelten Themen wenden Sie sich bitte an die entsprechenden Verantwortlichen.

Literature
Detaillierte Referenzen werden zusammen mit den jeweiligenThemen angegeben. Allgemeine Hintergrundinformationen ergeben sich z.B.aus den folgenden Lehrbüchern:

- Mitchell, T.; Machine Learning
- McGraw Hill, Cook, D.J. and Holder, L.B. (Editors) Mining Graph Data, ISBN:0-471-73190-0
- Wiley, Manning, C. and Schütze, H.; Foundations of Statistical NLP, MIT Press, 1999.

V	**Seminar Data Science & Real-time Big Data Analytics (Master)** 2513311, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

In this seminar, students will design applications in teams that use meaningful and creative Event Processing methods. Thereby, students have access to an existing record.

Event processing and real-time data are everywhere: financial market data, sensors, business intelligence, social media analytics, logistics. Many applications collect large volumes of data in real time and are increasingly faced with the challenge of being able to process them quickly and react promptly. The challenges of this real-time processing are currently also receiving a great deal of attention under the term "Big Data". The complex processing of real-time data requires both knowledge of methods for data analysis (data science) and their processing (real-time analytics). Seminar papers are offered on both of these areas as well as on interface topics, the input of own ideas is explicitly desired.

Further information to the practical seminar is given under the following Link:

http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

Organizational issues

Further information as well as the registration form can be found under the following link:

http://seminar-cep.fzi.de

Questions are answered via the e-mail address sem-ep@fzi.de.

V	**Cognitive Automobiles and Robots** 2513500, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

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

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Security and Privacy Awareness** 2400125, WS 21/22, 2 SWS, Open in study portal	**Seminar (S)**

Content

Within the framework of this interdisciplinary seminar, the topics security awareness and privacy awareness are to be considered from different perspectives. It deals with legal, information technology, psychological, social as well as philosophical aspects.

Note: The link to enrol is for every student, regardless of the study background!

Dates:

- Kick-Off : 22.10.21, 14:00 o'clock
- Final version: 23.01.2022
- Presentation: 04.02.2022, 13:00 o'clock

Topics will be assigned after the enrolment deadline, before the Kick-Off.

Consider that legal focused topics require you to speak and understand german legal texts.

Topics:

- Phishing for Difference: How Does Phishing Impact Visually-Impaired Users?
- Wann wird Marketing im Security-Kontext ethisch bedenklich?
- Untersuchung der Wahrnehmung von (technischen) Backdoors zur Strafverfolgung.
- Data-Governance-Act – Fluch oder Segen für den Datenschutz?
- Würde lieber kein Thema anbieten, notfalls "Was ist der Wert von Privatheit?"
- Massenüberwachung von Kommunikationsknotenpunkten und Chilling Effects -- Eine rechtliche und ethische Auseinandersetzung
- Verletzt algorithmische Analyse von personenbezogenen Daten durch KI Privatheit -- und wenn ja, wie schlimm ist das?

ATTENTION: The seminar is only for MASTER students!

| V | **Seminar Linked Data and the Semantic Web (Master)**
2513313, WS 21/22, 3 SWS, Language: German/English, Open in study portal | **Seminar (S)** |

Content

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

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

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

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

Topics of interest include, but are not limited to:

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

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

| V | **Seminar Real-World Challenges in Data Science and Analytics (Bachelor)**
2513314, WS 21/22, 3 SWS, Language: German/English, Open in study portal | |

Content

In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

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

V	**Seminar Real-World Challenges in Data Science and Analytics (Master)**
	2513315, WS 21/22, 3 SWS, Language: German/English, Open in study portal

Content

In the seminar, various Real-World Challenges in Data Science and Analytics will be worked on.

During this seminar, groups of students work on a case challenge with data provided. Here, the typical process of a data science project is depicted: integration of data, analysis of these, modeling of the decisions and visualization of the results.

During the seminar, solution concepts are worked out, implemented as a software solution and presented in an intermediate and final presentation. The seminar "Real-World Challenges in Data Science and Analytics" is aimed at students in master's programs.

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

V	**Seminar Cognitive Automobiles and Robots (Master)**	Seminar (S)
	2513500, WS 21/22, 2 SWS, Language: German/English, Open in study portal	

Content

The seminar is intended as a theoretical supplement to lectures such as "Machine Learning". The theoretical basics will be deepened in the seminar. The aim of the seminar is that the participants work individually to analyze a subsystem from the field of robotics and cognitive systems using one or more procedures from the field of AI/ML.

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

Learning objectives:

- Students can apply knowledge from the Machine Learning lecture in a selected field of current research in robotics or cognitive automobiles for theoretical analysis.
- Students can evaluate, document and present their concepts and results.

Recommendations:

Attendance of the lecture machine learning

Workload:

The workload of 3 credit points consists of the time spent on literature research and planning/specifying the proposed solution. In addition, a short report and a presentation of the work carried out will be prepared.

Organizational issues

Anmeldung und weitere Informationen sind im Wiwi-Portal zu finden.

Registration and further information can be found in the WiWi-portal.

V	**Seminar Representation Learning on Knowledge Graphs (Master)**	Seminar (S) Blended (On-Site/Online)
	2513605, WS 21/22, 2 SWS, Language: English, Open in study portal	

Content

Data representation or feature representation plays a key role in the performance of machine learning algorithms. In recent years, rapid growth has been observed in Representation Learning (RL) of words and Knowledge Graphs (KG) into low dimensional vector spaces and its applications to many real-world scenarios. Word embeddings are a low dimensional vector representation of words that are capable of capturing the context of a word in a document, semantic similarity as well as its relation with other words. Similarly, KG embeddings are a low dimensional vector representation of entities and relations from a KG preserving its inherent structure and capturing the semantic similarity between the entities.

KG representation learning algorithms (a.k.a. KG embedding models) could be either unimodal where a single source is used or multimodal where multiple sources are explored. The sources of information could be relations between entities, text literals, numeric literals, images, and etc. It is important to capture the information present in each of these sources in order to learn representations which are rich in semantics. Multimodal KG embeddings learn either multiple representations simultaneously based on each source of information in a non-unified space or learn a single representation for each element of the KG in a unified space. Representation of entities and relations learnt using both unimodal and multimodal KG embedding models could be used in various downstream applications such as clustering, classification, and so on. On the other hand, language models such as BERT, ELMo, GPT, etc. learn the probability of word occurrence based on text corpus and learn representation of words in a low-dimensional embedding space. Representation of the words generated by the language models are often used for various KG completion tasks such as link prediction, entity classification, and so on.

In this seminar, we would like to study the different state of the art algorithms for multimodal embeddings, applications of KG embeddings, or the use of language models for KG representation.

Contributions of the students:

Each student will be assigned 1 paper on the topic. The student will have to

1. give a seminar presentation,
2. write a seminar report paper of 15 pages explaining the method from the assigned paper, in their own words, and
3. implementation. If code is available from the authors, then re-implementation of it for small scale experiments using Google Colab or make it available via GitHub.

T 5.260 Course: Seminar in Operations Research A (Master) [T-WIWI-103481]

Responsible:	Prof. Dr. Stefan Nickel
	Prof. Dr. Steffen Rebennack
	Prof. Dr. Oliver Stein
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-102736 - Seminar Module Economic Sciences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2021	2550132	Seminar zur Mathematischen Optimierung (MA)	2 SWS	Seminar / 🖥	Stein, Beck, Neumann, Schwarze
ST 2021	2550473	Seminar on Power Systems Optimization (Master)	2 SWS	Seminar / 🖥	Rebennack, Warwicker, Sinske
ST 2021	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar / 🖥	Nickel, Mitarbeiter
WT 21/22	2550131	Seminar on Methodical Foundations of Operations Research (B)	2 SWS	Seminar	Stein, Beck, Neumann, Schwarze
WT 21/22	2550491	Seminar: Modern OR and Innovative Logistics	2 SWS	Seminar	Nickel, Mitarbeiter
Exams					
ST 2021	7900017_SS2021	Seminar in Operations Research (Bachelor)			Stein
ST 2021	7900018_SS2021	Seminar in Operations Research A (Master)			Stein
ST 2021	7900271	Digitization in the Steel Industry			Nickel
ST 2021	7900331	Seminar in Operations Research A (Master)			Nickel
ST 2021	7900348	Seminar on Power Systems Optimization (Master)			Rebennack

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate

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

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

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

Prerequisites

None.

Recommendation

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

Annotation

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

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

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

V	**Seminar: Modern OR and Innovative Logistics**	**Seminar (S)**
	2550491, SS 2021, 2 SWS, Language: German, Open in study portal	**Online**

Content

The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

The topics of the seminar will be announced at the beginning of the term in a preliminary meeting. Attendance is compulsory for the preliminary meeting as well for all seminar presentations.

Exam:

The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 35-40 minutes (according to §4(2), 3 of the examination regulation).

The final mark for the seminar consists of the seminar thesis, the seminar presentation, the handout, and if applicable further material such as programming code.

The seminar can be attended both by Bachelor and Master students. A differentiation will be achieved by different valuation standards for the seminar thesis and presentation.

Requirements:

If possible, at least one module of the institute should be taken before attending the seminar.

Objectives:

The student

- illustrates and evaluates classic and current research questions in discrete optimization,
- applies optimization models and algorithms in discrete optimization, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management),
- successfully gets in touch with scientific working by an in-depth working on a special scientific topic which makes the student familiar with scientific literature research and argumentation methods,
- acquires good rhetorical and presentation skills.

As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic.

Organizational issues

wird auf der Homepage dol.ior.kit.edu bzw. auf dem WiWi-Portal bekannt gegeben

Literature

Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

V	**Seminar on Methodical Foundations of Operations Research (B)** 2550131, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Content

The seminar aims at describing, evaluating, and discussing recent as well as classical topics in continuous optimization. The focus is on the treatment of optimization models and algorithms, also with respect to their practical application.

Bachelor studenst are introduced to the style of scientific work. By focussed treatment of a scientific topic they deal with the basics of scientific investigation and reasoning.

For further development of a scientific work style, master students are particularly expected to critically question the seminar topics.

With regard to the oral presentations the students become acquainted with presentation techniques and basics of scientifc reasoning. Also rethoric abilities may be improved.

Remarks:

Attendance at all oral presentations is compulsory.

Preferably at least one module offered by the Institute of Operations Research should have been chosen before attending this seminar.

Assessment:

The assessment is composed of a 15-20 page paper as well as a 40-60 minute oral presentation according to §4(2), 3 of the examination regulation.The grade is composed of the equally weighted assessments of the paper and the oral presentation.

The seminar is appropriate for bachelor as well as for master students. Their differentiation results from different assessment criteria for the seminar paper and the oral presentation.

Workload:

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

Literature

Die Literaur und die relevanten Quellen werden gegen Ende des vorausgehenden Semesters im Wiwi-Portal und in einer Seminarvorbesprechung bekannt gegeben.

References and relevant sources are announced at the end of the preceding semester in the Wiwi-Portal and in a prepatory meeting.

V	**Seminar: Modern OR and Innovative Logistics** 2550491, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Content

The seminar aims at the presentation, critical evaluation and exemplary discussion of recent questions in discrete optimization. The focus lies on optimization models and algorithms, also with regard to their applicability in practical cases (especially in Supply Chain and Health Care Management). The students get in touch with scientific working: The in-depth work with a special scientific topic makes the students familiar with scientific literature research and argumentation methods. As a further aspect of scientific work, especially for Master students the emphasis is put on a critical discussion of the seminar topic. Regarding the seminar presentations, the students will be familiarized with basic presentational and rhetoric skills.

Organizational issues

wird auf der Homepage bekannt gegeben

Literature

Die Literatur und die relevanten Quellen werden zu Beginn des Seminars bekannt gegeben.

T	**5.261 Course: Seminar in Statistics A (Master) [T-WIWI-103483]**

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

Organisation: KIT Department of Economics and Management

Part of: M-WIWI-102736 - Seminar Module Economic Sciences

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2021	2500004	Introduction to Statistical Machine Learning	2 SWS	Seminar / 🖥	Schienle, Lerch
ST 2021	2521310	Advanced Topics in Econometrics	2 SWS	Seminar / 🖥	Schienle, Krüger, Görgen, Koster
ST 2021	2550561	Spezielle fortgeschrittene Themen der Datenanalyse und Statistik	2 SWS	Seminar / 🖥	Grothe, Kaplan, Kächele
Exams					
ST 2021	7900033	Introduction to Statistical Machine Learning			Schienle
ST 2021	7900250	Data Mining and Applications (Projectseminar)			Nakhaeizadeh

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

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

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

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

Prerequisites
None.

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

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

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

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

V	**Introduction to Statistical Machine Learning** 2500004, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

V	**Advanced Topics in Econometrics** 2521310, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Organizational issues
Blockveranstaltung, Termine werden bekannt gegeben

T 5.262 Course: Seminar Informatics A [T-INFO-104336]

Responsible: Prof. Dr. Sebastian Abeck
Organisation: KIT Department of Informatics
Part of: M-INFO-102822 - Seminar Module Informatics

Type Examination of another type	Credits 3	Grading scale Grade to a third	Version 1

Events					
ST 2021	2400011	Hot Topics in Bioinformatics	2 SWS	Seminar / 🖳	Stamatakis
ST 2021	2400072	Seminar: Service-oriented Architectures		Seminar / 🖳	Abeck, Schneider, Sänger
ST 2021	2400075	Undergraduate Seminar Software Disasters	2 SWS	Proseminar (/ 🖳	Reussner
ST 2021	2400076	Proseminar Software Requirements and Design	2 SWS	Proseminar (/ 🖳	Koziolek
ST 2021	2400086	Proseminar Algorithms for NP-hard Problems	2 SWS	Proseminar (/ 🖳	Ueckerdt, Wolf
ST 2021	2400129	Internet of Things		Seminar / 🗱	Faghih, Salamin, Zervakis, Bauer, Henkel
ST 2021	2400137	Embedded Machine Learning		Seminar / 🗱	Rapp, Pfeiffer, Faghih, Zervakis, Khdr, Henkel
ST 2021	2400144	Can Statistics Prove Cause and Effect?	2 SWS	Seminar / 🖳	Janzing
ST 2021	2400148	Embedded Systems: Architectures and Technologies		Seminar / 🗱	Hussain, Rapp, Nassar, Bauer, Khdr, Henkel, Gonzalez, Hizzani
ST 2021	24336	Robotics and Medicine	2 SWS	Seminar / 🖳	Mathis-Ullrich
ST 2021	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / 🖳	Hanebeck, Radtke
ST 2021	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / 🗱	Mädche
ST 2021	2540553	Interactive Analytics Seminar	2 SWS	Seminar / 🖳	Mädche, Beigl, Toreini, Pescara
ST 2021	2540557	Information Systems and Service Design Seminar	3 SWS	Seminar / 🖳	Mädche
WT 21/22	2400060	Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection	2 SWS	Seminar	Reussner, Raabe, Werner, Müller-Quade
WT 21/22	2400078	Seminar: Neuronale Netze und künstliche Intelligenz		Seminar	Waibel, Asfour, Retkowski
WT 21/22	2400092	Internet of Things		Seminar / 🗱	Faghih, Salamin, Zervakis, Bauer, Henkel
WT 21/22	2400137	Embedded Machine Learning		Seminar / 🗱	Rapp, Sikal, Zervakis, Khdr, Henkel
WT 21/22	2400148	Embedded Security and Architectures		Seminar / 🗱	Hussain, Rapp, Nassar, Bauer, Khdr, Gonzalez, Hizzani, Sikal, Henkel
WT 21/22	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / 🗱	Hanebeck, Radtke
WT 21/22	24844	Seminar: Ubiquitous Systems	2 SWS	Seminar	Beigl, Pescara
WT 21/22	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / 🗱	Mädche

WT 21/22	2513214	Seminar Information security and Data protection (Bachelor)	2 SWS	Seminar	Oberweis, Volkamer, Raabe, Alpers, Düzgün, Dietmann, Hennig, Schiefer, Wagner
Exams					
ST 2021	7500013	Advanced Methods of Information Fusion			Hanebeck
ST 2021	7500014	Seminar: Hot Topics in Bioinformatics			Stamatakis
ST 2021	7500040	Seminar Information Systems			Böhm
ST 2021	750006	Seminar Robotics and Medicine			Mathis-Ullrich
ST 2021	7500106	Title not available			Bless, Hartenstein, Mädche, Zitterbart, Boehm, Sunyaev
ST 2021	7500148	Proseminar: Practical Seminar: Interactive Analytics			Beigl, Mädche
ST 2021	7500162	Seminar: Ubiquitous Systems			Beigl, Riedel
ST 2021	7500301	Seminar: Proofs from THE BOOK			Sanders
ST 2021	7500332	CES - Seminar: Internet of Things			Henkel
ST 2021	7500335	CES - Seminar: Machine Learning			Henkel
ST 2021	75104740	Seminar: Service-Oriented Architectures			Abeck
ST 2021	7900265	Interactive Analytics Seminar			Mädche
WT 21/22	7500021	Advanced Methods of Information Fusion			Hanebeck
WT 21/22	7500220	Seminar Ubiquitous Computing			Beigl

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

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

V	**Hot Topics in Bioinformatics** 2400011, SS 2021, 2 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

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

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

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

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

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

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

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

Credits: 3 ECTS

Organizational issues
IMPORTANT: Register for the seminar mailing list by sending an email to Alexandros.Stamatakis@h-its.org.

All information on the seminar is provided at: Seminar page Information about how we will start virtually is also provided there. We will start in the first week of the summer term. For all further information, students are requested to regularly read their emails.

V	**Internet of Things** 2400129, SS 2021, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Security in Internet of Things (IoT)

Welcome to the era of the Internet of Things (IoT), where millions of connected devices together in almost all aspects of our daily life, including our homes, offices, cars, and even our bodies, from TVs, fridges, and cars to health monitors and wearables. As a matter of fact, IoT is growing very fast and spreads very quickly. According to ARM, it is expected that the number of IoT devices will exceed 1 Trillion devices by 2025.

New applications and software always present new security threats; because it is developed very quickly and the developers cannot expect all threats, and it may need a decade to make these systems secure. For the IoT devices, these threats may have serious effects on our life; since Internet threats, today can steal credit cards, disable home security systems, personal data, webcam control, and even more.

Unfortunately, there is no "silver bullet" that can effectively mitigate every possible cyber threat. And these will open the need for improving the proposed security found in the IoT domain to keep malicious activity off and to cover personal privacy, financial transactions, and the threat of cyber theft to make IoT not only reliable but also safer.

Kubernetes for Edge and IoT

Kubernetes, originally developed by Google, is an open-source orchestration system for automating the deployment, scaling, monitoring, and management of containerized workloads/applications/services. Kubernetes was first announced by Google in mid-2014 and quickly became the industry standard for container orchestration. Kubernetes initially targeted on-premises, hybrid, or public cloud environments. Edge computing is gaining a lot of attraction lately with the need for mission-critical decisions to be made in real-time at the edge, the ML-powered IoT devices, and the move towards 5G. Hence, due to the increasing need to embrace cloud-native technology and containers, Kubernetes was quickly adopted in Edge/IoT environments opening up a new ecosystem for Edge Computing. However, to achieve this transition and enable leveraging Kubernetes on Edge an IoT, we have to overcome several challenges such as footprint of Kubernetes, energy constrained execution, scalability outside of the confines of data centers etc.

Kubernetes for Edge and IoT is offered only in English.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

V	**Embedded Machine Learning** 2400137, SS 2021, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Machine learning on on-chip systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) on a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest their own topics, but this is not required. The seminar can be held in English or German.

Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (eg, image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, eg, energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (eg, TPU) to improve its energy profile as well as performance.

Machine Learning methods for DNN compilation and mapping

Deep neural networks have achieved great success in challenging tasks such as image classification and object detection. There is a great demand for deploying these networks in different devices, ranging from cloud servers to embedded devices.
Mapping DNNs to these devices is a challenging task since each of these devices has different characteristics in terms of memory organization, compute units, etc. . There have been efforts to automate the process of mapping/compiling DNNs to hardware with different characteristics.
In this seminar, we will discuss the efforts that have been done in mapping/compiling DNNs over hardware using machine learning methods.

Organizational issues

Please register in ILIAS to participate.

V **Embedded Systems: Architectures and Technologies** 2400148, SS 2021, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft-errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient Soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures, and learn the ways to insert Trojan in an FPGA design/IP and explore different techniques to detect such stealthy Trojans, such as bitstream reverse engineering using Open Source Tool flow.

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re)configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.
This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Run-time Resource Management for Operating Systems

As the complexity of multi/many-core architectures increases, operating systems must evolve to adapt to the diversity of computing, memory and communication on-chip resources, as well the as the emerging goals and requirements of these complex systems. In this scenario, run-time (dynamic) resource management has been established as an effective technique to improve and balance critical metrics, such as performance, reliability, efficiency and quality of service (QoS). In this seminar, students will study the background and current trends in on-chip resource management, by identifying the nature of the chip's resources, the relevant metrics on high-end systems, and the state-the-art techniques to manage those resources, varying from models and heuristics to machine learning approaches.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

V	**Advanced Methods of Information Fusion** 24344, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount data .It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

V	**Information Systems and Service Design Seminar** 2540557, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group ISSD (Prof. Mädche). The research group "Information Systems & Service Design" (ISSD) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V	**Seminar: Neuronale Netze und künstliche Intelligenz** 2400078, WS 21/22, SWS, Language: German/English, Open in study portal	**Seminar (S)**

Content

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

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

Recommendations:

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

V	**Internet of Things** 2400092, WS 21/22, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Security in Internet of Things (IoT)

Welcome to the era of the Internet of Things (IoT), where millions of connected devices together in almost all aspects of our daily life, including our homes, offices, cars, and even our bodies, from TVs, fridges, and cars to health monitors and wearables. As a matter of fact, IoT is growing very fast and spreads very quickly. According to ARM, it is expected that the number of IoT devices will exceed 1 Trillion devices by 2025.

New applications and software always present new security threats; because it is developed very quickly and the developers cannot expect all threats, and it may need a decade to make these systems secure. For the IoT devices, these threats may have serious effects on our life; since Internet threats, today can steal credit cards, disable home security systems, personal data, webcam control, and even more.
Unfortunately, there is no "silver bullet" that can effectively mitigate every possible cyber threat. And these will open the need for improving the proposed security found in the IoT domain to keep malicious activity off and to cover personal privacy, financial transactions, and the threat of cyber theft to make IoT not only reliable but also safer.

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Kubernetes for Edge and IoT is offered only in English.

Organizational issues
Bitte im ILIAS zur Teilnahme anmelden.

V	**Embedded Machine Learning** 2400137, WS 21/22, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

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Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

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In this seminar, students will review cutting-edge state-of-the-art research (publications) to a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest own topics, but this is not required. The seminar can be held in English or German.

Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (e.g., image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, e.g., energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (e.g., TPU) to improve its energy profile as well as performance.

Organizational issues
Bitte im ILIAS zur Teilnahme anmelden.

| V | **Embedded Security and Architectures**
2400148, WS 21/22, SWS, Language: German/English, Open in study portal | **Seminar (S)**
Blended (On-Site/Online) |

Content
In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

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Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems
Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems
Various types of (re) configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.
This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management
Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues
Please register in ILIAS to participate.

| V | **Advanced Methods of Information Fusion**
24344, WS 21/22, 2 SWS, Language: German, Open in study portal | **Seminar (S)**
Blended (On-Site/Online) |

Content
The growing spread and performance of modern information and communication technologies produces an ever-increasing amount data .It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

T   5.263 Course: Seminar Informatics Master [T-INFO-111205]

Organisation: KIT Department of Informatics
Part of: M-INFO-102822 - Seminar Module Informatics

Type Examination of another type	Credits 3	Grading scale Grade to a third	Version 1

Events					
ST 2021	2400033	Research Focus Class: Blockchain & Payment Channel Networks Seminar	2 SWS	Seminar / 📱	Hartenstein, Grundmann
ST 2021	2400035	Seminar Image Analysis and Fusion	2 SWS	Seminar / 📱	Beyerer
ST 2021	2400044	Seminar Cryptanalysis	2 SWS	Seminar / 📱	Geiselmann, Müller-Quade, Tiepelt, Agrikola
ST 2021	2400059	Hot Topics in Decentralized Systems	2 SWS	Seminar / 📱	Hartenstein, Stengele
ST 2021	2400078	Die Bedeutung von ISMS im Datensicherheitsrecht	2 SWS	Seminar / 📱	Raabe
ST 2021	2400084	Seminar: Robot Reinforcement Learning	2 SWS	Seminar / 📱	Neumann
ST 2021	2400085	Quantum Information Theory	2 SWS	Seminar / 📱	Müller-Quade, Tiepelt, Ottenhues, Deußer, Maier, Strufe, Fruböse
ST 2021	2400089	Decentralized Systems: Fundamentals, Modeling, and Applications	3 SWS	Lecture / Practice (/ 📱	Hartenstein, Bayreuther, Stengele
ST 2021	2400129	Internet of Things		Seminar / ⚙	Faghih, Salamin, Zervakis, Bauer, Henkel
ST 2021	2400137	Embedded Machine Learning		Seminar / ⚙	Rapp, Pfeiffer, Faghih, Zervakis, Khdr, Henkel
ST 2021	2400148	Embedded Systems: Architectures and Technologies		Seminar / ⚙	Hussain, Rapp, Nassar, Bauer, Khdr, Henkel, Gonzalez, Hizzani
ST 2021	24336	Robotics and Medicine	2 SWS	Seminar / 📱	Mathis-Ullrich
ST 2021	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / 📱	Hanebeck, Radtke
ST 2021	2500043	Collaborative Development of Conversational Agents	3 SWS	Seminar / 📱	Mädche, Gnewuch
ST 2021	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / ⚙	Mädche
ST 2021	2540553	Interactive Analytics Seminar	2 SWS	Seminar / 📱	Mädche, Beigl, Toreini, Pescara
ST 2021	2540557	Information Systems and Service Design Seminar	3 SWS	Seminar / 📱	Mädche
ST 2021	2540559	Digital Service Design Seminar	3 SWS	Seminar / 📱	Mädche
ST 2021	5012005	Language Models		Advanced Graduate Seminar (/ 📱	Seidel-Saul, Betz, Koziolek
WT 21/22	2400013	Seminar: Energy Informatics	2 SWS	Seminar / ⚙	Wagner, Hagenmeyer, Fichtner, Gritzbach, Wolf, Heidrich, Phipps, Ueckerdt
WT 21/22	2400047	Seminar Algorithmentechnik	2 SWS	Seminar / 🗨	Wagner, Ueckerdt, Wilhelm, Feilhauer

WT 21/22	2400060	Data in Software-Intensive Technical Systems – Modeling – Analysis – Protection	2 SWS	Seminar	Reussner, Raabe, Werner, Müller-Quade
WT 21/22	2400090	Seminar Accessibiltity - Assistive Technologies for Visually Impaired Persons	2 SWS	Seminar	Stiefelhagen, Schwarz
WT 21/22	2400092	Internet of Things		Seminar / ✥	Faghih, Salamin, Zervakis, Bauer, Henkel
WT 21/22	2400108	Continuous Software Engineering	2 SWS	Seminar	Heinrich
WT 21/22	2400126	Post-Quantum Cryptography	2 SWS	Seminar / ✥	Ottenhues, Tiepelt, Müller-Quade, Coijanovic, Klooß, Fruböse, Gröll, Beskorovajnov
WT 21/22	2400137	Embedded Machine Learning		Seminar / ✥	Rapp, Sikal, Zervakis, Khdr, Henkel
WT 21/22	2400148	Embedded Security and Architectures		Seminar / ✥	Hussain, Rapp, Nassar, Bauer, Khdr, Gonzalez, Hizzani, Sikal, Henkel
WT 21/22	2400239	Selected Topics in Public-Key-Cryptography	2 SWS	Seminar / 📱	Müller-Quade, Agrikola, Fetzer
WT 21/22	24344	Advanced Methods of Information Fusion	2 SWS	Seminar / ✥	Hanebeck, Radtke
WT 21/22	2500125	Current Topics in Digital Transformation Seminar	3 SWS	Seminar / ✥	Mädche
WT 21/22	2513214	Seminar Information security and Data protection (Bachelor)	2 SWS	Seminar	Oberweis, Volkamer, Raabe, Alpers, Düzgün, Dietmann, Hennig, Schiefer, Wagner
Exams					
ST 2021	7400490	Language Models			Betz, Seidel-Saul, Gutmann, Koziolek
ST 2021	7500013	Advanced Methods of Information Fusion			Hanebeck
ST 2021	750006	Seminar Robotics and Medicine			Mathis-Ullrich
ST 2021	7500108	Seminar: Advanced Algorithms in Computer Graphics			Dachsbacher
ST 2021	7500284	Decentralized Systems: Fundamentals, Modeling, and Applications			Hartenstein
ST 2021	7500297	Seminar: Hot Topics in Decentralized Systems			Hartenstein
ST 2021	7500302	Research Focus Class: Blockchain & Payment Channel Networks - Seminar			Hartenstein
ST 2021	7500332	CES - Seminar: Internet of Things			Henkel
ST 2021	7500335	CES - Seminar: Machine Learning			Henkel
ST 2021	7900244	Digital Service Design Seminar			Mädche
WT 21/22	7500021	Advanced Methods of Information Fusion			Hanebeck
WT 21/22	7500069	Seminar Accessibility - Assistive Technologies for Visually Impaired Persons			Stiefelhagen

Legend: 📱 Online, ✥ Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

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

V	**Seminar Image Analysis and Fusion** 2400035, SS 2021, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Online**

Organizational issues

Termin und Ort der Einführungsveranstaltung werden vor Semesterbeginn auf der Webseite bekannt gegeben.

Findet - sofern Präsenz-Veranstaltung erlaubt - im Fraunhofer IOSB statt.

| V | **Decentralized Systems: Fundamentals, Modeling, and Applications**
 2400089, SS 2021, 3 SWS, Language: English, Open in study portal | **Lecture / Practice (VÜ)**
 Online |

Content

Decentralized Systems (like blockchain-based systems) represent distributed systems that are controlled by multiple parties who make their own independent decisions. In this course, we cover fundamental theoretical aspects as well as up-to-date decentralized systems and connect theory with current practice. We thereby address fault tolerance, security & trust, as well as performance aspects. Furthermore, we address measurements, modeling and simulation of decentralized systems and applications like Bitcoin and Matrix.

Prior knowledge in Foundations of IT-Security and Computer Networks is recommended.

Amount of Work

Lecture: 15 x 2h = 30h
Weekly lecture preparation and follow-up: 15 x 2 x 2h = 60h
Exam preparation: 30h

120h = 4 ECTS

Learning Objectives

1. Theoretic Fundamentals
    1. The student is able to recognize and distinguish distributed, federated, and decentralized systems.
    2. The student understands consensus, consistency and coordination within the context of networked and decentralized systems.
    3. The student understands the formally proven limits of fault tolerance and their underlying assumptions. This includes an understanding of the synchronous and asynchronous network model which underpin the respective proofs. The student also understands several models for fault tolerance, notably silent and noisy crash as well as byzantine fault tolerance within the context of decentralized and distributed systems.
    4. The student knows various models for and levels of consistency. In particular, strictly ordered, causally ordered, partially ordered consistency as well as numerical and temporal relaxations thereof.
2. Modeling & Simulation
    1. The student understands discrete event-based simulation as a scientific tool and is able to apply this concept properly to examine networked and decentralized systems.
    2. The student understands the generation, manipulation, and evaluation of randomness and its relevance to simulation of networked and decentralized systems.
    3. The student is able to statistically evaluate, visualize, and interpret the results of simulations.
3. Applications
    1. The student has a fundamental understanding of blockchain-based cryptocurrencies (e.g. Bitcoin/Ethereum), decentralized communication systems like Matrix, and understands trust relations in distributed and decentralized systems.

The student is able to understand how the previously introduced theoretical foundations relate to networked and decentralized systems in practice.

| V | **Internet of Things**
 2400129, SS 2021, SWS, Language: German/English, Open in study portal | **Seminar (S)**
 Blended (On-Site/Online) |

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Security in Internet of Things (IoT)

Welcome to the era of the Internet of Things (IoT), where millions of connected devices together in almost all aspects of our daily life, including our homes, offices, cars, and even our bodies, from TVs, fridges, and cars to health monitors and wearables. As a matter of fact, IoT is growing very fast and spreads very quickly. According to ARM, it is expected that the number of IoT devices will exceed 1 Trillion devices by 2025.

New applications and software always present new security threats; because it is developed very quickly and the developers cannot expect all threats, and it may need a decade to make these systems secure. For the IoT devices, these threats may have serious effects on our life; since Internet threats, today can steal credit cards, disable home security systems, personal data, webcam control, and even more.

Unfortunately, there is no "silver bullet" that can effectively mitigate every possible cyber threat. And these will open the need for improving the proposed security found in the IoT domain to keep malicious activity off and to cover personal privacy, financial transactions, and the threat of cyber theft to make IoT not only reliable but also safer.

Kubernetes for Edge and IoT

Kubernetes, originally developed by Google, is an open-source orchestration system for automating the deployment, scaling, monitoring, and management of containerized workloads/applications/services. Kubernetes was first announced by Google in mid-2014 and quickly became the industry standard for container orchestration. Kubernetes initially targeted on-premises, hybrid, or public cloud environments. Edge computing is gaining a lot of attraction lately with the need for mission-critical decisions to be made in real-time at the edge, the ML-powered IoT devices, and the move towards 5G. Hence, due to the increasing need to embrace cloud-native technology and containers, Kubernetes was quickly adopted in Edge/IoT environments opening up a new ecosystem for Edge Computing. However, to achieve this transition and enable leveraging Kubernetes on Edge an IoT, we have to overcome several challenges such as footprint of Kubernetes, energy constrained execution, scalability outside of the confines of data centers etc.

Kubernetes for Edge and IoT is offered only in English.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

V	**Embedded Machine Learning** 2400137, SS 2021, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content
In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.
Machine learning on on-chip systems

Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

Machine learning (ML) gains importance in all aspects of information systems. From high-level algorithms like image recognition to lower-level intelligent CPU management - ML is ubiquitous. On-chip systems also benefit from advances in ML techniques. Examples include adaptive resource management or workload prediction. However, ML techniques also benefit from advances in on-chip systems. A prominent example is acceleration of neural networks in recent desktop GPUs and even smartphone chips.

In this seminar, students will review cutting-edge state-of-the-art research (publications) on a specific topic related to ML on on-chip systems. The findings will be summarized in a seminar report and presented to the other members of the course. Students are welcome to suggest their own topics, but this is not required. The seminar can be held in English or German.

Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (eg, image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, eg, energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (eg, TPU) to improve its energy profile as well as performance.

Machine Learning methods for DNN compilation and mapping
Deep neural networks have achieved great success in challenging tasks such as image classification and object detection. There is a great demand for deploying these networks in different devices, ranging from cloud servers to embedded devices.
Mapping DNNs to these devices is a challenging task since each of these devices has different characteristics in terms of memory organization, compute units, etc. . There have been efforts to automate the process of mapping/compiling DNNs to hardware with different characteristics.
In this seminar, we will discuss the efforts that have been done in mapping/compiling DNNs over hardware using machine learning methods.

Organizational issues
Please register in ILIAS to participate.

V	**Embedded Systems: Architectures and Technologies** 2400148, SS 2021, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft-errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient Soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures, and learn the ways to insert Trojan in an FPGA design/IP and explore different techniques to detect such stealthy Trojans, such as bitstream reverse engineering using Open Source Tool flow.

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re)configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.
This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Run-time Resource Management for Operating Systems

As the complexity of multi/many-core architectures increases, operating systems must evolve to adapt to the diversity of computing, memory and communication on-chip resources, as well the as the emerging goals and requirements of these complex systems. In this scenario, run-time (dynamic) resource management has been established as an effective technique to improve and balance critical metrics, such as performance, reliability, efficiency and quality of service (QoS). In this seminar, students will study the background and current trends in on-chip resource management, by identifying the nature of the chip's resources, the relevant metrics on high-end systems, and the state-the-art techniques to manage those resources, varying from models and heuristics to machine learning approaches.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

V	**Advanced Methods of Information Fusion** 24344, SS 2021, 2 SWS, Language: German/English, Open in study portal	**Seminar (S)** **Online**

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount data .It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

V	**Collaborative Development of Conversational Agents** 2500043, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
This course focuses on the design, development, deployment, and evaluation of conversational agents (e.g., chatbots or voice assistants) for a given problem domain (e.g., customer service, team collaboration). The aim of the course is to introduce conceptual and technical foundations of conversational agents, relevant theories of human-computer interaction, and design guidelines for different classes of conversational agents. In addition, the course will introduce the human-centered design approach adapted to the design of conversational agents, including several qualitative and quantitative evaluation approaches.

The entire course is held virtually with no physical meetings, providing a first experience for future workplace scenarios. The course is a joint offering together with Saarland University (Prof. Stefan Morana) and Technische Universität Dresden (Prof. Benedikt Brendel). Students will work collaboratively in virtual teams with students from the other universities (i.e., one student per university in one team). Each student team will iteratively design, develop, and evaluate a conversational agent using contemporary technology tools (e.g., Google Dialogflow, Microsoft Bot Framework, Rasa). The teams document their activities and results in a project report. The project report as well as the conversational agent prototype are the basis for the grading of the course.

The entire course is limited to 15 participants (5 per university) and requires a short registration. More details will be made available on our website.

After completing this course, the course participants will be able to:

- explain conceptual and technical foundations of conversational agents
- perform the human-centered design approach to design, develop, and evaluate a conversational agent
- develop conversational agents using state-of-the-art tools and frameworks
- apply qualitative and quantitative methods to evaluate conversational agent prototypes

Requirements

- Programming skills are beneficial
- Experience or general interest in human-computer interaction
- English communication skills

Literature
Relevant literature will be made available in the seminar.

V	**Information Systems and Service Design Seminar** 2540557, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content

With this seminar, we aim to provide students with the possibility to independently work on state-of-the-art research topics in addition to the knowledge gained in the lectures of the research group ISSD (Prof. Mädche). The research group "Information Systems & Service Design" (ISSD) headed by Prof. Mädche focuses in research, education, and innovation on designing interactive intelligent systems. It is positioned at the intersection of Information Systems and Human-Computer Interaction (HCI).

In the seminar, participants will get deeper insights in a contemporary research topic in the field of information systems, specifically interactive intelligent systems.

The actual seminar topics will be derived from current research activities of the research group. Our research assistants offer a rich set of topics from our research clusters (digital experience and participation, intelligent enterprise systems, or digital services design & innovation). Students can select among these topics individually depending on their personal interests. The seminar is carried out in the form of a literature-based thesis project. In the seminar, students will acquire the important methodological skills of running a systematic literature review.

Learning Objectives

- focus on a contemporary topic at the intersection of Information Systems and Human-Computer Interaction (HCI), specifically interactive intelligent systems
- carry out a structured literature search for a given topic
- aggregate the collected information in a suitable way to present and extract knowledge
- write a seminar thesis following academic writing standards
- deliver a presentation in a scientific context in front of an auditorium

Prerequisites

No specific prerequisites are required for the seminar.

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V	**Digital Service Design Seminar** 2540559, SS 2021, 3 SWS, Language: English, Open in study portal	**Seminar (S)** **Online**

Content
Description

In this seminar, a team of students addresses a real-world design challenge of an IISM cooperation partner. Students learn and apply design methods, techniques, and tools to explore the problem and deliver a solution in the form of an innovative prototype

Learningobjectives

The students

- explore a real-world digital service design challenge
- understand the human-centered design process and apply selected design techniques & tools
- deliver a digital service prototype as a potential solution for the challenge

Prerequisites

No specific prerequisites are required for the seminar

Literature

Further literature will be made available in the seminar.

Organizational issues

Termine werden bekannt gegeben

V	**Seminar Accessibiltity - Assistive Technologies for Visually Impaired Persons** 2400090, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Organizational issues
Gebäude 20.51, R103

| V | **Internet of Things**
2400092, WS 21/22, SWS, Language: German/English, Open in study portal | **Seminar (S)**
Blended (On-Site/Online) |

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Security in Internet of Things (IoT)

Welcome to the era of the Internet of Things (IoT), where millions of connected devices together in almost all aspects of our daily life, including our homes, offices, cars, and even our bodies, from TVs, fridges, and cars to health monitors and wearables. As a matter of fact, IoT is growing very fast and spreads very quickly. According to ARM, it is expected that the number of IoT devices will exceed 1 Trillion devices by 2025.

New applications and software always present new security threats; because it is developed very quickly and the developers cannot expect all threats, and it may need a decade to make these systems secure. For the IoT devices, these threats may have serious effects on our life; since Internet threats, today can steal credit cards, disable home security systems, personal data, webcam control, and even more.
Unfortunately, there is no "silver bullet" that can effectively mitigate every possible cyber threat. And these will open the need for improving the proposed security found in the IoT domain to keep malicious activity off and to cover personal privacy, financial transactions, and the threat of cyber theft to make IoT not only reliable but also safer.

Kubernetes for Edge and IoT

Kubernetes, originally developed by Google, is an open-source orchestration system for automating the deployment, scaling, monitoring, and management of containerized workloads/applications/services. Kubernetes was first announced by Google in mid-2014 and quickly became the industry standard for container orchestration. Kubernetes initially targeted on-premises, hybrid, or public cloud environments. Edge computing is gaining a lot of attraction lately with the need for mission-critical decisions to be made in real-time at the edge, the ML-powered IoT devices, and the move towards 5G. Hence, due to the increasing need to embrace cloud-native technology and containers, Kubernetes was quickly adopted in Edge/IoT environments opening up a new ecosystem for Edge Computing. However, to achieve this transition and enable leveraging Kubernetes on Edge an IoT, we have to overcome several challenges such as footprint of Kubernetes, energy constrained execution, scalability outside of the confines of data centers etc.

Kubernetes for Edge and IoT is offered only in English.

Organizational issues
Bitte im ILIAS zur Teilnahme anmelden.

| V | **Continuous Software Engineering**
2400108, WS 21/22, 2 SWS, Language: German/English, Open in study portal | **Seminar (S)** |

Content

Modern software engineering happens in short cycles, which allow fast feedback. Technologies like build servers and containerization support fast, frequent and automated deployment of software to production systems and fast feedback to development (devops).

The term "continuous software engineering" combines different aspects of this intertwinement of different software engineering activities.

In this seminars, students will work on a topic in the context of continuous software engineering. Some of the addressed topics will be concerned with challenges when engineering systems with machine-learning components.

Literature
Fitzgerald, Brian, and Klaas-Jan Stol. "Continuous software engineering: A roadmap and agenda." Journal of Systems and Software 123 (2017): 176-189.

| V | **Embedded Machine Learning**
2400137, WS 21/22, SWS, Language: German/English, Open in study portal | **Seminar (S)**
Blended (On-Site/Online) |

Content

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Machine learning and on-chip systems form a symbiosis where each research area benefits from advances in the other. In this seminar, students review cutting-edge research on both areas.

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Approximate Computing for Efficient Machine Learning

Nowadays, energy efficiency is a first-class design constraint in the ICT sector. Approximate computing emerges as a new design paradigm for generating energy efficient computing systems. There is a large body of resource-hungry applications (e.g., image processing and machine learning) that exhibit an intrinsic resilience to errors and produce outputs that are useful and of acceptable quality for the users despite their underlying computations being performed in an approximate manner. By exploiting this inherent error tolerance of such applications, approximate computing trades computational accuracy for savings in other metrics, e.g., energy consumption and performance. Machine learning, a very common and top trending workload of both data centers and embedded systems, is a perfect candidate for approximate computing application since, by definition, it delivers approximate results. Performance as well as energy efficiency (especially in the case of embedded systems) are crucial for machine learning applications and thus, approximate computing techniques are widely adopted in machine learning (e.g., TPU) to improve its energy profile as well as performance.

Organizational issues

Bitte im ILIAS zur Teilnahme anmelden.

V	**Embedded Security and Architectures** 2400148, WS 21/22, SWS, Language: German/English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In our seminars, students learn about cutting-edge research in the research fields presented below. Students are offered topics by the supervisors, but also can suggest their own topics in these fields. The seminar is offered in both English and German.

Dependability for Reconfigurable Architectures

Dependability has become one of the prime concerns in recent nano-era. Reliability (the ability of the system to deliver services as specified) and Security (the ability of the system to protect itself against deliberate or accidental intrusion) are the two crucial attributes of dependable systems. Among the other reliability threats due to physical limits of CMOS technology, radiation induced soft errors or transient faults are also the most challenging threat to be handled. During this seminar, we will explore state-of-the-art for the power-efficient soft-error reliability and study different research solutions to improve soft-error resiliency in power efficient manner leveraging power-performance-reliability trade-offs. During this seminar, the students will also be able to understand hardware security in reconfigurable architectures,

Thermal and Power Aware Embedded Systems

Power densities are continuously increasing along with technology scaling and the integration of more transistors into smaller areas, potentially resulting in thermal emergencies on the chip. To mitigate such emergencies, power and thermal management techniques are employed. The state-of-the-art power and thermal management techniques can be classified into several categories, such as reactive and proactive techniques, centralized and distributed ones. Recently, machine learning algorithms are employed in power and thermal management techniques to make them more proactive and adaptive. Those various categories of the state-of-the-art techniques need to be reviewed in this seminar to demonstrate the advantage and disadvantage of each of them.

Security of Reconfigurable Embedded Systems

Various types of (re) configurable systems have emerged in recent years. The spectrum ranges from one-time configurable systems that are programmed at the design time for product-specific requirements, to reconfigurable systems that can also be adapted after commissioning, to dynamically reconfigurable systems whose configuration can be changed at runtime and their ability to dynamic reconfiguration is an important part of their system functionality.
This seminar focuses on the runtime reconfigurable systems, their security aspects and methods. It investigates the current state of research for securing the runtime reconfigurable systems, as well as the feasibility of using the security measures from general processing architectures to runtime reconfigurable systems.

Security in Resource Management

Efficient resource management in many-core systems (ie, systems with more than 100 cores, not only a dozen) has become a research challenge in the last years. As complexity and the demand for scalability increase, this new paradigm should also consider new security features to avoid or mitigate the effects of malicious applications both on critical information and the system as a whole.

In this seminar, we will focus on the state-of-the-art of security attacks such as Side Channel Attacks (SCA), Covert channel attacks, as well as other similar resource-based attacks and their effects on other critical applications running on many-core systems. During this seminar, student will dive into the security aspects of resource management, while investigating answers to the following research questions:

- How do these attacks work?
- Which are the associated vulnerabilities? What resources are vulnerable?
- What's their impact on critical information or other resources?
- What are the current countermeasures for the attacks?

Organizational issues
Please register in ILIAS to participate.

V	**Advanced Methods of Information Fusion** 24344, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

The growing spread and performance of modern information and communication technologies produces an ever-increasing amount data .It is one of the central challenges of our time to extract meaningful information from these data sets. The approach to address these issues, often called data science, combines strategies and methods from the fields of machine learning, mathematics, state estimation, visualization and pattern recognition. During this seminar, the students will familiarize themselves with concepts and methods particularly focusing on estimation theory and its application

The seminar targets master students in computer science and bachelor students in Information engineering and management.

T   5.264 Course: Seminar Methods along the Innovation process [T-WIWI-110987]

Responsible:	Dr. Daniela Beyer
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate
Alternative exam assessment.

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.

T   5.265 Course: Seminar: Commercial and Corporate Law in the IT Industry [T-INFO-111405]

Responsible: Prof. Dr. Thomas Dreier
                      Dr. Georg Nolte
Organisation: KIT Department of Informatics
Part of: M-INFO-101216 - Private Business Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 21/22	2400165	Seminar Commercial and Corporate Law in Information Technology	2 SWS	Seminar / ▯	Nolte
Exams					
WT 21/22	7500182	Seminar: Legal Studies II			Dreier, Boehm, Raabe

Legend: ▯ Online, ⧉ Blended (On-Site/Online), ● On-Site, ✕ Cancelled

T   5.266 Course: Seminar: Computer Science TECO [T-INFO-110808]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-105328 - Seminar: Computer Science TECO

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	2

T   5.267 Course: Seminar: IT- Security Law [T-INFO-111404]

Responsible: Martin Schallbruch
Organisation: KIT Department of Informatics
Part of: M-INFO-101217 - Public Business Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 21/22	24389	Seminar "IT-Sicherheitsrecht"	2 SWS	Seminar	Schallbruch
Exams					
WT 21/22	7500249	Seminar: IT- Security Law			

T 5.268 Course: Seminar: Legal Studies I [T-INFO-101997]

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

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each term	1

Events					
ST 2021	2400041	Governance, Risk & Compliance	2 SWS	Seminar / 🖥	Herzig
ST 2021	2400061	Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung	2 SWS	Seminar / 🖥	Bless, Boehm, Hartenstein, Mädche, Sunyaev, Zitterbart, Volkamer
ST 2021	2400065	"Die Corona-Krise aus der Sicht des Verfassungsrechts"	2 SWS	Seminar / 🖥	Eichenhofer
ST 2021	2400082	"Verfassungsrechtliche Fragen staatlicher Öffentlichkeitsarbeit"	2 SWS	Seminar / 🖥	Eichenhofer
ST 2021	2400127	Aktuelle Probleme des Datenschutzrechts		Seminar / 🖥	Eichenhofer
ST 2021	2400153	Technische Aspekte der DSGVO und deren Umsetzung in der Praxis	2 SWS	Seminar / 🖥	Boehm, Dimitrova
ST 2021	24820	Current Issues in Patent Law	2 SWS	Seminar / 🖥	Melullis
Exams					
ST 2021	7500106	Title not available			Bless, Hartenstein, Mädche, Zitterbart, Boehm, Sunyaev
ST 2021	7500140	Seminar: Legal Studies I			Dreier, Boehm, Melullis, Matz
ST 2021	7500159	Seminar: Legal Studies I			Eichenhofer
WT 21/22	7500182	Seminar: Legal Studies II			Dreier, Boehm, Raabe

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

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

V Internet und Gesellschaft - gesellschaftliche Werte und technische Umsetzung
2400061, SS 2021, 2 SWS, Open in study portal

Seminar (S)
Online

Content

- Registration via https://portal.wiwi.kit.edu/ys/4516

Organizational issues
nach Vereinbarung

T   5.269 Course: Seminar: Patent Law [T-INFO-111403]

Responsible: Markus Dammler
Organisation: KIT Department of Informatics
Part of: M-INFO-101215 - Intellectual Property Law

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Events					
WT 21/22	24186	Seminar Patent Law	2 SWS	Seminar /	Dammler
Exams					
WT 21/22	7500182	Seminar: Legal Studies II			Dreier, Boehm, Raabe

Legend: ▯ Online, ✿ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

| T | 5.270 Course: Service Design Thinking [T-WIWI-102849] |

Responsible: Prof. Dr. Gerhard Satzger
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101503 - Service Design Thinking

| Type
Examination of another type | Credits
12 | Grading scale
Grade to a third | Recurrence
Irregular | Version
4 |
|---|---|---|---|---|

Exams				
ST 2021	7900314	Service Design Thinking		Satzger

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
This course is held in English – proficiency in writing and communication is required.

Our past students recommend to take this course at the beginning of the masters program.

Annotation
Due to practical project work as a component of the program, access is limited.
The module (as well as the module component) spans two semesters. It starts in September every year and runs until end of June in the subsequent year. Entering the program is only possible at its beginning - after prior application in May/June.
For more information on the application process and the program itself are provided in the module component description and the program's website (http://sdt-karlsruhe.de).
Furthermore, the KSRI conducts an information event for applicants every year in May.
This module is part of the KSRI Teaching Program „Digital Service Systems". For more information see the KSRI Teaching website: www.ksri.kit.edu/teaching.

T 5.271 Course: Service Innovation [T-WIWI-102641]

Responsible:	Prof. Dr. Gerhard Satzger
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101410 - Business & Service Engineering
	M-WIWI-101448 - Service Management
	M-WIWI-102806 - Service Innovation, Design & Engineering

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2595468	Service Innovation	2 SWS	Lecture / 📱	Satzger
Exams					
ST 2021	7900266	Service Innovation			Satzger
WT 21/22	7900009	Service Innovation			Satzger

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🗣 On-Site, ✗ Cancelled

Competence Certificate

The assessment consists of a written exam (60 min.). A bonus can be acquired through successful participation in the exercise. If the grade of the written exam is between 4.0 and 1.3, the bonus improves the grade by one grade (0.3 or 0.4). Details will be announced in the lecture.

Prerequisites
None

Recommendation
None

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

V Service Innovation
2595468, SS 2021, 2 SWS, Language: English, Open in study portal

Lecture (V)
Online

Content

Continuous innovation is a prerequisite for firms to stay competitive. While innovation in manufacturing or agriculture can build on a considerable body of research, experience and best practices, innovation in services has not reached the same level of maturity.

This course takes a close look at the topic of service innovation. We will lay the foundations with an initial overview of service innovation including the basic concepts, challenges and innovation processes. We will compare product and service innovation and understand how innovation diffusion works.

The second part focuses on applicable methods and tools for service innovation: we will cover possible sources of innovations, ways to identify opportunities for innovations and the potential of service innovations built on data. For example, open and closed innovation approaches will be contrasted, the benefits of leveraging user communities to drive innovation will be explored and the human-centric innovation approach (Service) Design Thinking will be introduced. We will also look into the opportunities that technology offers for service innovation.

The last part of the lecture covers the management of service innovation and insights from practice. You will understand obstacles and enablers, and learn how to manage, incentivize and foster service innovation.

Literature

- Cardoso, J., Fromm, H., Nickel, S., Satzger, G., Studer, R., & Weinhardt, C. (Eds.) (2015). Fundamentals of service systems (Vol. 12). Heidelberg: Springer.
- Lusch, R. F., & Nambisan, S. (2015). Service innovation: A service-dominant logic perspective. MIS quarterly, 39(1), 155-175.
- Christensen, Clayton M. (2013). The Innovator's Dilemma - when new technologies cause great firms to fail. Boston, Massachusetts: Harvard Business Review Press.
- Rogers, S. (2003). Diffusion of Innovations. 5. ed. New York: Free Press.
- Chesbrough, H. W. (2011). Open services innovation - rethinking your business to grow and compete in a new era. 1. ed. San Francisco: Jossey-Bass.
- Chesbrough, H. (2011). Open services innovation: Rethinking your business to grow and compete in a new era. John Wiley & Sons.
- Uebernickel, F., Brenner, W., Pukall, B., Naef, T., & Schindlholzer, B. (2015). Design Thinking: Das Handbuch. Frankfurt am Main: Frankfurter Allgemeine Buch.
- Runco, M.A. (2014). Creativity: Theories and Themes: Research, Development, and Practice (2nd ed.). Amsterdam: Academic Press.

T 5.272 Course: Signals and Codes [T-INFO-101360]

Responsible:	Prof. Dr. Jörn Müller-Quade
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Irregular	1

Events					
WT 21/22	24137	Signals and Codes	2 SWS	Lecture / ⚙	Geiselmann, Müller-Quade
Exams					
ST 2021	7500179	Signals and Codes			Geiselmann, Müller-Quade

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

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

V	**Signals and Codes**	**Lecture (V)**
	24137, WS 21/22, 2 SWS, Language: German, Open in study portal	**Blended (On-Site/Online)**

Content

In this lecture, bounds for codes (Hamming, Gilbert-Varshamov, Singleton) are presented. Coding and decoding for classical algebraic codes (linear, cyclic, Reed Solomon-, Goppa- und Reed Muller-codes) will be presented as well as concatanated codes.

Literature

Shu Lin, Daniel Costello, 'Error Control Coding', 2nd Ed., Pearson Prentice Hall, 2004
Todd Moon, 'Error Correction Coding', Wiley, 2005
Weitere Literatur wird in der Vorlesung bekannt gegeben.

Weiterführende Literatur

Wird in der Vorlesung bekannt gegeben.

T 5.273 Course: Simulation Game in Energy Economics [T-WIWI-108016]

Responsible:	Dr. Massimo Genoese
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101451 - Energy Economics and Energy Markets

Type Examination of another type	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2581025	Simulation Game in Energy Economics	3 SWS	Lecture / Practice (/📱	Genoese, Zimmermann
Exams					
ST 2021	7981025	Simulation Game in Energy Economics			Fichtner

Legend: 📱 Online, ⚡ Blended (On-Site/Online), 🔊 On-Site, ✗ Cancelled

Competence Certificate
Examination as written assignment and oral presentation (§4 (2), 1 SPO).

Prerequisites
None

Recommendation
Visiting the course "Introduction to Energy Economics"

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

V Simulation Game in Energy Economics
2581025, SS 2021, 3 SWS, Language: German, Open in study portal

Lecture / Practice (VÜ)
Online

Content

- Introduction
- Agents and market places in the electricity industry
- Selected planning tasks of energy service companies
- Methods of modelling in the energy sector
- Agent-based simulation: The PowerACE model
- Simulation game: Simulation in energy economics (electricity and emission trading, investment decisions)

The lecture is structured in a theoretical and a practical part. In the theoretical part, the students are taught the basics to carry out simulations themselves in the practical part which comprises amongst others the simulation of the power exchange. The participants of the simulation game take a role as a power trader in the power market. Based on various sources of information (e.g. prognosis of power prices, available power plants, fuel prices), they can launch bids in the power exchange.

Assessment: presentation and written summary

Prerequisites: Basics in Energy economics ad markets are advantageous.

Organizational issues
CIP-Pool West, Raum 102, Geb. 06.41 - siehe Institutsaushang

Literature
Weiterführende Literatur:

Möst, D. und Genoese, M. (2009): Market power in the German wholesale electricity market. The Journal of Energy Markets (47–74). Volume 2/Number 2, Summer 2009

T 5.274 Course: Smart Energy Infrastructure [T-WIWI-107464]

Responsible: Dr. Armin Ardone
                    Dr. Dr. Andrej Marko Pustisek
Organisation: KIT Department of Economics and Management
      Part of: M-WIWI-101452 - Energy Economics and Technology

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2581023	(Smart) Energy Infrastructure	2 SWS	Lecture	Ardone, Pustisek
Exams					
ST 2021	7981023	Smart Energy Infrastructure			Fichtner

Competence Certificate
The assessment consists of a written exam (60 minutes). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
None.

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

V (Smart) Energy Infrastructure
2581023, WS 21/22, 2 SWS, Language: German, Open in study portal

Lecture (V)

Content

- Basic terms and concepts
- Meaning of infrastructure
- Excursus: regulation of infrastructure
- Natural gas transportation
- Natural gas storage
- Electricity transmission
- (Overview) Crude oil and oil product transportation

T 5.275 Course: Smart Grid Applications [T-WIWI-107504]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101446 - Market Engineering
	M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	2

Events					
WT 21/22	2540452	Smart Grid Applications	2 SWS	Lecture	Staudt, van Dinther
WT 21/22	2540453	Übung zu Smart Grid Applications	1 SWS	Lecture	Staudt, Henni

Competence Certificate

The assessment consists of a written exam (60 min) (according to §4(2), 1 of the examination regulations). By successful completion of the exercises (§4 (2), 3 SPO 2007 respectively §4 (3) SPO 2015) a bonus can be obtained. If the grade of the written exam is at least 4.0 and at most 1.3, the bonus will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites

None

Recommendation

None

Annotation

The lecture will be read for the first time in winter term 2018/19.

T   5.276 Course: Social Choice Theory [T-WIWI-102859]

Responsible:	Prof. Dr. Clemens Puppe
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101500 - Microeconomic Theory
	M-WIWI-101504 - Collective Decision Making

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2520537	Social Choice Theory	2 SWS	Lecture / 🖥	Puppe, Kretz
ST 2021	2520539	Übung zu Social Choice Theory	1 SWS	Practice / 🖥	Kretz, Puppe
Exams					
ST 2021	7900292	Social Choice Theory			Puppe
ST 2021	7900293	Social Choice Theory			Puppe

Legend: 🖥 Online, ✣ Blended (On-Site/Online), ◕ On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an alternative exam assessment (open book exam). The exam takes place in every summer semester.

Prerequisites
None

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

V	**Social Choice Theory**	**Lecture (V)**
	2520537, SS 2021, 2 SWS, Language: English, Open in study portal	**Online**

Content
How should (political) candidates be elected? What are good ways of merging individual judgments into collective judgments? Social Choice Theory is the systematic study and comparison of how groups and societies can come to collective decisions.

The course offers a rigorous and comprehensive treatment of judgment and preference aggregation as well as voting theory. It is divided into two parts. The first part deals with (general binary) aggregation theory and builds towards a general impossibility result that has the famous Arrow theorem as a corollary. The second part treats voting theory. Among other things, it includes prooving the Gibbard-Satterthwaite theorem.

Literature
Main texts:

- Hervé Moulin: Axioms of Cooperative Decision Making, Cambridge University Press, 1988
- Christian List and Clemens Puppe: Judgement Aggregation. A survey, in: Handbook of rational & social choice, P.Anand,P.Pattanaik, C.Puppe (Eds.), Oxford University Press 2009.

Secondary texts:

- Amartya Sen: Collective Choice and Social Welfare, Holden-Day, 1970
- Wulf Gaertner: A Primer in Social Choice Theory, revised edition, Oxford University Press, 2009
- Wulf Gaertner: Domain Conditions in Social Choice Theory, Oxford University Press, 2001

| T | **5.277 Course: Sociotechnical Information Systems Development [T-WIWI-109249]** |

Responsible: Prof. Dr. Ali Sunyaev
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-104403 - Critical Digital Infrastructures

Type Examination of another type	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each term	**Version** 2

Events					
ST 2021	2512400	Advanced Lab Development of Sociotechnical Information Systems (Bachelor)	3 SWS	Practical course / 📱	Sunyaev, Pandl
ST 2021	2512401	Development of Sociotechnical Information Systems (Master)	3 SWS	Practical course / 📱	Sunyaev, Pandl
Exams					
ST 2021	7900173	Advanced Lab Development of Sociotechnical Information Systems (Master)		Sunyaev	
WT 21/22	7900080	Advanced Lab Development of Sociotechnical Information Systems (Bachelor)		Sunyaev	
WT 21/22	7900143	Advanced Lab Development of Sociotechnical Information Systems (Master)		Sunyaev	

Legend: 📱 Online, 🔀 Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate

The alternative exam assessment consists of an implementation and a final thesis documenting the development and use of the application.

Prerequisites

None.

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

| V | **Advanced Lab Development of Sociotechnical Information Systems (Bachelor)**
2512400, SS 2021, 3 SWS, Language: German/English, Open in study portal | **Practical course (P)**
Online |

Content

The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

| V | **Development of Sociotechnical Information Systems (Master)**
2512401, SS 2021, 3 SWS, Language: German/English, Open in study portal | **Practical course (P)**
Online |

Content

The aim of the lab is to get to know the development of socio-technical information systems in different application areas. In the event framework, you should develop a suitable solution strategy for your problem alone or in group work, collect requirements, and implement a software artifact based on it (for example, web platform, mobile apps, desktop application). Another focus of the lab is on the subsequent quality assurance and documentation of the implemented software artifact.

Registration information will be announced on the course page.

T 5.278 Course: Software Architecture and Quality [T-INFO-101381]

Responsible:	Prof. Dr. Ralf Reussner
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101201 - Software Systems
	M-INFO-101202 - Software Methods

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	24667	Software Architecture and Quality	2 SWS	Lecture / 🖥	Reussner
Exams					
ST 2021	7500021	Software Architecture and Quality			Reussner
WT 21/22	7500032	Software Architecture and Quality			Reussner

Legend: 🖥 Online, ⬙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T   5.279 Course: Software Quality Management [T-WIWI-102895]

Responsible: Prof. Dr. Andreas Oberweis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101477 - Development of Business Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Events					
ST 2021	2511208	Software Quality Management	2 SWS	Lecture / 📱	Oberweis
ST 2021	2511209	Übungen zu Software-Qualitätsmanagement	1 SWS	Practice / 📱	Oberweis, Frister
Exams					
ST 2021	7900031	Software Quality Management (Registration until 12 July 2021)			Oberweis
WT 21/22	7900027	Software Quality Management			Oberweis

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 📍 On-Site, ✗ Cancelled

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

Prerequisites
None

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

V   Software Quality Management
2511208, SS 2021, 2 SWS, Language: German, Open in study portal

Lecture (V)
Online

Content
This lecture imparts fundamentals of active software quality management (quality planning, quality testing, quality control, quality assurance) and illustrates them with concrete examples, as currently applied in industrial software development. Keywords of the lecture content are: software and software quality, process models, software process quality, ISO 9000-3, CMM(I), BOOTSTRAP, SPICE, software tests.

Learning objectives:
Students

- explain the relevant quality models,
- apply methods to evaluate the software quality and evaluate the results,
- know the mail models of sofware certification, compare and evaluate these models,
- write scientific theses in the area of software quality management and find own solutions for given problems.

Recommendations:
Programming knowledge in Java and basic knowledge of computer science are expected.

Workload:

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

Literature

- Helmut Balzert: Lehrbuch der Software-Technik. Spektrum-Verlag 2008
- Peter Liggesmeyer: Software-Qualität, Testen, Analysieren und Verifizieren von Software. Spektrum Akademischer Verlag 2002
- Mauro Pezzè, Michal Young: Software testen und analysieren. Oldenbourg Verlag 2009

Weitere Literatur wird in der Vorlesung bekanntgegeben.

T 5.280 Course: Software-Evolution [T-INFO-101256]

Responsible:	Prof. Dr. Ralf Reussner
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101201 - Software Systems
	M-INFO-101202 - Software Methods

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each winter term	1

Events					
WT 21/22	24164	Software Evolution	2 SWS	Lecture / ⚙	Heinrich
Exams					
ST 2021	7500023	Software-Evolution			Reussner

Legend: ▯ Online, ⚙ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

T	**5.281 Course: Spatial Economics [T-WIWI-103107]**

Responsible: Prof. Dr. Ingrid Ott
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101485 - Transport Infrastructure Policy and Regional Development
M-WIWI-101496 - Growth and Agglomeration

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each winter term	1

Events					
WT 21/22	2561260	Spatial Economics	2 SWS	Lecture / ✗	Ott
WT 21/22	2561261		1 SWS	Practice / ✗	Ott, Assistenten
Exams					
ST 2021	7900103	Spatial Economics			Ott
WT 21/22	7900075	Spatial Economics			Ott

Legend: 🗔 Online, ⚙ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Depending on further pandemic developments, the examination will be offered either as an open-book examination, or as a 60-minute written examination.

Prerequisites
None

Recommendation
Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses "Economics I" [2600012], and "Economics II" [2600014]. In addition, an interest in quantitative-mathematical modeling is required. The attendance of the course "Introduction to economic policy" [2560280] is recommended.

Annotation
Due to the research semester of Prof. Dr. Ingrid Ott, the course will not be offered in the winter semester 2021/22. The exam will take place. Preparation materials can be found in ILIAS.

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

| V | **Spatial Economics**
2561260, WS 21/22, 2 SWS, Language: English, Open in study portal | Lecture (V)
Cancelled |
|---|---|---|

Content

The course covers the following topics:

- Geography, trade and development
- Geography and economic theory
- Core models of economic geography and empirical evidence
- Agglomeration, home market effect, and spatial wages
- Applications and extensions

Learning objectives:

The student

- analyses how spatial distribution of economic activity is determined.
- uses quantitative methods within the context of economic models.
- has basic knowledge of formal-analytic methods.
- understands the link between economic theory and its empirical applications.
- understands to what extent concentration processes result from agglomeration and dispersion forces.
- is able to determine theory based policy recommendations.

Recommendations:

Basic knowledge of micro- and macroeconomics is assumed, as taught in the courses Economics I [2600012], and Economics II [2600014]. An interest in mathematical modeling is advantageous.

Workload:

The total workload for this course is approximately 135 hours.

- Classes: ca. 30 h
- Self-study: ca. 45 h
- Exam and exam preparation: ca. 60 h

Assessment:

The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Organizational issues

Die Vorlesung wird im WiSe 2021 aufgrund eines Forschungssemesters nicht gelesen. Die Prüfung findet statt. Vorbereitungsmaterialien finden Sie im ILIAS.

Literature

Steven Brakman, Harry Garretsen, Charles van Marrewijk (2009): The New Introduction to Geographical Economics, 2nd ed, Cambridge University Press.

Weitere Literatur wird in der Vorlesung bekanntgegeben.
(Further literature will be announced in the lecture.)

T   5.282 Course: Special Topics in Information Systems [T-WIWI-109940]

Responsible:	Prof. Dr. Christof Weinhardt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101410 - Business & Service Engineering
	M-WIWI-101506 - Service Analytics
	M-WIWI-103720 - eEnergy: Markets, Services and Systems

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	4,5	Grade to a third	Each term	2

Exams			
ST 2021	7900224	Special Topics in Information Systems	Weinhardt
WT 21/22	7900263	Special Topics in Information Systems	Weinhardt

Competence Certificate

The assessment of this course is according to §4(2), 3 SPO in form of a written documentation, a presentation of the outcome of the conducted pracitcal components and an active participation in class.

Please take into account that, beside the written documentation, also a practical component (such as a survey or an implementation of an application) is part of the course. Please examine the course description for the particular tasks.

The final mark is based on the graded and weighted attainments (such as the written documentation, presentation, practical work and an active participation in class).

Prerequisites
see below

Recommendation
None

Annotation

All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Systems course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre.

The Special Topics Information Systems is equivalent to the practical seminar, as it was only offered for the major in "Information Systems" so far. With this course students majoring in "Industrial Engineering and Management" and "Economics Engineering" also have the chance of getting practical experience and enhance their scientific capabilities.

The Special Topics Information Systems can be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

T 5.283 Course: Startup Experience [T-WIWI-111561]

Responsible: Prof. Dr. Orestis Terzidis
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101488 - Entrepreneurship (EnTechnon)
M-WIWI-101488 - Entrepreneurship (EnTechnon)

Type Examination of another type	Credits 6	Grading scale Grade to a third	Recurrence Each term	Version 1

Events					
WT 21/22	2545004	Startup Experience	4 SWS	Seminar / 🕸	González
Exams					
WT 21/22	7900186	Startup Experience			Terzidis

Legend: 📱 Online, 🕸 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
Alternative exam assessment. Details on the design of the examination performance of other types will be announced in the course.The grade is composed of a presentation and a written paper (plus any specified documentation, e.g. work results, experience diary, reflection).

Recommendation
Lecture Entrepreneurship already completed

Annotation
The language in the seminar is English. The seminar contents will be published on the chair homepage.

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

V	**Startup Experience** 2545004, WS 21/22, 4 SWS, Language: English, Open in study portal	**Seminar (S)** **Blended (On-Site/Online)**

Content

In the Startup Experience course, you develop entrepreneurial competences that enable you to develop a new venture. In an entrepreneurial project, you have three main goals:

1. Identify and develop an opportunity. Who is your target customer and what problem or task does he or she have? How attractive and how big is this market?

2. How will you provide value for them? How can you use specific resources, including technology to develop a solution?

3. How can you conceive and set up a viable organization? Which business model do you suggest to create, deliver, and capture value?

After the teams have been formed, they start with an analysis of the personal values and competences of the team members. This will create a basis for their common project.

The focus of the seminar is on technology-based venturing. In this context, we will use the TAS (Technology-Application-Selection) approach developed at the EnTechnon. By default, we start from KIT patents (but you can also 'bring with you' other new technologies). We analyze the technology and use creativity techniques to find potential applications. Among other approaches, we will systematically explore applications around the UN sustainable development goals. Prototyping, business model development, and pitching are part of the seminar.

Learning Objectives

You will be able to explore deep technology venturing opportunities and create new products and services. The pedagogical approach is that of action learning. In a team, you will experience typical challenges and processes related to setting up a new business and develop the corresponding entrepreneurial competences.

After completing this course, the course participants will be able to:

- Characterize the core process of Deep Tech Venturing,
- Describe their personal core values and competences, and the relationship to the entrepreneur-opportunity nexus,
- Use a technology characterization canvas to extract the core characteristics of a technology,
- Apply creativity techniques to ideate potential applications,
- Use utility analysis approaches to select a promising technology application,
- Develop a value proposition based on techniques like the value proposition canvas or the jobs-to-be-done method,
- Use approaches of technology impact assessment to implement responsible innovation processes,
- Apply advanced business modeling methods to develop a sound business concept,
- Develop and deliver a concise presentation ("pitch") to communicate you project.

Additional information:

Alternative exam assessment. The grade consists of the presentation and the written elaboration. Potentially, a 'project diary' of the seminar progress may be part of the deliverables (depends on tutor and will be communicated at the kick-off).

For a successful course completion, we expect you to submit a Business Plan with the following features:

- Scope: 9000 words,
- Sound and clear structure,
- Expression and spelling are correct
- Complete and correct references, quotations, etc.
- Visual elements are chosen appropriately
- Documentation and traceability of data acquisition, analysis and evaluation,
- Content is developed according to the course instructions.

Furthermore, we expect you to deliver a team Pitch.

- Duration: will be communicated (typically 7 minutes)
- Content: Introduction/Purpose; Problem; Solution; Business Model; Prototype; Competition; Management Team; Current Status and next steps,
- Layout and form: appropriate choice,
- Appearance: appropriate amount of visual elements,
- Data: well researched and organized visually
- Story Line: is sound; clear and convincing.

Organizational issues

The seminar will be conducted in Zoom and/or face-to-face (Detailed information will be available in ILIAS). In the seminar you will work on a project in teams of max. 5 persons. Team applications are welcome but not a prerequisite for participation. The seminars will be held in English.

T 5.284 Course: Statistical Modeling of Generalized Regression Models [T-WIWI-103065]

Responsible:	apl. Prof. Dr. Wolf-Dieter Heller
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101638 - Econometrics and Statistics I
	M-WIWI-101639 - Econometrics and Statistics II

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2521350	Statistical Modeling of Generalized Regression Models	2 SWS	Lecture	Heller

Competence Certificate
The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation.

Prerequisites
None

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

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

V Statistical Modeling of Generalized Regression Models
2521350, WS 21/22, 2 SWS, Open in study portal

Lecture (V)

Content
Learning objectives:

The student has profound knowledge of generalized regression models.

Requirements:

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

Workload:

Total workload for 4.5 CP: approx. 135 hours

Attendance: 30 hours

Preparation and follow-up: 65 hours

T	**5.285 Course: Stochastic Calculus and Finance [T-WIWI-103129]**

Responsible: Dr. Mher Safarian
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101639 - Econometrics and Statistics II

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2521331	Stochastic Calculus and Finance	2 SWS	Lecture	Safarian

Competence Certificate
The assessment of this course consists of a written examination (§4(2), 1 SPOs, 180 min.).

Prerequisites
None

Annotation
For more information see http://statistik.econ.kit.edu/

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

V	**Stochastic Calculus and Finance** 2521331, WS 21/22, 2 SWS, Language: English, Open in study portal	**Lecture (V)**

Content
Learning objectives:

After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis we be put on both finance and the theory behind it**.**

Content:

The course will provide rigorous yet focused training in stochastic calculus and mathematical finance. Topics to be covered:

1. Stochastic Calculus: Stochastic Processes, Brownian Motion and Martingales, Entropy, Stopping Times, Local martingales, Doob-Meyer Decomposition, Quadratic Variation, Stochastic Integration, Ito Formula, Girsanov Theorem, Jump-diffusion Processes, Stable and Levy processes.
2. Mathematical Finance: Pricing Models, The Black-Scholes Model, State prices and Equivalent Martingale Measure, Complete Markets and Redundant Security Prices, Arbitrage Pricing with Dividends, Term-Structure Models (One Factor Models, Cox-Ingersoll-Ross Model, Affine Models), Term-Structure Derivatives and Hedging, Mortgage-Backed Securities, Derivative Assets (Forward Prices, Future Contracts, American Options, Look-back Options), Incomplete Markets, Markets with Transaction Costs, Optimal Portfolio and Consumption Choice (Stochastic Control and Merton continuous time optimization problem, CAPM), Equilibrium models, Numerical Methods.

Workload:

Total workload for 4.5 CP: approx. 135 hours
Attendance: 30 hours
Preparation and follow-up: 65 hours

Organizational issues
Blockveranstaltung, Termine werden über Ilias bekannt gegeben

Literature

- Dynamic Asset Pricing Theory, Third Edition by D. Duffie, Princeton University Press, 1996
- Stochastic Calculus for Finance II: Continuous-Time Models by S. E. Shreve, Springer, 2003
- Stochastic Finance: An Introduction in Discrete Time by H. Föllmer, A. Schied, de Gruyter, 2011
- Methods of Mathematical Finance by I. Karatzas, S. E. Shreve, Springer, 1998
- Markets with Transaction Costs by Yu. Kabanov, M. Safarian, Springer, 2010
- Introduction to Stochastic Calculus Applied to Finance by D.Lamberton, B. Lapeyre, Chapman&Hall,1996

| T | **5.286 Course: Strategic Finance and Technoloy Change [T-WIWI-110511]** |

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101483 - Finance 2

Type	Credits	Grading scale	Recurrence	Version
Written examination	1,5	Grade to a third	Each summer term	1

Exams				
ST 2021	7900268	Strategic Finance and Technoloy Change		Ruckes
WT 21/22	7900219	Strategic Finance and Technoloy Change		Ruckes

Competence Certificate
The assessment consists of a written exam (60 min.) according to § 4 paragraph 2 Nr. 1 of the examination regulation. The exam is offered each semester. If there are only a small number of participants registered for the exam, we reserve the right to hold an oral examination instead of a written one.

Prerequisites
None

Recommendation
Attending the lecture "Financial Management" is strongly recommended.

T 5.287 Course: Strategic Foresight China [T-WIWI-110986]

Responsible:	Prof. Dr. Marion Weissenberger-Eibl
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	1

Competence Certificate
Alternative exam assessment.

Recommendation
Prior attendance of the course Innovation Management [2545015] is recommended.

T   5.288 Course: Strategic Management of Information Technology [T-WIWI-102669]

Responsible: Prof. Dr. Thomas Wolf
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101477 - Development of Business Information Systems

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	2

Competence Certificate

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

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

Prerequisites

None

| T | 5.289 Course: Strategy and Management Theory: Developments and "Classics" [T-WIWI-106190] |

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2021	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar / 📱	Lindstädt
WT 21/22	2577921	Strategy and Management Theory: Developments and "Classics" (Master)	2 SWS	Seminar	Lindstädt
Exams					
ST 2021	7900126	Strategy and Management Theory: Developments and "Classics"			Lindstädt

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🌐 On-Site, ✗ Cancelled

Competence Certificate
The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a conclusion meeting. Details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization" is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.

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

| V | **Strategy and Management Theory: Developments and "Classics" (Master)**
2577921, SS 2021, 2 SWS, Language: German, Open in study portal | **Seminar (S)**
Online |

Content

In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:

Students

- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a final meeting. Details on the design of the success control will be announced during the lecture.

Note:

This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
siehe Homepage

V	**Strategy and Management Theory: Developments and "Classics" (Master)** 2577921, WS 21/22, 2 SWS, Language: German, Open in study portal	**Seminar (S)**

Content

In this lecture, students discuss and evaluate models in the field of strategic management with a focus on applicability and theory based limitations. Critical examination of current research results will be a substantial part of this course.

Learning Objectives:

Students

- are able to explain and evaluate theoretical approaches and models in the field of strategic management and can illustrate them by tangible examples
- learn to express their position in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

The control of success according to § 4(2), 3 SPO takes place by writing a scientific work and a presentation of the results of the work in the context of a final meeting. Details on the design of the success control will be announced during the lecture.

Note:

This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
siehe Homepage

T 5.290 Course: Subdivision Algorithms [T-INFO-103550]

Responsible:	Prof. Dr. Hartmut Prautzsch
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101864 - Subdivision Algorithms

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Irregular	1

Exams			
ST 2021	7500143	Subdivision Algorithms	Prautzsch

| T | **5.291 Course: Supplement Enterprise Information Systems [T-WIWI-110346]** |

Responsible:	Prof. Dr. Andreas Oberweis
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101477 - Development of Business Information Systems

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each term	**Version** 1

Competence Certificate

The assessment of this course is a written or (if necessary) oral examination.

Depending on the particular course associated with this placeholder a bonus on the examination grade is possible.

Prerequisites

None

Annotation

This course can be used in particular for the acceptance of external courses whose content is in the broader area of applied informatics, but is not equivalent to another course of this topic.

T	**5.292 Course: Supply Chain Management in the Automotive Industry [T-WIWI-102828]**

Responsible:	Tilman Heupel
	Hendrik Lang
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III
	M-WIWI-101471 - Industrial Production II

Type Written examination	**Credits** 3,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2581957	Supply Chain Management in the automotive industry	2 SWS	Lecture / 🖥	Heupel, Lang
Exams					
ST 2021	7981957	Supply Chain Management in the Automotive Industry			Schultmann

Legend: 🖥 Online, ⚙ Blended (On-Site/Online), 🗣 On-Site, ✘ Cancelled

Competence Certificate

The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (examination of another type, following §4(2), 3 of the examination regulation).

Prerequisites

None

Recommendation

None

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

V	**Supply Chain Management in the automotive industry** 2581957, WS 21/22, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **Online**

Content

- Automotive industry significance
- The automotive supply chain
- Adding value structures of the automotive supply chain and mastering of the production systems as factors of success in the SCM
- Strategic procurement logistics
- Risk management
- Quality engineering and management in the automotive supply chain
- Cost engineering and management in the automotive supply chain
- Purchasing (Supplier selection, contract management)
- Performance measurement of the supply chain
- Organization

Organizational issues

Blockveranstaltung, siehe Homepage

Literature

Wird in der Veranstaltung bekannt gegeben.

T 5.293 Course: Supply Chain Management with Advanced Planning Systems [T-WIWI-102763]

Responsible:	Claus J. Bosch Dr. Mathias Göbelt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101412 - Industrial Production III M-WIWI-101471 - Industrial Production II

Type Written examination	Credits 3,5	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	2581961	Supply Chain Management with Advanced Planning Systems	2 SWS	Lecture / 📱	Göbelt, Bosch
Exams					
ST 2021	7981961	Supply Chain Management with Advanced Planning Systems			Schultmann

Legend: 📱 Online, ⚄ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
The assessment consists of an oral (30 minutes) or written exam (60 minutes) (following §4(2) of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date. Depending on the respective pandemic situation, the exam may be offered as an open book exam (alternative exam assessment, following §4(2), 3 of the examination regulation).

Prerequisites
None

Recommendation
None

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

V	**Supply Chain Management with Advanced Planning Systems** 2581961, SS 2021, 2 SWS, Language: English, Open in study portal	Lecture (V) Online

Content

This lecture deals with supply chain management from a practitioner's perspective with a special emphasis Advanced Planning Systems (APS) and the planning domain. The software solution SAP SCM, one of the most widely used Advanced Planning Systems, is used as an example to show functionality and application of an APS in practice.

First, the term supply chain management is defined and its scope is determined. Methods to analyze supply chains as well as indicators to measure supply chains are derived. Second, the structure of an APS (advanced planning system) is discussed in a generic way. Later in the lecture, the software solution SAP SCM is mapped to this generic structure. The individual planning tasks and software modules (demand planning, supply network planning / sales & operations planning, production planning / detailed scheduling, deployment, transportation planning, global available-to-promise) are presented by discussing the relevant business processes, providing academic background, describing typical planning processes and showing the user interface and user-related processes in the software solution. At the end of the lecture, implementation methodologies and project management approaches for SAP SCM are covered.

Contents

1. Introduction to Supply Chain Management

1.1.   Supply Chain Management Fundamentals

1.2.   Supply Chain Management Analytics

2. Structure of Advanced Planning Systems

3. SAP SCM

3.1.   Introduction / SCM Solution Map

3.2.   Demand Planning

3.3.   Supply Network Planning / Sales & Operations Planning

3.4.   Production Planning and Detailed Scheduling

3.5.   Deployment

3.6.   Transportation Planning / Global Available to Promise

3.7.   Cloud-based Supply Chain Planning

4. SAP SCM in Practice

4.1.   Project Management and Implementation

4.2.   SAP Implementation Methodology

Literature

will be announced in the course

T 5.294 Course: Symmetric Encryption [T-INFO-101390]

Responsible:	Prof. Dr. Jörn Müller-Quade
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101198 - Advanced Topics in Cryptography

Type	Credits	Grading scale	Recurrence	Version
Oral examination	3	Grade to a third	Each summer term	1

Events					
ST 2021	24629	Symmetric encryption	2 SWS	Lecture / 🖥	Müller-Quade, Geiselmann
Exams					
ST 2021	7500070	Symmetric Encryption			Geiselmann, Müller-Quade

Legend: 🖥 Online, ⚃ Blended (On-Site/Online), 🎤 On-Site, ✘ Cancelled

Competence Certificate
Es wird empfohlen, das Modul Sicherheit zu belegen.

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

V	**Symmetric encryption** 24629, SS 2021, 2 SWS, Language: German, Open in study portal	**Lecture (V)** **Online**

| T | **5.295 Course: Tax Law [T-INFO-111437]** |

Responsible:	Detlef Dietrich
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101216 - Private Business Law

| **Type**
Written examination | **Credits**
3 | **Grading scale**
Grade to a third | **Recurrence**
Each summer term | **Version**
1 |

T   5.296 Course: Technologies for Innovation Management [T-WIWI-102854]

Responsible:	Dr. Daniel Jeffrey Koch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Each winter term	2

Events					
WT 21/22	2545106	Technologies for Innovation Management	2 SWS	Block / ▤	Koch

Legend: ▤ Online, ♻ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

Competence Certificate
Presentation and individual paper (ca. 15 pages) as alternative exam assessment.

Prerequisites
None

Recommendation
Prior attendance of the course Innovationsmanagement: Konzepte, Strategien und Methoden is recommended.

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

V   Technologies for Innovation Management
2545106, WS 21/22, 2 SWS, Language: German, Open in study portal

Block (B)
Online

Content
The seminar "Technologies for Innovation Management" will focus on the early phase or fuzzy front end in innovation management. Technologies can be of great importance here, above all in the supply of information. In globally distributed R & D organizations, it is necessary to collect as much information as possible on new technological developments in the early phase of the innovation process. Information and communication technologies can be supported.

Literature
Werden in der ersten Veranstaltung bekannt gegeben.

T 5.297 Course: Technology Assessment [T-WIWI-102858]

Responsible:	Dr. Daniel Jeffrey Koch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	see Annotations	1

Competence Certificate
Alternative exam assessment.

Prerequisites
None

Recommendation
Prior attendance of the course Innovation Management
is recommended.

Annotation
See German version.

| **T** | **5.298 Course: Telecommunication and Internet Economics [T-WIWI-102713]** |

Responsible:	Prof. Dr. Kay Mitusch
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101406 - Network Economics
	M-WIWI-101409 - Electronic Markets

Type Written examination	**Credits** 4,5	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	2561232	Telecommunication and Internet Economics	2 SWS	Lecture	Mitusch
WT 21/22	2561233	Übung zu Telekommunikations- und Internetökonomie	1 SWS	Practice	Mitusch, Wisotzky, Corbo
Exams					
ST 2021	7900276	Telecommunication and Internet Economics			Mitusch

Competence Certificate
Result of success is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

Prerequisites
None

Recommendation
Basic knowledge and skills of microeconomics from undergraduate studies (bachelor's degree) are expected.

Particularly helpful but not necessary: Industrial Economics. Prior attendance of the lecture „Competition in Networks" [26240] or "Industrial Organisation" is helpful in any case but not considered a formal precondition. The english taught course "Communications Economics" is complementary and recommendet for anyone interested in the sector.

Annotation
Due to the research semester of Prof. Mitusch the course for partial performance will not be offered in the winter semester 2020/2021. An examination will be offered in each semester.

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

| **V** | **Telecommunication and Internet Economics**
2561232, WS 21/22, 2 SWS, Language: German, Open in study portal | **Lecture (V)** |

Literature
J.-J. Laffont, J. Tirole (2000): Competition in Telecommunications, MIT Press.

Zarnekow, Wulf, Bronstaedt (2013): Internetwirtschaft: Das Geschäft des Datentransports im Internet.

Weitere Literatur wird in den einzelnen Veranstaltungen angegeben

T   5.299 Course: Telecommunications Law [T-INFO-101309]

Responsible: Dr. Yoan Hermstrüwer
Organisation: KIT Department of Informatics
Part of: M-INFO-101217 - Public Business Law

Type Written examination	Credits 3	Grading scale Grade to a third	Recurrence Each summer term	Version 1

Events					
ST 2021	24632	Telekommunikationsrecht	2 SWS	Lecture / 📱	Hermstrüwer
Exams					
ST 2021	7500085	Telecommunications Law			Eichenhofer

Legend: 📱 Online, ✿ Blended (On-Site/Online), ◉ On-Site, ✗ Cancelled

T	**5.300 Course: Telematics [T-INFO-101338]**

Responsible: Prof. Dr. Martina Zitterbart
Organisation: KIT Department of Informatics
Part of: M-INFO-100801 - Telematics
M-INFO-101205 - Future Networking
M-INFO-101206 - Networking

Type Written examination	**Credits** 6	**Grading scale** Grade to a third	**Recurrence** Each winter term	**Version** 1

Events					
WT 21/22	24128	Telematics	3 SWS	Lecture	Heseding, König, Kopmann, Zitterbart
Exams					
ST 2021	7500115	Telematics			Zitterbart
WT 21/22	7500166	Telematics			Zitterbart

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

V	**Telematics** 24128, WS 21/22, 3 SWS, Language: German, Open in study portal	**Lecture (V)**

Content

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

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

Learning Objectives

After attending this lecture, the students will

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

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

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

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

Students know the architecture of ISDN and can reproduce the peculiarities of setting up the ISDN subscriber line. Students are familiar with the technical features of DSL.

Literature

S. Keshav. An Engineering Approach to Computer Networking. Addison-Wesley, 1997 J.F. Kurose, K.W. Ross. Computer Networking: A Top-Down Approach Featuring the Internet. 4rd Edition, Addison-Wesley, 2007 W. Stallings. Data and Computer Communications. 8th Edition, Prentice Hall, 2006 Weiterführende Literatur •D. Bertsekas, R. Gallager. Data Networks. 2nd Edition, Prentice-Hall, 1991 •F. Halsall. Data Communications, Computer Networks and Open Systems. 4th Edition, Addison-Wesley Publishing Company, 1996 •W. Haaß. Handbuch der Kommunikationsnetze. Springer, 1997 •A.S. Tanenbaum. Computer-Networks. 4th Edition, Prentice-Hall, 2004 •Internet-Standards •Artikel in Fachzeitschriften

T 5.301 Course: The negotiation of open innovation [T-WIWI-110867]

Responsible:	Dr. Daniela Beyer
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101507 - Innovation Management
	M-WIWI-101507 - Innovation Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Once	1

Competence Certificate

Non exam assessment.

The following aspects are included in the evaluation:

- Exposé of the seminar paper (15%)
- Preparation of the methodology (15%) (interview guide, quantitative survey, etc.)
- informed participation and preparation of the simulation game (20%)
- written elaboration (50%).

Prerequisites

None

Recommendation

Prior attendance of the course Innovation Management [2545015] is recommended.

T | 5.302 Course: Topics in Experimental Economics [T-WIWI-102863]

Responsible: Prof. Dr. Johannes Philipp Reiß
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101505 - Experimental Economics

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Irregular	1

Competence Certificate
The assessment consists of a written exam (following §4(2), 1 of the examination regulation).

Prerequisites
None

Recommendation
Basic knowledge of Experimental Economics is assumed. Therefore, it is strongly recommended to attend the course Experimental Economics beforehand.

Annotation
The course is offered in summer 2020 for the next time, not in summer 2018.

T 5.303 Course: Trademark and Unfair Competition Law [T-INFO-101313]

Responsible:	Dr. Yvonne Matz
Organisation:	KIT Department of Informatics
Part of:	M-INFO-101215 - Intellectual Property Law

Type Written examination	**Credits** 3	**Grading scale** Grade to a third	**Recurrence** Each term	**Version** 1

Events					
WT 21/22	24136	Trademark and Unfair Competition Law	2 SWS	Lecture / 🖥	Matz
Exams					
ST 2021	7500051	Trademark and Unfair Competition Law			Dreier, Matz

Legend: 🖥 Online, ⬡ Blended (On-Site/Online), ● On-Site, ✕ Cancelled

T   5.304 Course: Transport Economics [T-WIWI-100007]

Responsible:	Prof. Dr. Kay Mitusch
	Dr. Eckhard Szimba
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-101406 - Network Economics
	M-WIWI-101468 - Environmental Economics
	M-WIWI-101485 - Transport Infrastructure Policy and Regional Development

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Each summer term	1

Events					
ST 2021	2560230	Transport Economics		Lecture / 📱	Mitusch, Szimba
ST 2021	2560231	Übung zu Transportökonomie	1 SWS	Practice / 📱	Mitusch, Szimba, Wisotzky
Exams					
ST 2021	7900275	Transport Economics			Mitusch

Legend: 📱 Online, ⚙ Blended (On-Site/Online), 🎤 On-Site, ✕ Cancelled

Competence Certificate
The assessment is made by a 60 minutes written examination during the semester break (according to §4(2), 1 ERSC).
Examination is offered every semester and can be retried at any regular examination date.

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

V   Transport Economics
2560230, SS 2021, SWS, Language: German, Open in study portal   **Lecture (V)** **Online**

Content
The course shall provide an overview of transport economics. It will be demonstrated, using new microeconomic models, which impacts regulation and pricing in transport have on the economic actions of individuals and logisticans and which benefits and costs apply. The following topics will be discussed:

- demand and supply in transport
- empirical analysis of transport demand
- assessment of transport infrastructure projects
- external effects in transport
- transport policy
- cost structures of transport infrastructure
- Project evaluation from the perspective of the public sector

Literature
Literatur:

Aberle, G: Transportwirtschaft: einzelwirtschaftliche und gesamtwirtschaftliche Grundlagen München; Wien: Oldenbourg, 2003.

Blauwens, G., De Baere, P. and Van der Voorde, E. (2006): Transport Economics.

Frerich, J; Müller, G: Europäische Verkehrspolitik, Landverkehrspolitik München; Wien: Oldenbourg, 2004.

Dasgupta, A, Pearce, D (1972): Cost-Benefit Analysis, MacMillan, London.

Europäische Kommission (2008): Guide to Cost Benefit Analysis of Investment Projects, online unter http://ec.europa.eu/regional_policy/sources/Ben-Akiva, M., Meersman, H., and Van de Voorde, E. (2008): Recent developments in transport modelling: Lessons for the freight sector.

Ortúzar, J. d. D. and Willumsen, L. (1990): Modelling Transport.

T 5.305 Course: Ubiquitous Computing [T-INFO-101326]

Responsible: Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-100789 - Ubiquitous Computing
M-INFO-101203 - Wireless Networking
M-INFO-101210 - Dynamic IT-Infrastructures
M-WIWI-101458 - Ubiquitous Computing

Type	Credits	Grading scale	Recurrence	Version
Oral examination	5	Grade to a third	Each winter term	1

Events					
WT 21/22	24146	Ubiquitäre Informationstechnologien	2+1 SWS	Lecture / Practice (	Beigl
Exams					
ST 2021	7500122_0621	Ubiquitous Computing			Beigl
ST 2021	7500122_0819	Ubiquitous Computing			Beigl
ST 2021	7500122_0930	Ubiquitous Computing			Beigl
WT 21/22	7500187	Ubiquitous Computing			Beigl

T 5.306 Course: Valuation [T-WIWI-102621]

Responsible: Prof. Dr. Martin Ruckes
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101480 - Finance 3
M-WIWI-101482 - Finance 1
M-WIWI-101483 - Finance 2
M-WIWI-101510 - Cross-Functional Management Accounting

Type Written examination	Credits 4,5	Grading scale Grade to a third	Recurrence Each winter term	Version 1

Events					
WT 21/22	2530212	Valuation	2 SWS	Lecture	Ruckes
WT 21/22	2530213	Übungen zu Valuation	1 SWS	Practice	Ruckes, Luedecke
Exams					
ST 2021	7900072	Valuation			Ruckes
WT 21/22	7900057	Valuation			Ruckes

Competence Certificate
See German version.

Prerequisites
None

Recommendation
None

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

V Valuation
2530212, WS 21/22, 2 SWS, Language: English, Open in study portal

Lecture (V)

Literature
Weiterführende Literatur

Titman/Martin (2013): *Valuation - The Art and Science of Corporate Investment Decisions,* 2nd. ed. Pearson International.

T 5.307 Course: Wearable Robotic Technologies [T-INFO-106557]

Responsible: Prof. Dr.-Ing. Tamim Asfour
Prof. Dr.-Ing. Michael Beigl
Organisation: KIT Department of Informatics
Part of: M-INFO-103294 - Wearable Robotic Technologies

Type	Credits	Grading scale	Recurrence	Version
Written examination	4	Grade to a third	Each summer term	3

Events					
ST 2021	2400062	Wearable Robotic Technologies	2 SWS	Lecture / 📱	Asfour, Beigl
Exams					
ST 2021	7500219	Wearable Robotic Technologies			Asfour
WT 21/22	7500073	Wearable Robotic Technologies			Asfour

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🔵 On-Site, ✗ Cancelled

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

V Wearable Robotic Technologies
2400062, SS 2021, 2 SWS, Language: German/English, Open in study portal

Lecture (V)
Online

Content

The lecture starts with an overview of wearable robot technologies (exoskeletons, prostheses and ortheses) and its potentials, followed by the basics of wearable robotics. In addition to different approaches to the design of wearable robots and their related actuator and sensor technology, the lecture focuses on modeling the neuromusculoskeletal system of the human body and the physical and cognitive human-robot interaction for tightly coupled hybrid human-robot systems. Examples of current research and various applications of lower, upper and full body exoskeletons as well as prostheses are presented.

Learning Objectives:

The students have received fundamental knowledge about wearable robotic technologies and understand the requirements for the design, the interface to the human body and the control of wearable robots. They are able to describe methods for modelling the human neuromusculoskeletal system, the mechatronic design, fabrication and composition of interfaces to the human body. The students understand the symbiotic human–machine interaction as a core topic of Anthropomatics and have knowledge of state of the art examples of exoskeletons, ortheses and protheses.

Organizational issues

Die Erfolgskontrolle erfolgt in Form einer schriftlichen Prüfung im Umfang von i.d.R. 60 Minuten nach § 4 Abs. 2 Nr. 1 SPO.

Modul für Master Maschinenbau, Mechatronik und Informationstechnik, Elektrotechnik und Informationstechnik, Sportwissenschaften

Voraussetzungen: Der Besuch der Vorlesung *Mechano-Informatik in der Robotik* wird vorausgesetzt

Arbeitsaufwand: 120h

Literature

Vorlesungsfolien und ausgewählte aktuelle Literaturangaben werden in der Vorlesung bekannt gegeben und als pdf unter http://www.humanoids.kit.edu verfügbar gemacht.

T   5.308 Course: Web App Programming for Finance [T-WIWI-110933]

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

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	Once	1

Competence Certificate

Non exam assessment according to § 4 paragraph 3 of the examination regulation. (Anmerkung: gilt nur für SPO 2015). The grade is made up as follows: 50% result of the project (R-code), 50% presentation of the project.

Prerequisites

None

Recommendation

The content of the bachelor course Investments is assumed to be known and necessary to follow the course.

T 5.309 Course: Web Applications and Service-Oriented Architectures (II) [T-INFO-101271]

Responsible: Prof. Dr. Sebastian Abeck
Organisation: KIT Department of Informatics
Part of: M-INFO-104061 - Microservice-Based Web Applications

Type	Credits	Grading scale	Recurrence	Version
Oral examination	4	Grade to a third	Each summer term	1

Events					
ST 2021	24677	Web Applications and Service oriented Architectures (II)	2 SWS	Lecture / 📱	Abeck, Schneider, Sänger
Exams					
ST 2021	7500138	Web Applications and Service-oriented Architectures (II)			Abeck

Legend: 📱 Online, ⬟ Blended (On-Site/Online), ● On-Site, ✗ Cancelled

T 5.310 Course: Web Science [T-WIWI-103112]

Responsible: Michael Färber
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-101455 - Web Data Management
M-WIWI-105368 - Web and Data Science

Type	Credits	Grading scale	Recurrence	Version
Written examination	4,5	Grade to a third	see Annotations	2

Exams			
ST 2021	7900032	Web Science (Registration until 12 July 2021)	Färber
WT 21/22	7900031	Web Science	Sure-Vetter

Competence Certificate

The exam will be offered for the last time for first-time takers in the summer semester 2021. The last opportunity to take the exam (for repeaters only) is in the winter semester 2021/22.

The assessment of this course is a written examination (60 min) according to §4(2), 1 of the examination regulation or an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.

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

Prerequisites

None

Annotation

The lecture is no longer offered.

T	**5.311 Course: Workshop Business Wargaming – Analyzing Strategic Interactions [T-WIWI-106189]**

Responsible: Prof. Dr. Hagen Lindstädt
Organisation: KIT Department of Economics and Management
Part of: M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Events					
ST 2021	2577922	Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)	2 SWS	Seminar / 📱	Lindstädt
Exams					
ST 2021	7900071	Workshop Business Wargaming – Analyzing Strategic Interactions			Lindstädt

Legend: 📱 Online, 🔀 Blended (On-Site/Online), 🎤 On-Site, ✗ Cancelled

Competence Certificate
In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the performance review will be announced during the lecture.

Prerequisites
None

Recommendation
Basic knowledge as conveyed in the bachelor module „Strategy and Organization" is recommended.

Annotation
This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the summer term 2018.

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

| V | **Workshop Business Wargaming - Analyse strategischer Interaktionen (Master)**
2577922, SS 2021, 2 SWS, Language: German, Open in study portal | **Seminar (S) Online** |
|---|---|---|

Content

In this lecture, current economic trends will be discussed from a perspective of competition analysis and corporate strategies. Using appropriate frameworks, the students will be able to analyze collectively selected case studies and derive business strategies.

Learning Objectives:

Students

- are able to analyze business strategies and derive recommendations for the management
- learn to express their position through compelling reasoning in structured discussions

Recommendations:

Basic knowledge as conveyed in the bachelor module "Strategy and Organization" is recommended.

Workload:

The total workload for this course is approximately 90 hours.

Lecture: 15 hours

Preparation of lecture: 75 hours

Exam preparation: n/a

Assessment:

In this course, real conflict situations are simulated and analyzed using various methods from business wargaming. Details on the design of the success control will be announced during the lecture.

Note:

This course is admission restricted. If you werealready admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed. Further information on the application process can be found on the IBU website.

The examinations are offered at least every second semester, so that the entire module can be completed in two semesters.

Organizational issues
4 Blöcke mittwochs nachmittags

siehe Institutshomepage

T 5.312 Course: Workshop Current Topics in Strategy and Management [T-WIWI-106188]

Responsible:	Prof. Dr. Hagen Lindstädt
Organisation:	KIT Department of Economics and Management
Part of:	M-WIWI-103119 - Advanced Topics in Strategy and Management

Type	Credits	Grading scale	Recurrence	Version
Examination of another type	3	Grade to a third	Irregular	1

Competence Certificate

The evaluation of the performance takes place through the active participation in the discussion rounds; an appropriate preparation is expressed here and a clear understanding of the topic and framework becomes recognizable. Further details on the design of the performance review will be announced during the lecture.

Prerequisites

None

Recommendation

Basic knowledge as conveyed in the bachelor module „Strategy and Organization" is recommended.

Annotation

This course is admission restricted. If you were already admitted to another course in the module "Advanced Topics in Strategy and Management" the participation at this course will be guaranteed.

The course is planned to be held for the first time in the winter term 2017/18.