Karlsruher Institut für Technologie

Module Handbook Information Engineering and Management (M.Sc.)

Summer Term 2012
Long version SPO 2009
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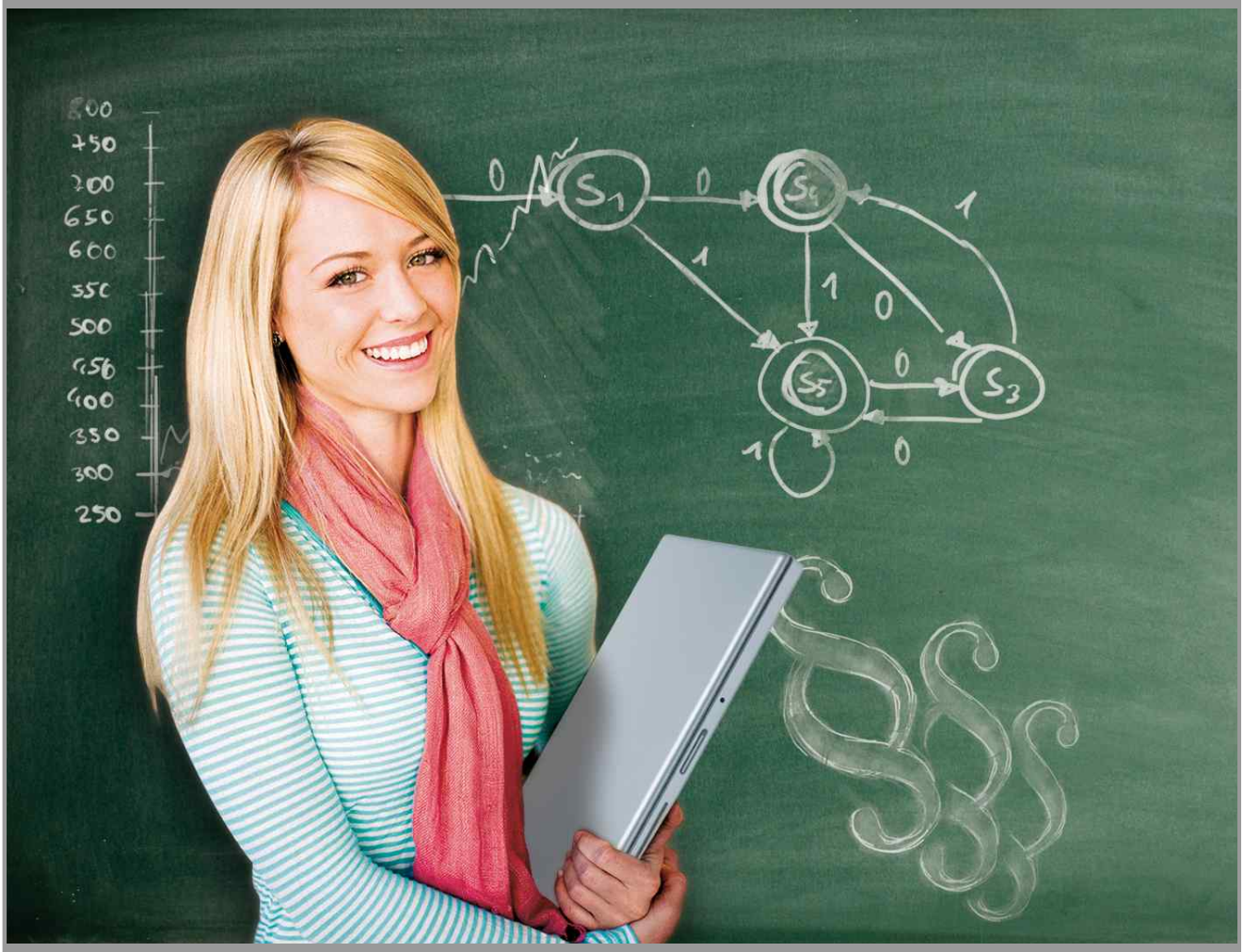
Faculty of Economics and Business Engineering
Fakultät für Informatik



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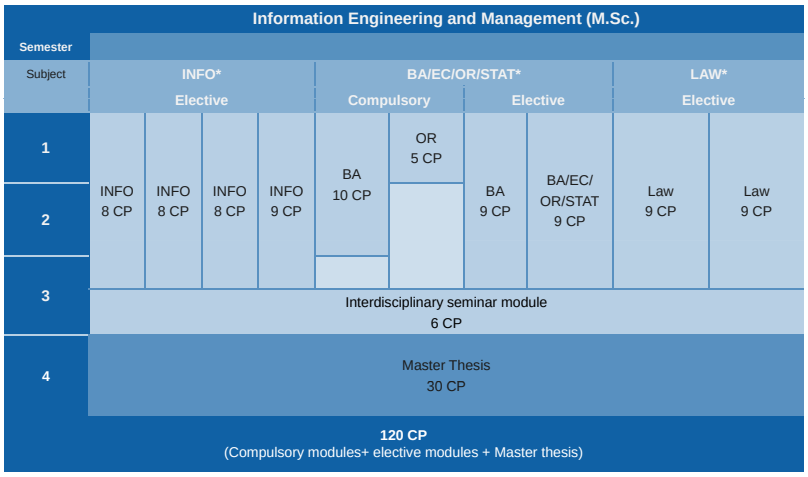
1 Structure of the Master Programme in Information Engineering and Management

The Master programme in *Information Engineering and Management* has 4 terms. The terms 1 to 3 of the programme 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 programme.
- The interdisciplinary seminar should be taken in the third term of the programme.
- 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 programme.
- 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 1 shows a summary of this recommendation with the structure of the disciplines and with credit points allocated to the modules of the programme.



*: The amount of credit points for the modules shown in the figure are only examples. In the elective field of „Informatics" 33 CP have to be gained in total. The elective field of „BA/EC/OR/STAT" has to be covered with 18 CP in total; whereby 9 CP have to be gained within a module of BA.

Figure 1: Structure of the Master Programme in Information Engineering and Management (Recommendation)

2 Module Handbook - a helpful guide throughout the studies

The programme exists of several **subjects** (e.g. business administration, economics, operations research). Every subject is split into **modules** and every module itself exists of one or more interrelated **courses**. 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 programme, 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 programme according to personal needs, interest and job perspective. The **module handbook** describes the modules belonging to the programme. It describes:

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

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

Begin and completion of a module

Every module and every course is allowed to be credited only once. The decision whether the course is assigned to one module or the other (e.g. if a course is selectable in two or more modules) is made by the student at the time of signing in for the corresponding exam. The module is **succeeded**, if the general exam of the module and/or if all of its relevant partial exams have been passed (grade min 4.0). In order to that the minimum requirement of credits of this module have been met.

General exams and partial exams

The module exam can be taken in a general exam or several partial exams. If the module exam is offered as a **general exam**, the entire content of the module will be reviewed in a single exam. If the module exam exists of **partial exams**, the content of each course will be reviewed in corresponding partial exams. The registration for the examinations takes place online via the self-service function for students. The following functions can be accessed on https://studium.kit.edu/meinsemester/Seiten/pruefungsanmeldung.aspx:

- Sign in and sign off exams
- Retrieve examination results
- Print transcript of records

For further and more detailed information also see https://zvwgate.zvw.uni-karlsruhe.de/download/leitfaden_studierende.pdf

Repeating exams

Principally, a failed exam 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. Requests for a second repetition of an exam require the approval of the examination committee. A request for a second repetition has to be made without delay after loosing the examination claim. A counseling interview is mandatory. For further information see http://www.wiwi.kit.edu/serviceHinweise.php.

Bonus accomplishments and additional accomplishments

Bonus accomplishments can be achieved on the basis of entire modules or within modules, if there are alternatives at choice. Bonus accomplishments can improve the module grade and overall grade by taking into account only the best possible combination of all courses when calculating the grades. The student has to declare a Bonus accomplishment as such at the time of registration for the exams. Exams, which have been registered as Bonus accomplishments, are subject to examination regulations. Therefore, a failed exam has to be repeated. Failing the repeat examination implies the loss of the examination claim.
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. Up to 2 modules with a minimum of 9 CP may appear additionally in the certificate. After the approval of the examination committee, it is also possible to include modules in the certificate, which are not defined in the module handbook. Single additional courses will be recorded in the transcript of records. Courses and modules, which have been declared as bonus accomplishments, can be changed to additional accomplishments.

Further information

More detailed information about the legal and general conditions of the programme can be found in the examination regulation of the programme (in the appendix).

Used abbreviations

LP/CP	Credit Points/ECTS	Leistungspunkte/ECTS
LV	course	Lehrveranstaltung
RÜ	computing lab	Rechnerübung
S	summer term	Sommersemester
Sem.	semester/term	Semester
ER/SPO	examination regulations	Studien- und Prüfungsordnung
KS/SQ	key skills	Schlüsselqualifikationen
SWS	contact hour	Semesterwochenstunde
Ü	excercise course	Übung
V	lecture	Vorlesung
W	winter term	Wintersemester

3 Actual Changes

Important changes are pointed out in this section in order to provide a better orientation. Although this process was done with great care, other/minor changes may exist. Please also check our updates on http://www.wiwi.kit.edu/lehreMHB.php#mhb_aktuell

IW4BWLISM1 - Advanced CRM (S. 22)

Anmerkungen

The course *Service Analytics* [2595501] has been added to the module.
The course Social Network Analysis in CRM [2540518] is currently not offered.

IW4INSE - Security Engineering (S. 55)

Anmerkungen

The module is not offered any longer.

IW4INWAWT - Web Applications and Web Technologies (S. 62)

Anmerkungen

The course is lectured for the last time in the summer term 2011. Examination is possible until winter term 2012/13

IW4INDITI - Dynamic IT-Infrastructures (S. 78)

Anmerkungen

The course *Networked IT-Infrastructures* is not offered any longer.

IW4INBSV - Biosignal Processing (S. 79)

Anmerkungen

The course *Analysis and modeling of human motion sequences* is not offered any longer, examination is possible until winter term 2012/13.

IW4INPV - Parallel Processing (S. 88)

Bedingungen

The lecture *Multicore Programming in Practice* can not be taken in the study course Information Engineering and Management.

Anmerkungen

The lecture *Multikernpraktikum* is no longer offered.

24819 - Algorithm Design Seminar (S. 316)

Anmerkungen

This lecture is offered irregularly.

2540518 - Social Network Analysis in CRM (S. 365)

Anmerkungen

The course is currently not offered.

24109 - Distributed Data Management (S. 402)

Anmerkungen

The lecture is not offered in the winter term 2010/11.

VGE - Computer Contract Law (S. 406)

Anmerkungen

The course is lectured in the winterterm 2011/12.
Until winter term 2010/11 the course was entitled "Vertragsgestaltung im EDV-Bereich".

VITI - Networked IT-Infrastructures (S. 401)

Anmerkungen

The course was lectured ultimately in the winer term 2010/11. Examination is possible until summer term 2012.

24604/24153 - Advanced Web Applications (S. 106)

Anmerkungen

The course is not offered any longer, examination is possible until winter term 2012/13.

WTprak - Practical Course Web Technologies (S. 289)

Anmerkungen

The course is not offered any longer, examination is possible until winter term 2012/13.

praktvd - Practical Course Distributed Data Management (S. 286)

Anmerkungen

The course is not offered.

ammb - Analysis and modeling of human motion sequences (S. 115)

Anmerkungen

The course is not offered any longer, examination is possible until winter term 2012/13.

GPR - Basic Principles of Patent Law (S. 195)

Anmerkungen

This course was previously announced as *Aktuelle Fragen des Patentrechts.*

24142 - Security Engineering (S. 313)

Anmerkungen

The course is not offered any longer.

24637 - Automatic Test Generation (S. 126)

Anmerkungen

Is not offered at the moment.
This lecture was previously called “Automatic Program Checking”.

4 Mandatory Modules

4.1 All Subjects

Module: Information Engineering and Management [IW4WWIW]

Coordination: C. Weinhardt, A. Geyer-Schulz
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration (obligatory)

ECTS Credits	Cycle	Duration
10	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540450	Principles of Information Engineering and Management (p. 196)	2/1	W	5	C. Weinhardt
2540500	Business Administration in Information Engineering and Management (p. 134)	2/1	S	5	A. Geyer-Schulz

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes
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 *Principles of Information Engineering and Management* [2540450] and *Business Administration in Information Engineering and Management* [2540500].
In the lecture *Principles of Information Engineering and Management*, 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.

Module: Stochastic Models in Information Engineering and Management [IW4WWOR]

Coordination: K. Waldmann
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Operations Research (obligatory)

ECTS Credits	Cycle	Duration
5	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550679	Markov Decision Models I (p. 382)	2/1/2	W	5	K. Waldmann

Learning Control / Examinations
The assessment of the module is in a written examination according to §4(2), 1 of the examination regulation. In each term (usually in March and July), one examination is held for both courses. The grade of the module corresponds to the grade of this examination.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques of stochastic modelling. Students are able to properly describe and analyze basic stochastic systems.

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.

Module: Interdisciplinary Seminar Module [IW4IWSEM]

Coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften), Studiendekan/in (Fak. f. Informatik)
Degree programme: Informationswirtschaft (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
6	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540530	Interdisciplinary Seminar in Information Engineering and Management (p. 206)	2	W/S	6	A. Geyer-Schulz, T. Dreier
2540510	Master Seminar in Information Engineering and Management (p. 235)	2	W	3	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management (p. 330)	2	W/S	3	C. Weinhardt
SemIIP2	Seminar in Industrial Production (p. 329)	2	W/S	3	F. Schultmann, M. Fröhling, T. Comes
SemEW	Seminar Energy Economics (p. 325)	2	W/S	3	W. Fichtner, P. Jochem, A. Eßer-Frey, M. Genoese
2572197	Seminar in strategic and behavioral marketing (p. 339)	2	W	3	B. Neibecker
2577915	Seminar: Management and Organization (p. 349)	2	W/S	3	H. Lindstädt
SemTuE1	(p. 327)				
2577916	Seminar Management accounting for industrial engineers (p. 323)	2	W/S	3	M. Wouters
2530293	Seminar in Finance (p. 328)	2	W/S	3	M. Uhrig-Homburg, M. Ruckes
2595477	Practical Seminar Service Innovation (p. 350)	3		5	G. Satzger, A. Neus, M. Kohler, H. Fromm
SemFBV1	Seminar in Insurance Management (p. 337)	2	W/S	3	U. Werner
SemFBV2	Seminar in Operational Risk Management (p. 338)	2	W/S	3	U. Werner
SemWIOR1	Seminar Stochastic Models (p. 335)	2	W/S	3	K. Waldmann
SemWIOR2	Seminar Economic Theory (p. 414)	2	W/S	3	C. Puppe
SemWIOR3	Seminar in Experimental Economics (p. 341)	2	W/S	3	C. Puppe
2550131	Seminar in Continous Optimization (p. 342)	2	W/S	3	O. Stein
2550491	Seminar in Discrete Optimization (p. 340)	2	W/S	3	S. Nickel
SemSTAT	(p. 334)	2		3	N.N.
SemAIFB1	Seminar in Enterprise Information Systems (p. 322)	2	W/S	3	R. Studer, A. Oberweis, T. Wolf, R. Kneuper
SemAIFB2	Seminar Efficient Algorithms (p. 324)	2	W/S	3	H. Schmeck
SemAIFB3	Seminar Complexity Management (p. 331)	2	W/S	3	D. Seese
SemAIFB4	Seminar Knowledge Management (p. 336)	2	W	3	R. Studer
SemAIFB5	Seminar eOrganization (p. 326)	2	S	3	S. Tai
2590470	Seminar Service Science, Management & Engineering (p. 333)	2	W/S	4	C. Weinhardt, R. Studer, S. Nickel, H. Fromm
rechtsem	Seminar in Law (p. 320)	2	W/S	3	T. Dreier, P. Sester, I. Spiecker genannt Döhmann
RIO	(p. 308)	2	S	3	I. Spiecker genannt Döhmann

Learning Control / Examinations
The assessment in this module is regulated by § 4 (2) 3, of the examination regulation for the Master Information Engineering and Management. Further details will be defined for each seminar separately.

Conditions
Students should have experience with literature search in informatics, economics, business administration, and law. They should know the methods of scientific work, presentation techniques for scientific presentations, as well as the form requirements of scientific publications (guide line for authors) and review processes for scientific publications.
The interdisciplinary seminar should be taken as last course of the compulsory program in the 3rd term of the Master programme.
See German version.

Learning Outcomes

- In the interdisciplinary seminar Information Engineering and Management students investigate a recent topic in Information Engineering and Management with the scientific methods of the disciplines of the the degree programme.
- They develop interdisciplinary solution approaches on the base of the state-of-the art in the disciplines.
- They present selected solution approaches and methods on an expert level and they defend and rationalize the selected solution approaches and methods in a discussion with scientific arguments.
- They write a seminar paper whose form is appropriate for a scientific journal.
- They revise their paper taking into account the reviews of their tutors in an appropriate manner.

Content
The Students will be coached by a group of tutors which consists in each case of an tutor of informatics, economics and law.

Module: Master Thesis [IW4IWMATHESIS]

Coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften), Vorsitzender des Prüfungsausschusses
Degree programme: Informationswirtschaft (M.Sc.)
Subject:

ECTS Credits	Cycle	Duration
30		

Learning Control / Examinations
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.

Conditions
Regulated in §11 of the examination regulation.
The requirements for the examiner are described in §14 (2) of the examination regulation.

Learning Outcomes
The student

- investigates a topic in Information Engineering and Management autonomously in a scientific manner at the state-of-the-art of the research in the field.
- shows a comprehensive understanding of the methods and approaches relevant for the investigation of the topic chosen.
- selects appropriate scientific methods and he uses them in a correct way. If necessary, he modifies methods in a suitable way or he develops them.
- compares his results with competing approaches critically and he evaluates his results.
- communicates his results clearly and in a scientific form in his master thesis.

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 (Faculty of Informatics, Faculty of Economics and Business Engineering) 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 (Faculty of Informatics, Faculty of Economics and Business Engineering). 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.

5 Elective Modules

5.1 Business Administration

Module: Advanced CRM [IW4BWLISM1]

Coordination: A. Geyer-Schulz
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540508	Customer Relationship Management (p. 144)	2/1	W	4,5	A. Geyer-Schulz
2540506	Personalization and Recommender Systems (p. 273)	2/1	S	4,5	A. Geyer-Schulz
2540518	Social Network Analysis in CRM (p. 365)	2/1	S	4,5	A. Geyer-Schulz
2540531	Business Dynamics (p. 133)	2/1	W	4,5	A. Geyer-Schulz, P. Glenn
2595501	Service Analytics (p. 351)	2/1	S	4,5	T. Setzer, H. Fromm

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

Conditions
None.

Learning Outcomes
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.

Content
Besides the foundations of modern customer oriented and service oriented management, developments of CRM systems are lectured together with tools for analysis and optimization of such systems.
An overview of general aspects and concepts of personalization and their importance for service provider and customers is given. Then, different categories of recommendation systems are presented: Ranging from explizit recommendation services like reviews to implicit services like the calcuation of recommendations based on the historic data about products and/or customers.
There exist a trend towards viewing economic systems and social systems as networks. This approach allows for the application of different methods from mathematics, economic sciences, sociology and physics. In CRM, net work analyses may provide benefits calculating customer network values.
CRM processes and marketing campaigns are just two examples of dynamic systems that are characterized by feedback loops between different process steps. By means of the tools of business dynamics such processes can be modelled. Simulations of complex systems allow the analysis and optimization of business processes, marketing campaigns, and organizations.

Remarks
The course *Service Analytics* [2595501] has been added to the module.

The course Social Network Analysis in CRM [2540518] is currently not offered.

Module: Electronic Markets [IW4BWLISM2]

Coordination: A. Geyer-Schulz
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540502	Electronic Markets (Principles) (p. 167)	2/1	W	4,5	A. Geyer-Schulz
2540460	Market Engineering: Information in Institutions (p. 233)	2/1	S	4,5	C. Weinhardt, M. Adam
2561232	Telecommunication and Internet Economics (p. 391)	2/1	W	4,5	K. Mitusch
2540531	Business Dynamics (p. 133)	2/1	W	4,5	A. Geyer-Schulz, P. Glenn

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

Conditions
None.

Learning Outcomes
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.

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

Module: Market Engineering [IW4BWLISM3]

Coordination: C. Weinhardt
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540460	Market Engineering: Information in Institutions (p. 233)	2/1	S	4,5	C. Weinhardt, M. Adam
2590408	Auction Theory (p. 124)	2/1	W	5	K. Ehrhart
2540454	eFinance: Information Engineering and Management for Securities Trading (p. 165)	2/1	W	4,5	R. Riordan
2590458	Computational Economics (p. 140)	2/1	W	4,5	P. Shukla, S. Caton
2520373	Experimental Economics (p. 182)	2/1	W	4,5	M. Adam, Ch. Weinhardt
2540464	eEnergy: Markets, Services, Systems (p. 163)	2/1	S	4,5	C. van Dinther, C. Weinhardt

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

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

Learning Outcomes
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.

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.

Module: Business & Service Engineering [IW4BWLISM4]

Coordination: C. Weinhardt
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540456	Business Models in the Internet: Planning and Implementation (p. 189)	2/1	S	4,5	C. Weinhardt
2540478	Special Topics in Information Engineering & Management (p. 367)	3	W/S	4,5	C. Weinhardt
2540506	Personalization and Recommender Systems (p. 273)	2/1	S	4,5	A. Geyer-Schulz
2540468	Service Innovation (p. 353)	2/1	S	5	G. Satzger, A. Neus, M. Kohler
2595477	Practical Seminar Service Innovation (p. 350)	3		5	G. Satzger, A. Neus, M. Kohler, H. Fromm

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

Conditions
None.

Learning Outcomes
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

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.

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

Module: Communications & Markets [IW4BWLISM5]

Coordination: C. Weinhardt
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540462	Communications Economics (p. 137)	2/1	S	4,5	J. Kraemer
2540460	Market Engineering: Information in Institutions (p. 233)	2/1	S	4,5	C. Weinhardt, M. Adam
2590408	Auction Theory (p. 124)	2/1	W	5	K. Ehrhart
2540478	Special Topics in Information Engineering & Management (p. 367)	3	W/S	4,5	C. Weinhardt

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

Conditions
The course *Communications Economics* [2540462] is compulsory and must be examined.

Learning Outcomes
The student is able to

- understand the game theoretic basics of Industrial Economics
- understand the relationship between incentive mechanisms and the network economy
- analyse and evaluate markets and auction mechanisms using methods from game theory
- elaborate solutions in a team

Content
The module has a focus on applied game-theoretic analysis of information exchange and incentive mechanisms. Single participants in a market make decisions concerning their products, the price determination and competitive postion, which can change the situation in a market. These changes inflict a change in corporate policy. Approaches from game-theory in industrial economics and mechanism design are offering analytic tools by which one can systematically deduce strategic decisions for businesses, given a certain market situation.

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

Module: Service Management [IW4BWLISM6]

Coordination: C. Weinhardt, H. Fromm
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2590484	Business and IT Service Management (p. 132)	2/1	W	5	G. Satzger, J. Kunze von Bischhoffshausen
2540468	Service Innovation (p. 353)	2/1	S	5	G. Satzger, A. Neus, M. Kohler
2595501	Service Analytics (p. 351)	2/1	S	4,5	T. Setzer, H. Fromm

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

Conditions
The course *Business and IT Service Management* [2590484] is compulsory and must be examined

Learning Outcomes
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.

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.

Remarks
In the summer term fo 2012, the lectures eServices and Management of Business Networks were taken out of this module. They will be continued to be offerd exclusively in the Bachelor modules. Modules correctly opened before the summer term, are not affected by this change.

Module: Finance 1 [IW4BWLFBV1]

Coordination: M. Uhrig-Homburg, M. Ruckes
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530550	Derivatives (p. 157)	2/1	S	4,5	M. Uhrig-Homburg
2530212	Valuation (p. 400)	2/1	W	4,5	M. Ruckes
2530555	Asset Pricing (p. 122)	2/1	S	4,5	M. Uhrig-Homburg, M. Ruckes

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

Conditions
None.

Learning Outcomes
The student

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

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

Module: Finance 2 [IW4BWLFBV2]

Coordination: M. Uhrig-Homburg, M. Ruckes
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530260	Fixed Income Securities (p. 184)	2/1	W	4,5	M. Uhrig-Homburg
2530214	Corporate Financial Policy (p. 142)	2/1	S	4,5	M. Ruckes
2530240	Market Microstructure (p. 234)	2/0	W	3	T. Lüdecke
2530565	Credit Risk (p. 221)	2/1	W	4,5	M. Uhrig-Homburg
2530210	Cost and Management Accounting (p. 209)	2/1	S	4,5	T. Lüdecke
2530555	Asset Pricing (p. 122)	2/1	S	4,5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation (p. 400)	2/1	W	4,5	M. Ruckes
2530550	Derivatives (p. 157)	2/1	S	4,5	M. Uhrig-Homburg
2530570	International Finance (p. 208)	2	S	3	M. Uhrig-Homburg, Walter
2530299	Business Strategies of Banks (p. 190)	2	W	3	W. Müller
2530296	Exchanges (p. 130)	1	S	1,5	J. Franke
2530232	Financial Intermediation (p. 185)	3	W	4,5	M. Ruckes
2540454	eFinance: Information Engineering and Management for Securities Trading (p. 165)	2/1	W	4,5	R. Riordan

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

Conditions
It is only possible to choose this module in combination with the module *F1 (Finance)* [IW4BWLFBV1]. The module is passed only after the final partial exam of *F1 (Finance)*is additionally passed.

Learning Outcomes
The student has advanced skills in economics and methodology in the field of modern finance.

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

Remarks
Only in the winter term 2011/2012 the lecture Market Microstructure [2530240] could be replaced by the lecture eFinance: Information Engineering and Management for Securities Trading [2540454] within the corresponding module. Who wanted to replace it in this way had to make the first attempt at passing the examination at the regular examination dates of this winter term 2011/2012. The general regulation concerning the second attempt at passing the examination remains unchanged. The lecture eFinance: Information Engineering and Management for Securities Trading [2540454] must not be chosen in all other cases within this module.

Module: Insurance Management I [IW4BWLFBV6]

Coordination: U. Werner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550055	Principles of Insurance Management (p. 297)	3/0	S	4,5	U. Werner
2530323	Insurance Marketing (p. 201)	3/0	S	4,5	E. Schwake
2530320	Insurance Accounting (p. 200)	3/0	W	4,5	E. Schwake
2530324	Insurance Production (p. 202)	3/0	W/S	4,5	U. Werner
26327	Service Management (p. 354)	3/0	W/S	4,5	U. Werner
2530050	Private and Social Insurance (p. 298)	2/0	W	2,5	W. Heilmann, K. Besserer
2530350	Current Issues in the Insurance Industry (p. 143)	2/0	S	2,5	W. Heilmann
2530335	Insurance Risk Management (p. 203)	2/0	S	2,5	H. Maser
INSGAME	Insurance Management Game (p. 397)	0/2	W	3	U. Werner

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

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Remarks
The courses *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: http://insurance.fbv.kit.edu

Module: Insurance Management II [IW4BWLFBV7]

Coordination: U. Werner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530323	Insurance Marketing (p. 201)	3/0	S	4,5	E. Schwake
2530320	Insurance Accounting (p. 200)	3/0	W	4,5	E. Schwake
2530324	Insurance Production (p. 202)	3/0	W/S	4,5	U. Werner
26327	Service Management (p. 354)	3/0	W/S	4,5	U. Werner
2530050	Private and Social Insurance (p. 298)	2/0	W	2,5	W. Heilmann, K. Besserer
2530350	Current Issues in the Insurance Industry (p. 143)	2/0	S	2,5	W. Heilmann
2530335	Insurance Risk Management (p. 203)	2/0	S	2,5	H. Maser

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

Conditions
It is only possible to choose this module in combination with the module *Insurance Management I*. The module is passed only after the final partial exam of *Insurance Management I* has been passed.

Recommendations
The courses chosen from the modules Insurance Management I or Insurance Management II are supposed to complement each other. Advice and information is available from the person responsible for the examination process at the Insurance Department of FBV.

Learning Outcomes
See German version.

Content
See German version.

Remarks
The courses *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: http://insurance.fbv.uni-karlsruhe.de
The module is offered as an extension module to *Insurance Management I* since summer term 2010 .

Module: Operational Risk Management I [IW4BWLFBV9]

Coordination: U. Werner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management (p. 176)	3/0	W	4,5	U. Werner
2530328	Multidisciplinary Risk Research (p. 248)	3/0	S	4,5	U. Werner
2530353	International Risk Transfer (p. 207)	2/0	S	2,5	W. Schwehr
2530395	Risk Communication (p. 310)	3/0	W	4,5	U. Werner
26354	Risk Management of Microfinance and Private Households (p. 312)	3/0	W/S	4,5	U. Werner
2530393	Project Work in Risk Research (p. 300)	3	W/S	4,5	U. Werner
2530355	Seminar Public Sector Risk Management (p. 332)	2	S	3	U. Werner, S. Hochrainer

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

Conditions
At least 50% of the assessment has to be carried out as a general oral exam or a general written exam (not as seminars).

Recommendations
Interest in interdisciplinary research is assumed. Good complements to this module are the engineering science modules *Understanding and Prediction of Disasters I* [WI4INTER1] and *Safety Science I* [WI4INTER4].

Learning Outcomes
See German version.

Content
Operational risk management strategies for different types of risk owners such as private and public households, small and larger business enterprises are introduced. Risks considered may derive from the interaction of human, technical, and organisational factors (internal risks) as well as from external natural, technical, social or political incidents. Aside from classical risk management strategies (risk control and loss financing), self insurance instruments such as captives or risk transfers into reinsurance and capital markets are considered. Additionally, risk communication is studied as a risk management instrument since it seems to become more and more important.

Remarks
The courses *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered on demand. For further information, see: http://insurance.fbv.kit.edu

Module: Operational Risk Management II [IW4BWLFBV10]

Coordination: U. Werner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management (p. 176)	3/0	W	4,5	U. Werner
2530328	Multidisciplinary Risk Research (p. 248)	3/0	S	4,5	U. Werner
2530353	International Risk Transfer (p. 207)	2/0	S	2,5	W. Schwehr
2530395	Risk Communication (p. 310)	3/0	W	4,5	U. Werner
26354	Risk Management of Microfinance and Private Households (p. 312)	3/0	W/S	4,5	U. Werner
2530393	Project Work in Risk Research (p. 300)	3	W/S	4,5	U. Werner
2530355	Seminar Public Sector Risk Management (p. 332)	2	S	3	U. Werner, S. Hochrainer

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

Conditions
It is only possible to choose this module in combination with the module *Operational Risk Management I* [IW4BWLFBV9]. The module is passed only after the final partial exam of *Operational Risk Management I has been* passed.
At least 50% of the assessment has to be carried out as a general oral exam or a general written exam (not as seminars).

Recommendations
Interest in interdisciplinary research is assumed. Good complements to this module are the engineering science modules *Understanding and Prediction of Disasters I* [WI4INTER1] and *Safety Science I* [WI4INTER4].

Learning Outcomes
See German version.

Content
See German version.

Remarks
The courses *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: http://insurance.fbv.kit.edu

Module: Strategic Corporate Management and Organization [IW4BWLUO1]

Coordination: H. Lindstädt
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2577904	Organization Theory (p. 267)	2	W	4,5	H. Lindstädt
2577902	Managing Organizations (p. 266)	2/0	W	4	H. Lindstädt
2577908	Modeling Strategic Decision Making (p. 244)	2	S	4,5	H. Lindstädt
2577900	Management and Strategy (p. 396)	2/0	S	4	H. Lindstädt
2577907	Special Topics in Management: Management and IT (p. 373)	1/0	W/S	2	H. Lindstädt

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

Conditions
None.

Learning Outcomes

Content

Module: Strategic Decision Making and Organization Theory [IW4BWLUO3]

Coordination: H. Lindstädt
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2577904	Organization Theory (p. 267)	2	W	4,5	H. Lindstädt
2577908	Modeling Strategic Decision Making (p. 244)	2	S	4,5	H. Lindstädt
2561127	Public Management (p. 303)	2/1	W	6	B. Wigger, Assistenten

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

Conditions
None.

Learning Outcomes

Content

Module: Industrial Production II [IW4BWLIIP2]

Coordination: F. Schultmann
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581952	Planning and Management of Industrial Plants (p. 118)	2/2	W	5,5	F. Schultmann
2581962	Emissions into the Environment (p. 170)	2/0	W	3,5	U. Karl
2581995	Material Flow Analysis and Life Cycle Assessment (p. 384)	2/0	W	3,5	L. Schebek

Learning Control / Examinations
The examination will be in form of individual written exams acc. to §4(2), 1 ER, covering the chosen courses which sum up to minimum requirements. Exams are offered in every semester and can be re-examined at every ordinary examination date.
The overall modular grade is calculated by weighing the individual grades with the according credit points. The grade will be truncated after the first decimal. Additional results may be considered on request.

Conditions
The course “Planning and Management of Industrial Plants” [2581952] has to be chosen.

Learning Outcomes

- 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.

Content

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

Module: Industrial Production III [IW4BWLIIP6]

Coordination: F. Schultmann
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581954	Production and Logistics Management (p. 299)	2/2	S	5,5	M. Fröhling, F. Schultmann
2581975	Computer-based Production Planning and Control, Process Simulation and Supply Chain Management (p. 141)	2/0	S	2	M. Fröhling, F. Schultmann
2581963	The Management of R&D Projects with Case Studies (p. 183)	2/2	W/S	3,5	H. Schmied
2581961	Supply Chain Management with Advanced Planning Systems (p. 387)	2	S	2	M. Göbelt, C. Sürie
2581992	Risk Management in Industrial Supply Chain Networks (p. 311)	2/0		3,5	T. Comes

Learning Control / Examinations
The examination will be in form of individual written exams acc. to §4(2), 1 ER, covering the chosen courses which sum up to minimum requirements. Exams are offered in every semester and can be re-examined at every ordinary examination date.
The overall modular grade is calculated by weighing the individual grades with the according credit points. The grade will be truncated after the first decimal.

Conditions
The course *Production and Logistics Management* [2581954] has to be chosen.

Learning Outcomes

- 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.

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.

Module: Energy Economics and Energy Markets [IW4BWLIIP4]

Coordination: W. Fichtner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581998	Basics of Liberalised Energy Markets (p. 127)	2/1	W	3,5	W. Fichtner
2581020	Energy Trade and Risk Management (p. 173)	2/1	S	3,5	K. Hufendiek
2581959	Energy Policy (p. 174)	2/0	S	3,5	M. Wietschel
2581022	Gas-Markets (p. 179)	2/0	W	3	A. Pustisek
2581025	Simulation Game in Energy Economics (p. 275)	2/0	W	3	W. Fichtner
2560234	Regulation Theory and Practice (p. 309)	2/1	S	4,5	K. Mitusch
2540464	eEnergy: Markets, Services, Systems (p. 163)	2/1	S	4,5	C. van Dinther, C. Weinhardt

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

Conditions
None.

Learning Outcomes

Content

Module: Energy Economics and Technology [IW4BWLIIP5]

Coordination: W. Fichtner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581003	Energy and Environment (p. 172)	2/1	S	4,5	U. Karl, n.n.
2581958	Strategical Aspects of Energy Economy (p. 385)	2/0	W	3,5	A. Ardone
2581000	Technological Change in Energy Economics (p. 390)	2/0	W	3	M. Wietschel
2581001	Heat Economy (p. 409)	2/0	S	3	W. Fichtner
2581002	Energy Systems Analysis (p. 175)	2/0	W	3	A. Eßer-Frey
2581006	Efficient Energy Systems and Electric Mobility (p. 164)	2/0	S	3,5	R. McKenna, P. Jochem

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

Conditions
None.

Learning Outcomes

Content

Module: EnTechnon [IW4BWLENT1]

Coordination: O. Terzidis, A. Presse
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

ECTS Credits	Cycle	Duration
9		2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2545001	Lecture „Entrepreneurship“ (p. 407)	2/1	W/S	4,5	O. Terzidis, A. Presse
2545008	Seminar „From Invention to Innovation“ (p. 346)	2	W	3	O. Terzidis, Presse, André, Fahrenberg, Jens, Blattner, Rolf
2545005	Seminar „Business Planning“ (p. 343)	2	S	3	O. Terzidis, A. Presse
2545006	Seminar „Innovation Management“ (p. 344)	2	S	3	O. Terzidis, B. Kneisel, A. Presse
2545007	Service-oriented Innovation Systems (p. 345)	2	S	3	O. Terzidis, R. Eichin, A. Presse
2545003	Managing New Technologies (p. 229)	2/1	S	5	T. Reiß

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

5.2 Economics

Module: Applied Strategic Decisions [IW4VWL2]

Coordination: C. Puppe
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520525	Game Theory I (p. 375)	2/2	S	4,5	N.N.
2590408	Auction Theory (p. 124)	2/1	W	5	K. Ehrhart
2540460	Market Engineering: Information in Institutions (p. 233)	2/1	S	4,5	C. Weinhardt, M. Adam
2520373	Experimental Economics (p. 182)	2/1	W	4,5	M. Adam, Ch. Weinhardt
2520365	Decision Theory (p. 177)	2/1	S	4,5	K. Ehrhart

Learning Control / Examinations
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 of the course.

Conditions
The course *Game Theory I* [2520525] is obligatory. Exception: This lecture was completed in the Bachelor study programme.

Recommendations
The student should have basic knowledge of game theory.

Learning Outcomes
The student

- knows and analyzes complex strategic decisions, knows advanced formal solution concepts and how to apply them,
- knows basic solution concepts for simple strategic decisions and is able to apply them to concrete problems,
- knows the experimental method from design of an experiment to evaluation of data and applies them.

Content
The module offers various possibilities of application of game theoretic methods. The main focus is on strategic bargaining and behavior in auctions. Also empirical aspects are taken into account.

Module: Allocation and Equilibrium [IW4VWL7]

Coordination: C. Puppe
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520527	Advanced Topics in Economic Theory (p. 105)	2/1	S	4,5	C. Puppe, M. Hillebrand, K. Mitusch
2520517	Welfare Economics (p. 415)	2/1	S	4,5	C. Puppe
25549	Theory of Business Cycles (p. 217)	2/1	W	4,5	M. Hillebrand

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

Conditions
None.

Recommendations
Micro- and macroeconomical knowledge corresponding to the content of the economical courses of the Bachelor Programme is assumed.

Learning Outcomes

Content

Module: Macroeconomic Theory [IW4VWL8]

Coordination: M. Hillebrand
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520543	Theory of Economic Growth (p. 408)	2/1	S	4,5	M. Hillebrand
25549	Theory of Business Cycles (p. 217)	2/1	W	4,5	M. Hillebrand

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

Conditions
None.

Recommendations
Grundlegende mikro- und makroökonomische Kenntnisse, wie sie beispielsweise in den Veranstaltungen *Volkswirtschaftslehre I (Mikroökonomie)* [2600012] und *Volkswirtschaftslehre II (Makroökonomie)* [2600014] vermittelt werden, werden vorausgesetzt. Aufgrund der inhaltlichen Ausrichtung der Veranstaltung wird ein Interesse an quantitativ-mathematischer Modellierung vorausgesetzt.

Learning Outcomes

Content

Module: Social Choice Theory [IW4VWL9]

Coordination: C. Puppe
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520517	Welfare Economics (p. 415)	2/1	S	4,5	C. Puppe
2520525	Game Theory I (p. 375)	2/2	S	4,5	N.N.
25537	Decision Theory and Objectives in Applied Politics (p. 178)	2/1	W	4,5	A. Melik-Tangyan
25539	Mathematical Theory of Democracy (p. 236)	2/1	S	4,5	A. Melik-Tangyan

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

Conditions
None.

Recommendations
Micro- and macroeconomical knowledge corresponding to the content of the economical courses of the Bachelor Programme is assumed.

Learning Outcomes

Content

Module: Telecommunications Markets [IW4VWL10]

Coordination: K. Mitusch
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Economics

ECTS Credits	Cycle	Duration
9		

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2561232	Telecommunication and Internet Economics (p. 391)	2/1	W	4,5	K. Mitusch
2540462	Communications Economics (p. 137)	2/1	S	4,5	J. Kraemer

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

Conditions
none

Learning Outcomes
The module shall provide students with a general understanding of the economic correlations and structures of modern telecommunications markets. A broad overview over market structures, actors and relations of the different markets will be given and students shall acquire the means to analyze the interactions between different actors both qualitatively and by applying methods of industrial economics. On this basis students are able to examine practical issues from different perspectives and to assess the different practices.

Content
Accompanied by rapid technological developments the telecommunications markets have undergone substantial changes since their liberalization in the late 90s. Besides the former state-owned monopoly incumbents, a large number of new actors has established on different levels of the industry. While particularly on the service level, intensive competition has developed, some infrastructure elements still qualify as natural monopolies and are subject to regulation. With the rising number of actors, services and applications the economic correlations of these markets are getting more and more complex. Growing data volumes and technological developments give rise to ne new infrastructure investments. Actors have to consider direct and indirect network effects as they operate on several markets simultaneously and regulators need to keep the balance between fostering competition and incentivizing investments. The rapidly developing markets pose many issues that are worth to be discussed.
The two sector specific courses are complementary and address the most relevant aspects and economic effects that have influenced the development of telecommunications markets in the recent past and will most probably influence them in the future. For some topics the methods of industrial economics are applied, which makes the third course of the module, *Industrial Organization*, a perfect supplement to either of the two courses.

5.3 Operations Research

Module: Operations Research in Supply Chain Management and Health Care Management [IW4OR4]

Coordination: S. Nickel
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Operations Research

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550486	Facility Location and Strategic Supply Chain Management (p. 378)	2/1	S	4,5	S. Nickel
2550488	Tactical and Operational Supply Chain Management (p. 389)	2/1	W	4,5	S. Nickel
2550480	Operations Research in Supply Chain Management (p. 261)	2/1	W/S	4,5	S. Nickel
2550495	Operations Research in Health Care Management (p. 260)	2/1	W/S	4,5	S. Nickel
2550493	Hospital Management (p. 220)	2/0	W/S	3	S. Nickel, Hansis
2550498	Practical seminar: Health Care Management (with Case Studies) (p. 296)	2/1/2	W/S	7	S. Nickel
2550497	Software Laboratory: OR Models II (p. 363)	2/1	W	4,5	S. Nickel
n.n.	Discrete-event Simulation in Production and Logistics (p. 180)	2/1	S	4,5	S. Nickel, S. Spieckermann

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

Conditions
In agreement with the module coordinator, a course from the modules *Mathematical optimization* [WW4OR6] or *Stochastic Modelling and Optimization* [WW4OR7] or the course *Game Theory I* [2520525] can be acknowledged.

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

Learning Outcomes
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 familiar with general procedures and characteristics of Health Care Management and the possibilities for adapting mathematical models for non-profit organizations,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

Content
Supply Chain Management is concerned with the planning and optimization of the entire, inter-company procurement, production and distribution process for several products taking place between different business partners (suppliers, logistics service

providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.
This module considers several areas of SCM. On the one hand, the determination of optimal locations within a supply chain is addressed. Strategic decisions concerning the location of facilities as production plants, distribution centers or warehouses are of high importance for the rentability of Supply Chains. Thoroughly carried out, location planning tasks allow an efficient flow of materials and lead to lower costs and increased customer service. On the other hand, the planning of material transport in the context of supply chain management represents another focus of this module. By linking transport connections and different facilities, the material source (production plant) is connected with the material sink (customer). For given material flows or shipments, it is considered how to choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. Furthermore, this module offers the possibility to learn about different aspects of the tactical and operational planning level in 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.
Health Care Management addresses specific Supply Chain Management problems in the health sector. Important applications arise in scheduling and internal logistics of hospitals.

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

Module: Mathematical Programming [IW4OR6]

Coordination: O. Stein
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Operations Research

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25138	Mixed Integer Programming I (p. 186)	2/1	S	4,5	O. Stein
25140	Mixed Integer Programming II (p. 187)	2/1	W	4,5	O. Stein
25128	Special Topics in Optimization I (p. 371)	2/1	W/S	4,5	O. Stein
25126	Special Topics in Optimization II (p. 372)	2/1	W/S	4,5	O. Stein
2550484	Graph Theory and Advanced Location Models (p. 193)	2/1	W/S	4,5	S. Nickel
2550497	Software Laboratory: OR Models II (p. 363)	2/1	W	4,5	S. Nickel
2550111	Nonlinear Optimization I (p. 257)	2/1	S	4,5	O. Stein
2550113	Nonlinear Optimization II (p. 258)	2/1	S	4,5	O. Stein
2550134	Global Optimization I (p. 191)	2/1	W	4,5	O. Stein
2550136	Global Optimization II (p. 192)	2/1	W	4,5	O. Stein

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

Conditions
Upon consultation with the module coordinator, alternatively one lecture from the modules *Operations Research in Supply Chain Management and Health Care Management* [WW4OR5] and *Stochastic Modeling and Optimization* [WW4OR7] or the lecture *Game Theory I* [2520525] may be accepted.

Learning Outcomes
The student

- names and describes basic notions for advanced optimization methods, in particular from continuous and mixed integer programming, location theory, and graph theory,
- 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.

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

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

Module: Stochastic Modelling and Optimization [IW4OR7]

Coordination: K. Waldmann
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Operations Research

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550679	Markov Decision Models I (p. 382)	2/1/2	W	5	K. Waldmann
2550682	Markov Decision Models II (p. 383)	2/1/2	S	4,5	K. Waldmann
2550674	Quality Control I (p. 304)	2/1/2	W	4,5	K. Waldmann
25659	Quality Control II (p. 305)	2/1/2	S	4,5	K. Waldmann
25687	Optimization in a Random Environment (p. 262)	2/1/2	W/S	4,5	K. Waldmann
2550662	Simulation I (p. 360)	2/1/2	W	4,5	K. Waldmann
2550665	Simulation II (p. 361)	2/1/2	S	4,5	K. Waldmann
25688	OR-oriented modeling and analysis of real problems (project) (p. 263)	1/0/3	W/S	4,5	K. Waldmann

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

Conditions
None.

Learning Outcomes
The student knows and understands stochastic relationships and has a competent knowledge in modelling, analyzing and optimizing stochastic systems in economics and engineering.

Content
see courses

5.4 Statistics

Module: Mathematical and Empirical Finance [IW4STAT1]

Coordination: Y. Kim
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Statistics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520381	Advanced Econometrics of Financial Markets (p. 104)	2/1	S	5	Y. Kim
2520357	Portfolio and Asset Liability Management (p. 276)	2/1	S	5	Y. Kim

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

Conditions
The lecture *Stochastic Calculus and Finance* [2521331] is mandatory.

Learning Outcomes

Content

Remarks
The course Advanced Econometrics of Financial Markets [2520381] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.
The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.

Module: Statistical Methods in Risk Management [IW4STAT2]

Coordination: W. Heller
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Statistics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520337	Stochastic and Econometric Models in Credit Risk Management (p. 381)	2/2	S	5	Y. Kim
2520357	Portfolio and Asset Liability Management (p. 276)	2/1	S	5	Y. Kim
2520375	Data Mining (p. 146)	2	W	5	G. Nakhaeizadeh
2520317	Multivariate Methods (p. 252)	2/2	S	5	W. Heller

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

Conditions
None.

Learning Outcomes

Content

Remarks
The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.
The course Stochastic and Econometric Models in Credit Risk Management [2520337] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term2012.

Module: Risk Management and Econometrics in Finance [IW4STAT3]

Coordination: Y. Kim
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Statistics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520381	Advanced Econometrics of Financial Markets (p. 104)	2/1	S	5	Y. Kim

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

Conditions
None.

Recommendations
Profound knowledge in the area of probability theory, estimation theory and test theory is recommended.

Learning Outcomes

Content

Remarks
The course Advanced Econometrics of Financial Markets [2520381] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.

5.5 Informatics

Module: Computer Security [IW4INSICH]

Coordination: J. Müller-Quade
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24941	Security (p. 357)	3/1	S	6	J. Müller-Quade
SemSich	Seminar in Security (p. 321)	2	W/S	3	J. Müller-Quade, M. Zitterbart
24137	Signals and Codes (p. 359)	2	W	3	J. Müller-Quade
24629	Symmetric Encryption (p. 388)	2	S	3	J. Müller-Quade

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- knows and understands the basic commonly used algorithms, their design, correctness and efficiency analysis, implementation, documentation and application,
- an handle new algorithmic problems, using this understanding,
- can apply the mathematical approaches learned in the basic computer science and mathematics courses to solve problems. Main topics are here formal correctness arguments and a mathematical analysis of efficiency.
- deals with a restricted problem in the field of computer security within the seminar,
- analyzes and discusses the problems associated to a distinct discipline in the lectures and in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content
Theoretical and practical aspects of computer security

- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- 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
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (eg, Diffie-Hellman)
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS)

Module: Security Engineering [IW4INSE]

Coordination: A. Pretschner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
5	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24142	Security Engineering (p. 313)	2/1	W	5	A. Pretschner

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
The module is not offered any longer.

Module: Advanced Topics in Cryptography [IW4INFKRYP]

Coordination: J. Müller-Quade
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
PrakKryp	Laboratory in Cryptography (p. 280)	4	W/S	3	J. Müller-Quade
24623	Selected topics in Cryptography (p. 125)	2	S	3	J. Müller-Quade
SemiKryp3	Seminar in Cryptography (p. 318)	2	W/S	3	J. Müller-Quade
WSUW	How Statistics Begins to Understand the Difference Between Cause and Effect (p. 413)	2	W	3	D. Janzing
24137	Signals and Codes (p. 359)	2	W	3	J. Müller-Quade
24629	Symmetric Encryption (p. 388)	2	S	3	J. Müller-Quade
EmSec	Embedded Security (p. 169)	2	S	3	J. Müller-Quade
24652	Computational Complexity Theory, with a View Towards Cryptography (p. 214)	4	S	6	J. Müller-Quade
24166	Provable Security in Cryptography (p. 128)	2	W	3	D. Hofheinz
24115	Asymmetric Encryption Schemes (p. 123)	2	W	3	J. Müller-Quade
24828	The logic of security (p. 159)	2	S	3	J. Müller-Quade
24170	Security in Modern Business Applications (p. 358)	2	W	3	J. Müller-Quade, Florian Kerschbaum
24691	Cryptographic Voting Schemes (p. 222)	2	S	3	J. Müller-Quade
24654	Digital signatures (p. 160)	2	S	3	Tibor Jager

Learning Control / Examinations
Lectures will be assessed in an oral overall exam on all taken lectures according to sec. 4 subsec. 2 no. 2 study and examination regulations.
Seminar in Cryptography [SemiKryp]: The assessment consists of a written seminar thesis and the presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation). In this module the seminar can only be counted in with 3 credit points.
Laboratory in Cryptography [PrakKryp]: The assessment will be an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations and will be assessed with “passed” or “failed”.
The grade of the module is the average of the single grades weighted by the related credit points and cut off after the first decimal place.

Conditions
None.

Learning Outcomes
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).
- learns to transform theoretical concepts into practice (eg. in a Praktikum)

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.

Remarks
The lecture *Public Key Kryptographie* was last offered in the winter term 2009/10. Exams are only offered for repeaters.

Module: Public Key Cryptography [IW4INPKK]

Coordination: J. Müller-Quade
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
PKK	Public Key Cryptography (p. 302)	3	W	6	J. Müller-Quade
SemiKryp2	Seminar in Cryptography (p. 319)	2	W/S	2	J. Müller-Quade

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- will learn the methods and mechanisms of cryptography in practice as well as the theoretical foundations of cryptography.
- should be able to critically assess algorithms and protocols and to identify vulnerabilities / threats.
- deals with a restricted problem in the field of cryptography within the seminar,
- analyzes and discusses the problems associated to a distinct discipline in the lectures and in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content

- The most important primitives of cryptography will be covered, as there are: one-way function, hash function, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (eg, Diffie-Hellman) with their strengths and weaknesses.
- In addition to public-key systems, the module provides knowledge about number-theoretic algorithms for solving problems such as primality testing, factoring large numbers and computing discrete logarithms in finite groups. Thus the choice of parameters and the related level of security of a cryptographic system can be estimated.
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (eg, IND-CCA).
- The combination of cryptographic modules will be treated using the example of currently used protocols such as Secure Shell (SSH), Transport Layer Security (TLS) and anonymous digital money.

Module: Introduction to Algorithmics [IW4INEALGT]

Coordination: D. Wagner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079	Algorithms II (p. 110)	3/1	W	6	P. Sanders
24819	Algorithm Design Seminar (p. 316)	2	W/S	4	D. Wagner

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- gains basic insights into the most important areas of algorithmics,
- identifies algorithmic problems from different areas of application and can formulate these in a formal manner,
- comprehends and determines the running times of algorithms,
- knows basic algorithms and data structures and can transfer this knowledge to new problems.

Content
This module conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.

Module: Advanced Algorithms: Design and Analysis [IW4INAALGOA]

Coordination: D. Wagner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24171	Randomized Algorithms (p. 306)	2/1	W	5	T. Worsch
24602	Parallel Algorithms (p. 268)	2/1	S	5	P. Sanders
24123	Algorithm Engineering (p. 107)	2/1	W	5	P. Sanders, D. Wagner
24622	Algorithms in Cellular Automata (p. 111)	2/1	S	3	T. Worsch
24819	Algorithm Design Seminar (p. 316)	2	W/S	4	D. Wagner
24118	Algorithms for Visualization of Graphs (p. 112)	2/1	W/S	5	D. Wagner, R. Görke
2511106	Nature-inspired Optimisation Methods (p. 253)	2/1	W	5	S. Mostaghim, P. Shukla
24079p	Practical Course in Algorithm Design (p. 278)	4	W/S	6	P. Sanders, D. Wagner, M. Krug
24638	Algorithms for Routing (p. 109)	2/1	S	5	D. Wagner
24693	Algorithms for Ad-Hoc and Sensor Networks (p. 108)	2/1		5	B. Katz
24618	Computational Geometry (p. 113)	3	S	5	M. Nöllenburg, D. Wagner

Learning Control / Examinations

Conditions
None.

Learning Outcomes
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.

Module: Advanced Algorithms: Engineering and Applications [IW4INAALGOB]

Coordination: D. Wagner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079p	Practical Course in Algorithm Design (p. 278)	4	W/S	6	P. Sanders, D. Wagner, M. Krug
24123	Algorithm Engineering (p. 107)	2/1	W	5	P. Sanders, D. Wagner
2511104	Organic Computing (p. 264)	2/1	S	5	H. Schmeck, S. Mostaghim
2511106	Nature-inspired Optimisation Methods (p. 253)	2/1	W	5	S. Mostaghim, P. Shukla
24638	Algorithms for Routing (p. 109)	2/1	S	5	D. Wagner
24602	Parallel Algorithms (p. 268)	2/1	S	5	P. Sanders
24118	Algorithms for Visualization of Graphs (p. 112)	2/1	W/S	5	D. Wagner, R. Görke
24819	Algorithm Design Seminar (p. 316)	2	W/S	4	D. Wagner
24622	Algorithms in Cellular Automata (p. 111)	2/1	S	3	T. Worsch
24171	Randomized Algorithms (p. 306)	2/1	W	5	T. Worsch
24693	Algorithms for Ad-Hoc and Sensor Networks (p. 108)	2/1		5	B. Katz

Learning Control / Examinations

Conditions
None.

Learning Outcomes
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

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.

Module: Web Applications and Web Technologies [IW4INWAWT]

Coordination: S. Abeck
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24604/24153	Advanced Web Applications (p. 106)	2/0	W/S	4	S. Abeck
WTprak	Practical Course Web Technologies (p. 289)	2/0	W/S	5	S. Abeck, Gebhart, Hoyer, Link, Pansa

Learning Control / Examinations
The assessment of this module consists of:

1. an oral exam according to sec. 4 subsec. 2 no. 2 study and examination regulations on course *Advanced Web Applications* [24604/24153]
2. an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations on course *Practical Course Web Technologies* [24304/24873]

The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
None.

Learning Outcomes
To understand the architecture of multi-layered and service-oriented applications.
To be able to model the software architecture of a Web application.
To understand the major principles of traditional application development and the corresponding development process.
To comprehend how high-level process models are systematically refined in order to be mapped to a service oriented architecture.
The technologies and development tools can be applied to support exemplary scenarios.
Using document templates the obtained results can be clearly described.
The results can be vividly presented and supported in discussions.

Content
This module comprises at first the lecture “Advanced Web Applications”. The lecture deals with the model-driven development of service-oriented Web applications which support business processes. These processes must be modeled in a way that it can be mapped to a Service-oriented Architecture (SOA).
The lecture is completed by a practical course. Each participant is integrated in one of the current project teams of the research group. The practical course consists of two parts: (i) An introduction into traditional and advanced service-oriented software development which takes about 4 to 5 weeks (ii) The solution (and its documentation) of an individual problem that is derived from one of the projects conducted by the project team.

Remarks
The course is lectured for the last time in the summer term 2011. Examination is possible until winter term 2012/13

Module: Language Technology and Compiler [IW4INCOMP1]

Coordination: G. Snelting
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24661	Language Technology and Compiler (p. 376)	4/2	S	8	G. Snelting

Learning Control / Examinations
The assessment consists of an oral exam (approx. 30 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
The student

- knows the importance of language and compiler technologies in other areas of computer science
- learns the theoretical foundations and practical methods which form the foundation for the compiler passes: lexical analysis, syntactic analysis, semantic analysis, code generation and code optimization
- has received an overview over the state of the art in compiler construction
- is able to apply his knowledge in practice when constructing a compiler (e.g. In the compiler lab)
- is able to follow advanced courses (e.g. Compiler 2)

Content

- Structure of a compiler
- Lexical analysis
- Syntactic analysis
- Semantic analysis
- Code generation
- Code optimization
- Specific technologies: LL-Parser, LR/LALR-Parser, attributed grammars, instruction selection, register allocation, runtime mechanisms, memory management, static single assignment form and its usage in optimization

Module: Software Systems [IW4INSWS]

Coordination: R. Reussner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24667	Component Based Software Architecture (p. 215)	2	S	3	R. Reussner, Andreas Rentschler
24660	Software Development for Modern, Parallel Platforms (p. 364)	2	S	3	V. Pankratius
24112	Multicore Computers and Computer Clusters (p. 249)	2	W	3	W. Tichy, V. Pankratius
24673	Reading Group (p. 228)	1	W/S	1	R. Reussner
SpezVer	Specification and Verification of Software (p. 374)	3	W	5	B. Beckert, P. Schmitt
24649	Multicore Programming in Practice: Tools, Models, Languages (p. 293)	4	W/S	6	V. Pankratius
24164	Software-Evolution (p. 362)	2	W	3	K. Krogmann, Mircea Trifu
24142	Security Engineering (p. 313)	2/1	W	5	A. Pretschner
24187	Natural Language Processing and Software Engineering (p. 377)	2	W	3	W. Tichy
24637	Automatic Test Generation (p. 126)	3	S	5	M. Taghdiri
24657	(p. 245)	2	S	3	R. Reussner, Lucia Kapova
24625	Applying Formal Verification (p. 119)	3	S	5	B. Beckert

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures and practical courses (approx. 60 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
Practical courses: In addition the student needs to submit a certificate (not graded) of the practical course as an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.
Seminars: Seminars will have a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.
The lecture *Multicore Programming in Practice: Tools, Models, Languages* [24293] will have a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. The assessment is explained in the course description.
The lecture *Multicore Computers and Computer Clusters* will have an asessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
The lecture *Multicore Programming in Practice* [24293] can **not** be taken in the study course Information Engineering and Management.

Learning Outcomes
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.

Content
The content will be explained in the course descriptions.

Remarks
The lecture *Multikernpraktikum* is no longer offered.
The lecture *Praktikum Performance von Anwendungen auf Cloud-Großrechner IBM z10* is no longer offered.

Module: Software Methods [IW4INSWM]

Coordination: R. Reussner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24667	Component Based Software Architecture (p. 215)	2	S	3	R. Reussner, Andreas Rentschler
24156	Empirical Software Engineering (p. 171)	2	S	3	W. Tichy
24634	Modern Development Environments using the example of .NET (p. 247)	2	S	3	W. Tichy, Gelhausen, Ladani
24636	Performance Engineering of Enterprise Software Systems (p. 271)	2	S	3	R. Reussner, S. Kounev
24673	Reading Group (p. 228)	1	W/S	1	R. Reussner
24164	Software-Evolution (p. 362)	2	W	3	K. Krogmann, Mircea Trifu
24142	Security Engineering (p. 313)	2/1	W	5	A. Pretschner
24187	Natural Language Processing and Software Engineering (p. 377)	2	W	3	W. Tichy
24657	(p. 245)	2	S	3	R. Reussner, Lucia Kapova

Learning Control / Examinations
The assessment consists of an oral exam on the taken lectures and practical courses (approx. 50 minutes) according to section 4 subsection 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
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.

Content
The content is explained in the course descriptions.

Remarks
The lecture *Praktikum Performance von Anwendungen auf Cloud-Großrechner IBM z10* is not offered any longer.

Module: Applied Web Engineering [IW4INPWE]

Coordination: H. Hartenstein
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering (p. 410)	2/0	W	4	H. Hartenstein, M. Nußbaumer
24880	Practical Course Web Engineering (p. 287)	4	W/S	5	H. Hartenstein, M. Nußbaumer, M. Keller

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The assessment is based on practical work and presentations according to § 4(2), 3 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
None.

Recommendations
Knowledge of HTML is required, basic programming knowledge (e.g. Java, C++/C or C#, etc.) is expected.

Learning Outcomes

- Students know the fundamentals as well as current methodologies and techniques in the field of Web Engineering and can apply them in practice. They have gained insights and first experiences in managing Web projects as well as in analyzing, structuring and describing problems in the field of Web Engineering.
- Students have acquired knowledge about state-of-the-art Web-based concepts, technologies and frameworks. They have developed a fundamental understanding of server- and client-side technologies and their interaction.
- Students have the ability to design Web-based systems autonomously with regard to the aspects data, interaction, navigation, presentation, communication and processing.
- Students are able to understand and interpret scientific papers and standard specifications and are confident in using the domain-specific language.

Content
The module is designed as an introduction to the discipline of Web Engineering, covering both theory and practice. The focus is on approaches and methods fostering a systematic construction of Web-based applications and systems. The different phases and aspects of the Web application lifecycle are examined as well. It helps students to look at the Web phenomenon from different perspectives - e.g. as a Web designer, analyst, architect, component engineer, program manager, product manager or CIO. Methods for dealing with requirements, design, architecture, implementation and management are discussed and applied in a project.

The module will convey practical knowledge of the Web's fundamental languages and technologies, like (X)HTML/CSS and XML/XSL. Furthermore component-based Web engineering approaches and frameworks are applied in the software project. Another thematic focus of the course is on Web services as a fundamental building block for constructing service-oriented applications. By realizing a software project, the structured and disciplined application of the learnt technologies is emphasized.

Module: Wireless Networking [IW4INWN]

Coordination: M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24104	Wireless Sensor-Actuator-Networks (p. 162)	2/0	W	4	M. Zitterbart
24669	Modeling and Simulation of Networks and Distributed Systems (p. 246)	2/0	S	4	H. Hartenstein
24643	Mobile Communications (p. 242)	2/0	S	4	O. Waldhorst
24146	Ubiquitous Computing (p. 394)	2/0	W	4	M. Beigl
24601	Network Security: Architectures and Protocols (p. 255)	2/0	S	4	M. Schöller
24128	Telematics (p. 393)	2	W	4	M. Zitterbart

Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

Conditions
The lecture *Telematics* [24128] must be taken if it has not been passed yet. If the lecture *Telematics* [24128] has not been passed yet, it has to be the first exam or examined simultaneously with the second chosen lecture.

Recommendations
Knowledge of the lecture *Introduction in Computer Networks* [24519] or *Networked IT-Infrastructures* [24074] is recommended as a basis for this module.

Learning Outcomes
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.

Remarks
The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].
The course *Praktikum Simulation von Rechnernetzen* was renamed to *Practical Course Modeling and Simulation of Networks and Distributed Systems* [24878].

Module: Networking Labs [IW4INNL]

Coordination: M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24674	Next Generation Internet (p. 256)	2/0	S	4	R. Bless
24104	Wireless Sensor-Actuator-Networks (p. 162)	2/0	W	4	M. Zitterbart
PrakATM	Lab Advanced Telematics (p. 277)	2	W/S	5	M. Zitterbart
24669	Modeling and Simulation of Networks and Distributed Systems (p. 246)	2/0	S	4	H. Hartenstein
24878	Practical Course Modeling and Simulation of Networks and Distributed Systems (p. 284)	0/2	S	5	H. Hartenstein
24149	IT-Security Management for Networked Systems (p. 211)	2/1	W	5	H. Hartenstein
24601	Network Security: Architectures and Protocols (p. 255)	2/0	S	4	M. Schöller

Learning Control / Examinations
The assessments for the individual lectures consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The assessments for practical courses will be assessments according to sec. 4 subsec. 2 no. 3 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.

Conditions

- Knowledge of the lectures *Introducted in Computer Networks* [24519] or *Networked IT-Infrastructures* [24074] is recommended as a basis for this module.
- The lecture *Telematics* [24128] is presumed to be known.

One of the following combinations can be taken:

- *Next Generation Internet* [24674] and *Project Lab Future Internet* [PrakATM]
- *Wireless Sensor-Actuator-Networks* [24104] and *Project Lab Sensor Networks* [PrakATM]
- *Modeling and Simulation of Networks and Distributed Systems* [24669] and *Practical Course Modeling and Simulation of Networks and Distributed Systems* [24878]
- *Network and IT-Security Management* [24149] and *Network Security: Architectures and Protocols* [24601]

Learning Outcomes
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.

Remarks
If the lecture *Telematics* [24128] has not been taken yet, it has to be the first exam or examined simultaneously with the second chosen lecture.
The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].
The course *Praktikum Simulation von Rechnernetzen* was renamed to *Practical Course Modeling and Simulation of Networks and Distributed Systems* [24878].

Module: Future Networking [IW4INFN]

Coordination: M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24674	Next Generation Internet (p. 256)	2/0	S	4	R. Bless
24132	Multimedia Communications (p. 251)	2/0	W	4	R. Bless
24643	Mobile Communications (p. 242)	2/0	S	4	O. Waldhorst
24104	Wireless Sensor-Actuator-Networks (p. 162)	2/0	W	4	M. Zitterbart
24128	Telematics (p. 393)	2	W	4	M. Zitterbart

Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

Conditions
The lecture *Telematics* [24128] must be taken if it has not been passed yet. If the lecture *Telematics* [24128] has not been passed yet, it has to be the first exam or examined simultaneously with the second chosen lecture.

Recommendations
Knowledge of the lecture *Introduction in Computer Networks* [24519] or *Networked IT-Infrastructures* [24074] is recommended as a basis for this module.

Learning Outcomes
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.

Module: Networking [IW4INNW]

Coordination: M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24128	Telematics (p. 393)	2	W	4	M. Zitterbart
24110	High Performance Communication (p. 198)	2/0	W	4	M. Zitterbart
24674	Next Generation Internet (p. 256)	2/0	S	4	R. Bless
24669	Modeling and Simulation of Networks and Distributed Systems (p. 246)	2/0	S	4	H. Hartenstein
24132	Multimedia Communications (p. 251)	2/0	W	4	R. Bless
24601	Network Security: Architectures and Protocols (p. 255)	2/0	S	4	M. Schöller

Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

Conditions
The lecture *Telematics* [24128] must be taken if it has not been passed yet. If the lecture *Telematics* [24128] has not been passed yet, it has to be the first exam or examined simultaneously with the second chosen lecture.

Recommendations
Knowledge of the lecture *Introduction in Computer Networks* [24519] or *Networked IT-Infrastructures* [24074] is recommended as a basis for this module.

Learning Outcomes
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.

Remarks
The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].
The course *Praktikum Simulation von Rechnernetzen* was renamed to *Practical Course Modeling and Simulation of Networks and Distributed Systems* [24878].

Module: Networking Security - Theory and Praxis [IW4INNTP]

Coordination: M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24601	Network Security: Architectures and Protocols (p. 255)	2/0	S	4	M. Schöller
24149	IT-Security Management for Networked Systems (p. 211)	2/1	W	5	H. Hartenstein
SemiKryp2	Seminar in Cryptography (p. 319)	2	W/S	2	J. Müller-Quade
24629	Symmetric Encryption (p. 388)	2	S	3	J. Müller-Quade
24941	Security (p. 357)	3/1	S	6	J. Müller-Quade

Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The assessment of the seminar consists of a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.
The assessment of the course *Seminar in Cryptography* [SemiKryp2] consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation). The seminar can be taken in this module with 2 credit points. This has to be approved by the examiner.
The assessment of the lecture *Security* consists of a written exam (approx. 60 minutes) according to sec. 4 subsec. 2 no. 1 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

Conditions

- Exactly one of the following lectures has to be taken: *Network Security: Architectures and Protocols* [24601] or *Network and IT-Security Management* [24149].
- Furthermore the following lectures can be chosen from: *Symmetric encryption* [24629] or *Seminar in Cryptography* [SemiKryp2] or *Security* [24941]

Recommendations
The lecture *Security* is a basis for this module.

Learning Outcomes
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

Content
This module details selected aspects of networking security and cryptography in theory and praxis.

Module: Communication and Database Systems [IW4INKD]

Coordination: K. Böhm, M. Zitterbart
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24516	Database Systems (p. 153)	2/1	S	4	K. Böhm
24519	Introduction in Computer Networks (p. 166)	2/1	S	4	M. Zitterbart

Learning Control / Examinations
The assessment of the lecture ***Introduction in Computer Networks*** consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.
The assessment of the lecture ***Database Systems*** consists of exercise sheets during the semester accoring to sec. 4 subsec. 2 no. 3 study and examination regulations. The solutions of the exercise sheets will be graded. A graded, written "Präsenzübung" will take place at the end of the semester.
The grade of the module is the average of the single grades weighted with the related credit points and cut off after the first decimal place.

Conditions
None.

Learning Outcomes
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.

Module: Innovative Concepts of Data and Information Management [IW4INIKDI]

Coordination: K. Böhm
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24114	Data Warehousing and Mining (p. 148)	2/1	W	5	K. Böhm
db_impl	Database Implementation and Tuning (p. 151)	2/1	S	5	K. Böhm
dbe	Deployment of Database Systems (p. 149)	2/1	S	5	K. Böhm
24109	Distributed Data Management (p. 402)	2/1	W	5	K. Böhm
24109	Moving Objects Databases (p. 150)	2	W	3	K. Böhm
24141	Information Integration and Web Portals (p. 199)	2	W	3	J. Mülle, Andreas Schmidt
24605	Data Privacy Protection in Interconnected Information Systems (p. 155)	2	S	3	K. Böhm, Buchmann
PLV	Selling IT-Solutions Professionally (p. 295)	2	S	1	K. Böhm, Hellriegel
PUB	Consulting in Practice (p. 294)	2	W/S	1	K. Böhm, Dürr
24147	Project Management in Practice (p. 301)	2	S	1	K. Böhm, W. Schnober
24522	(p. 412)	0/1	S	1	K. Böhm
24111	Mechanisms and Applications of Workflow Systems (p. 219)	3	W	5	J. Mülle, Silvia von Stackelberg
24647	Data Mining Paradigms and Methods for Complex Databases (p. 147)	2/1	S	5	K. Böhm, E. Müller
24310	(p. 290)	2	W	4	K. Böhm, E. Müller

Learning Control / Examinations
The assessment consists of partial examinations on the selected courses that satisfy the minimum requirement of credit points. The assessments are explained in the course descriptions.
The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
None.

Recommendations
It is recommended to take the module *Communication and Database Systems* in advance.

Learning Outcomes
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.

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.

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

Module: Theory and Practice of Data Warehousing and Mining [IW4INDWMTP]

Coordination: K. Böhm
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24874	Practical Course Data Warehousing and Mining (p. 282)	2	S	4	K. Böhm
24114	Data Warehousing and Mining (p. 148)	2/1	W	5	K. Böhm
dbe	Deployment of Database Systems (p. 149)	2/1	S	5	K. Böhm
db_impl	Database Implementation and Tuning (p. 151)	2/1	S	5	K. Böhm
24109	Distributed Data Management (p. 402)	2/1	W	5	K. Böhm
24647	Data Mining Paradigms and Methods for Complex Databases (p. 147)	2/1	S	5	K. Böhm, E. Müller
24310	(p. 290)	2	W	4	K. Böhm, E. Müller

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the selected lecture (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The practical course requires an additional certificate following sec. 4 subsec. 2 no. 3 study and examination regulations.
The grade of the module is the grade of the oral exam.

Conditions
At least one practical course has to be taken.

Recommendations
It is recommended to take the lecture *Data Warehousing and Mining* [24118] if it has not been taken yet.

Learning Outcomes
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.

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.

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

Module: Theory and Practice of Database Technology [IW4INDBTP]

Coordination: K. Böhm
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24286	Practical Course Database Systems (p. 152)	2	W	4	K. Böhm
praktvd	Practical Course Distributed Data Management (p. 286)	2	W	4	K. Böhm
24109	Distributed Data Management (p. 402)	2/1	W	5	K. Böhm
24114	Data Warehousing and Mining (p. 148)	2/1	W	5	K. Böhm
dbe	Deployment of Database Systems (p. 149)	2/1	S	5	K. Böhm
db_impl	Database Implementation and Tuning (p. 151)	2/1	S	5	K. Böhm
24647	Data Mining Paradigms and Methods for Complex Databases (p. 147)	2/1	S	5	K. Böhm, E. Müller
24310	(p. 290)	2	W	4	K. Böhm, E. Müller

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the selected lecture (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The practical course requires an additional certificate following sec. 4 subsec. 2 no. 3 study and examination regulations.
The grade of the module is the grade of the oral exam.

Conditions
One of the practical courses has to be taken.

Recommendations
It is recommended to

- combine the *Practical Course Databases* with the lecture *Deployment of Database Systems* [24647].
- combine the *Practical Course Distributed Data Management* with the lecture *Distributed Data Management* [24114].

Learning Outcomes
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 explain and to discuss complex aspects of the topics covered by this module with both experts and informed outsiders,
- are able to deploy (distributed) databases and are familiar with the relevant technologies.

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 the topics of this module not only from a theoretical point of view but deploy and realise the respective technologies in a practical course.

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

Module: Dynamic IT-Infrastructures [IW4INDITI]

Coordination: H. Hartenstein
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering (p. 410)	2/0	W	4	H. Hartenstein, M. Nußbaumer
24669	Modeling and Simulation of Networks and Distributed Systems (p. 246)	2/0	S	4	H. Hartenstein
24146	Ubiquitous Computing (p. 394)	2/0	W	4	M. Beigl
24878	Practical Course Modeling and Simulation of Networks and Distributed Systems (p. 284)	0/2	S	5	H. Hartenstein
VITI	Networked IT-Infrastructures (p. 401)	2/1	W	5	B. Neumair
24149	IT-Security Management for Networked Systems (p. 211)	2/1	W	5	H. Hartenstein
24119	Distributed Systems - Grid and Cloud (p. 403)	2	W	4	A. Streit, Jie Tao
24074	Data and Storage Management (p. 145)	2	W	4	B. Neumair

Learning Control / Examinations
The assessments of the lectures *Data Storage Management*, *IT-Security Management for Network Systems*, *Web Engineering*, *Modeling and Simulation of Networks and Distributed Systems, Verteilte Systeme - Grid und Cloud* and *Ubiquitous Computing* consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The assessments for practical courses and seminars will be graded assessments according to sec. 4 subsec. 2 no. 3 study and examination regulations.
The grade of the module is the average of the single grades weighted equally.

Conditions
The *Practical Course Modeling and Simulation of Networks and Distributed Systems* can only be taken if the lecture *Modeling and Simulation of Networks and Distributed Systems* is taken as well.

Recommendations
Knowledge of the lecture *Introduction in Computer Networks* [24519] or *IT-Security Management for Networked Systems* is recommended as a basis for this module.

Learning Outcomes
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)

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.

Remarks
The course *Networked IT-Infrastructures* is not offered any longer.

Module: Biosignal Processing [IW4INBSV]

Coordination: T. Schultz
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24105	Biosignals and User Interfaces (p. 129)	4	W	6	T. Schultz, M. Wand
24600	Multilingual Human-Machine Communication (p. 250)	4	S	6	T. Schultz, F. Putze
ammb	Analysis and modeling of human motion sequences (p. 115)	2	W	3	T. Schultz
24612	Cognitive Modeling (p. 213)	2	S	3	T. Schultz, F. Putze
24103	Design and Evaluation of innovative user interfaces (p. 158)	2	W	3	T. Schultz, F. Putze
24641	Methods of Biosignals Processing (p. 240)	2	S	3	M. Wand, T. Schultz

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
For appointments please e-mail helga.scherer@kit.edu.
It is recommended to schedule an appointment well in advance.

Conditions
One of the lectures *Biosignals and User Interfaces* or *Multilingual Human-Machine Communication* must be part of the exam.

Learning Outcomes

- Introduction to biosignals, especially speech, motion, brain and muscle activity
- Foundations of production and recording of biosignals
- Foundations of automatic recognition and interpretation of biosignals
- Theory of biosignal processing
- Theory of statistical modeling
- Knowledge of the current state of the art in research and development
- Knowledge of many real-world applications
- Assessment of the potential, challenges and limitations of biosignals for human-machine interaction

Content
This module introduces students to the foundations and applications of automatic recording, processing and interpretation of biosignals. The production of biosignals will be explained, followed by methods for recording and preprocessing. Furthermore, the lecture will explain the foundations of statistical modeling as it is used in current systems. Many examples illustrate the practical application for human-machine interaction.

Remarks
The course *Analysis and modeling of human motion sequences* is not offered any longer, examination is possible until winter term 2012/13.

Module: Speech Processing [IW4INSV]

Coordination: T. Schultz
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24145	Principles of Automatic Speech Recognition (p. 194)	4	W	6	A. Waibel, Sebastian Stüker
24600	Multilingual Human-Machine Communication (p. 250)	4	S	6	T. Schultz, F. Putze
24298	Practical Course Automatic Speech Recognition (p. 281)	2	W	3	A. Waibel, Stüker
24103	Design and Evaluation of innovative user interfaces (p. 158)	2	W	3	T. Schultz, F. Putze

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
Practical course *Automatic Speech Recognition:* In addition the student needs to submit a certificate (not graded) as an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.
For appointments please e-mail helga.scherer@kit.edu. It is recommended to schedule an appointment well in advance.

Conditions
None.

Learning Outcomes

- Introduction to the processing of natural speech
- Theory of signal processing
- Theory of statistical modeling of speech
- Foundations of machine learning methods for speech processing
- Knowledge of the current state of the art in research and development
- Knowledge of many real-world applications
- Assessment of the potential, challenges and limitations of speech processing for human-machine interaction and human-human communication.

Content
This module introduces students to the foundations and applications of automatic speech recognition and processing. The lecture will explain the foundations of statistical modeling of speech as it is used in current systems. Many examples from state of the art systems illustrate the practical application for human-machine interaction and human-human communication.

Remarks
Lecture slides are available as pdf at http://csl.anthropomatik.kit.edu.
Current literature will be announced in the lectures, seminars and practical courses.

Module: Curves and Surfaces [IW4INKUF]

Coordination: H. Prautzsch
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
KFCAD2	Curves and Surfaces in CAD I (p. 223)	2	S	3	H. Prautzsch
CFD2	Curves and Surfaces in CAD II (p. 224)	2	W	3	H. Prautzsch
KFCAD3	Curves and Surfaces in CAD III (p. 225)	2	W/S	3	H. Prautzsch
rsp	Rationale Splines (p. 307)	2	W	3	H. Prautzsch
24626	Subdivision algorithms (p. 398)	2	W	3	H. Prautzsch
24122	Meshes and point clouds (p. 254)	2	W	3	H. Prautzsch
24175	Applied Differential Geometry (p. 117)	2	W	3	H. Prautzsch

Learning Control / Examinations
The assessment consists of an oral exam (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
Gaining knowledge and deeper understanding in the area of Computer Aided Geometric Design (CAGD) and Geometric Computing.
Further, this module should enable the students to master typical CAGD tasks and to work on a master's thesis, in particular.

Content
Technics and algorithms for generating, representing, reconstructing, modifying, animating and analyzing free form geometries (curves, surfaces and bodies).

Remarks
Some courses are not offered every year, see http://i33www.ira.uka.de/pages/Lehre/VertiefungsgebietComputergraphik.html

Module: [IN4INKUS]

Coordination: M. Beigl
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24658	(p. 218)	2	S	4	M. Beigl
24895	(p. 291)	4	S	5	M. Beigl
24844	(p. 348)	2	W/S	4	M. Beigl
24146	Ubiquitous Computing (p. 394)	2/0	W	4	M. Beigl
24786	Seminar: Internet of Things and Services (p. 347)	2	S	4	M. Beigl, Stefan Tai
24696	(p. 226)	1	S	1	M. Beigl

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Module: [IN4INMMI]

Coordination: M. Beigl
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24844	(p. 348)	2	W/S	4	M. Beigl
24875	(p. 292)	4	S	5	M. Beigl
24659	(p. 239)	2	S	4	M. Beigl, Takashi Miyaki
24146	Ubiquitous Computing (p. 394)	2/0	W	4	M. Beigl
24786	Seminar: Internet of Things and Services (p. 347)	2	S	4	M. Beigl, Stefan Tai
24697	(p. 227)	1	S	1	M. Beigl

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Module: Introduction to Algorithmics [IW4INEAT]

Coordination: D. Wagner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
10	Every 2nd term, Winter Term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079	Algorithms II (p. 110)	3/1	W	6	P. Sanders
24819	Algorithm Design Seminar (p. 316)	2	W/S	4	D. Wagner

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- gains basic insights into the most important areas of algorithmics,
- identifies algorithmic problems from different areas of application and can formulate these in a formal manner,
- comprehends and determines the running times of algorithms,
- knows basic algorithms and data structures and can transfer this knowledge to new problems.

Content
This module conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.

Module: [IW4INACG]

Coordination: H. Prautzsch
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24122	Meshes and point clouds (p. 254)	2	W	3	H. Prautzsch
24173	Medical Simulation Systems I (p. 237)	2	W	3	R. Dillmann, Röhl, Speidel
24676	Medical Simulation Systems II (p. 238)	2	S	3	R. Dillmann, Unterhinninghofen, Suwelack
24657	Geometric Optimzation (p. 188)	2	S	3	H. Prautzsch
24618	Computational Geometry (p. 113)	3	S	5	M. Nöllenburg, D. Wagner
24626	Subdivision algorithms (p. 398)	2	W	3	H. Prautzsch
24884	Practical course: Geometric Modeling (p. 283)	2	S	3	H. Prautzsch, Diziol

Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures and practical courses (approx. 40 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes
Fundamental knowledge in the area of geometric modelling and computer graphics with its applications in CAD/CAGD and medical simulation.

Content

Remarks
For the courses plan see http://cg.ibds.kit.edu/lehre/ .
The courses *Einführung in die Computergraphik, Graphisch-geometrische Algorithmen and Geometrieverarbeitung* are not offered any longer, examination is possible until WS 11/12.

Module: Advanced Algorithms: Design and Analysis [IW4INAADA]

Coordination: D. Wagner
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24171	Randomized Algorithms (p. 306)	2/1	W	5	T. Worsch
24602	Parallel Algorithms (p. 268)	2/1	S	5	P. Sanders
24123	Algorithm Engineering (p. 107)	2/1	W	5	P. Sanders, D. Wagner
24622	Algorithms in Cellular Automata (p. 111)	2/1	S	3	T. Worsch
24819	Algorithm Design Seminar (p. 316)	2	W/S	4	D. Wagner
24118	Algorithms for Visualization of Graphs (p. 112)	2/1	W/S	5	D. Wagner, R. Görke
24079p	Practical Course in Algorithm Design (p. 278)	4	W/S	6	P. Sanders, D. Wagner, M. Krug
24638	Algorithms for Routing (p. 109)	2/1	S	5	D. Wagner
24693	Algorithms for Ad-Hoc and Sensor Networks (p. 108)	2/1		5	B. Katz
24618	Computational Geometry (p. 113)	3	S	5	M. Nöllenburg, D. Wagner
2511106	Nature-inspired Optimisation Methods (p. 253)	2/1	W	5	S. Mostaghim, P. Shukla

Learning Control / Examinations

Conditions
None.

Learning Outcomes
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.

Module: Foundations and Application of IT-Security [IW4INGAS]

Coordination: J. Müller-Quade
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every 2nd term, Summer Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24941	Security (p. 357)	3/1	S	6	J. Müller-Quade
SemiKryp2	Seminar in Cryptography (p. 319)	2	W/S	2	J. Müller-Quade

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

- knows the theoretic background and the basic mechanisms of computer security and cryptography
- understands the mechanisms of computer security and can explain them,
- can read and understand the current scientific papers,
- can evaluate the safety procedures and can recognize hazards,
- can adapt mechanisms of computer security to new environment.
- deals with a restricted problem in the field of cryptography within the seminar,
- analyzes and discusses the problems associated to a distinct discipline in the lectures and in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content

- Theoretical and practical aspects of computer security
- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective protection methods / avoidance strategies
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g., Diffie-Hellman)
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS).

Module: Parallel Processing [IW4INPV]

Coordination: W. Karl
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24161	Microprocessors II (p. 241)	2	W	3	W. Karl
24117	Heterogeneous Parallel Computing Systems (p. 197)	2	W	3	W. Karl
24660	Software Development for Modern, Parallel Platforms (p. 364)	2	S	3	V. Pankratius
24112	Multicore Computers and Computer Clusters (p. 249)	2	W	3	W. Tichy, V. Pankratius
24606	Models of Parallel Processing (p. 243)	3	S	5	T. Worsch
24622	Algorithms in Cellular Automata (p. 111)	2/1	S	3	T. Worsch
24649	Multicore Programming in Practice: Tools, Models, Languages (p. 293)	4	W/S	6	V. Pankratius
24602	Parallel Algorithms (p. 268)	2/1	S	5	P. Sanders

Learning Control / Examinations
The assessment consists of oral exams of the taken courses according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The lecture *Multicore Programming in Practice: Tools, Models, Languages* [24293] will have an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. The assessment is explained in the course description.
The lecture *Multicore Computers and Computer Clusters* will have an asessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
The lecture *Multicore Programming in Practice* can not be taken in the study course Information Engineering and Management.

Learning Outcomes

Content

Remarks
The lecture *Multikernpraktikum* is no longer offered.

Module: Web Engineering [IW4INWEBE]

Coordination: H. Hartenstein
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
4	Every 2nd term, Winter Term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering (p. 410)	2/0	W	4	H. Hartenstein, M. Nußbaumer

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.

Conditions
None.

Learning Outcomes

- Students know fundamentals as well as current methodologies and techniques in the field of Web Engineering
- Students have gained insight into existing Web-oriented application platforms and development frameworks, and have the basic knowledge for system design close to current practices.
- Students can apply methods for analyzing current standards and technologies of the Web. Students are able to understand and interpret scientific papers and standard specifications and are confident in using the domain-specific terminology.
- Students are able to analyze, structure and describe problems in the field of Web Engineering as well as to design Web-based system architectures.

Content
This module will discuss the systematic construction of Web-based applications and systems by focusing on the different phases and aspects of the Web application lifecycle. It helps students to look at the Web phenomenon from different perspectives - e.g. as a Web designer, analyst, architect, component engineer, program manager, product manager or CIO. Students learn how to engineer Web applications and agile systems from requirements engineering, planning, design, development, testing, deployment and up to operation, maintenance and evolution. Many examples are shown and discussed, demonstrating the need for expecting change and staying agile. As this is not a programming course, students will be introduced to the core technology aspects and are encouraged to consolidate the details.

Module: Service Technology [IW4INAIFB1]

Coordination: S. Tai
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511500	Service Oriented Computing 1 (p. 355)	2/1	W	5	S. Tai
2511308	Service Oriented Computing 2 (p. 356)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
25820	Lab Class Web Services (p. 288)	2	W	4	S. Tai

Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes

Content

Remarks
This module is not offered any more. Please see German version for details.

Module: Cloud Computing [IW4INAIFB2]

Coordination: S. Tai
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511504	Cloud Computing (p. 136)	2/1	W	5	S. Tai, Kunze
SemAIFB5	Seminar eOrganization (p. 326)	2	S	3	S. Tai
25820	Lab Class Web Services (p. 288)	2	W	4	S. Tai

Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes
The student is familiar with the fundamentals of Cloud Computing and has ackquired further knowledge through additional seminar studies or through lab practice.

Content
Theory and practice of cloud computing.
Please also refer to the class descriptions.

Remarks
This module is not offered any more. Please see German version for details.

Module: Web Service Engineering [IW4INAIFB3]

Coordination: S. Tai
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511502	Web Service Engineering (p. 411)	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization (p. 326)	2	S	3	S. Tai
25820	Lab Class Web Services (p. 288)	2	W	4	S. Tai

Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes
The student is familiar with the fundamentals of Web Service Engineering and has ackquired further knowledge through additional seminar studies or through lab practice.

Content
Theory and practice of Web service engineering.
Please also refer to the class descriptions.

Remarks
This module is not offered any more. Please see German version for details.

Module: Web Data Management [IW4INAIFB4]

Coordination: R. Studer
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511304	Semantic Web Technologies I (p. 314)	2/1	W	5	R. Studer, S. Rudolph, E. Simperl
2511306	Semantic Web Technologies II (p. 315)	2/1	S	5	E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
2511504	Cloud Computing (p. 136)	2/1	W	5	S. Tai, Kunze
25070p	Advanced Lab Applied Informatics (p. 279)	2	W/S	4	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai

Learning Control / Examinations
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.

Conditions
The lecture *Semantic Web Technologies II* [2511306] is obligatory and has to be absolved.

Learning Outcomes
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.

Module: Intelligent Systems and Services [IW4INAIFB5]

Coordination: R. Studer
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511302	Knowledge Discovery (p. 212)	2/1	W	5	R. Studer
2511402	Intelligent Systems in Finance (p. 204)	2/1	S	5	D. Seese
2511308	Service Oriented Computing 2 (p. 356)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
25860sem	Special Topics of Knowledge Management (p. 370)	2/1	W/S	5	R. Studer
2511102	Algorithms for Internet Applications (p. 114)	2/1	W	5	H. Schmeck
2511202	Database Systems and XML (p. 154)	2/1	W	5	A. Oberweis
25070p	Advanced Lab Applied Informatics (p. 279)	2	W/S	4	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes
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.

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.

Module: Semantic Technologies [IW4INAIFB6]

Coordination: R. Studer
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
8	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511306	Semantic Web Technologies II (p. 315)	2/1	S	5	E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
25070s	Seminar in Applied Informatics (p. 317)	2	W/S	3	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes

Content

Module: Ubiquitous Computing [IW4INAIFB7]

Coordination: H. Schmeck
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24146	Ubiquitous Computing (p. 394)	2/0	W	4	M. Beigl
2511102	Algorithms for Internet Applications (p. 114)	2/1	W	5	H. Schmeck
2511104	Organic Computing (p. 264)	2/1	S	5	H. Schmeck, S. Mostaghim
24149	IT-Security Management for Networked Systems (p. 211)	2/1	W	5	H. Hartenstein
24146p	Advanced Lab in Ubiquitous Computing (p. 285)	2/0	W/S	4	H. Schmeck

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes

Content

Module: Organic Computing [IW4INAIFB8]

Coordination: H. Schmeck
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511104	Organic Computing (p. 264)	2/1	S	5	H. Schmeck, S. Mostaghim
2511106	Nature-inspired Optimisation Methods (p. 253)	2/1	W	5	S. Mostaghim, P. Shukla
25700sp	Special Topics of Efficient Algorithms (p. 369)	2/1	W/S	5	H. Schmeck
2511400	Complexity Management (p. 138)	2/1	S	5	D. Seese
25070p	Advanced Lab Applied Informatics (p. 279)	2	W/S	4	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes

Content

Module: Development of Distributet Business Information Systems [IW4INAIFB11]

Coordination: A. Oberweis
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511202	Database Systems and XML (p. 154)	2/1	W	5	A. Oberweis
2511218	Requirements Analysis and Requirements Management (p. 116)	2/0	W	4	R. Kneuper
2511404	IT Complexity in Practice (p. 231)	2/1	W	5	D. Seese, Kreidler
2511502	Web Service Engineering (p. 411)	2/1	S	5	C. Zirpins
2511212	Document Management and Groupware Systems (p. 161)	2	S	4	S. Klink
2511602	Strategic Management of Information Technology (p. 386)	2/1	S	5	T. Wolf
2511400	Complexity Management (p. 138)	2/1	S	5	D. Seese
2511214	Management of IT-Projects (p. 230)	2/1	S	5	R. Schätzle
SBI	Special Topics of Enterprise Information Systems (p. 368)	2/1	W/S	5	A. Oberweis
25070p	Advanced Lab Applied Informatics (p. 279)	2	W/S	4	A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
2590458	Computational Economics (p. 140)	2/1	W	4,5	P. Shukla, S. Caton
2511506	Business Activity Management (p. 131)	2/1		5	C. Janiesch

Learning Control / Examinations
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.

Conditions
The course *Datenbanksysteme und XML* [2511202] has to be attended.

Learning Outcomes
The students

- are familiar with the requirements and limitations of distributed database systems,
- can ensure error-free operation and the consistency of distributed databases,
- can master methods and concepts of essential algorithms in distributed systems,
- are able to use methods of IT project management appropiate to current project phases and project contexts,
- can model and analyse an information system and evaluate alternative designs systematically.

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.

Module: Service Computing 1 [IW4INAIFB12]

Coordination: S. Tai
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511500	Service Oriented Computing 1 (p. 355)	2/1	W	5	S. Tai
2511308	Service Oriented Computing 2 (p. 356)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511504	Cloud Computing (p. 136)	2/1	W	5	S. Tai, Kunze
2511502	Web Service Engineering (p. 411)	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization (p. 326)	2	S	3	S. Tai
25820	Lab Class Web Services (p. 288)	2	W	4	S. Tai
2511506	Business Activity Management (p. 131)	2/1		5	C. Janiesch

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
The course *Service Oriented Computing 1* [2511500] ist mandatory.

Learning Outcomes
The module introduces methods and technologies for implementing service-oriented architectures. Students will be able to structure, design, and engineer modern, Web-based service-oriented systems for enterprises and for business networks. Students will acquire knowledge about current standards and tools.

Content
The module covers knowledge about designing and implementing service-oriented architectures. In this context different aspects are considered:

- The module introduces basic concepts of a service-oriented architecture and discusses differences to traditional software development.
- The module introduces technologies for implementing service-oriented architectures, including technical standards in the area of Web Services and Web Computing. In addition, an overview of existing development methodologies and tools is given.
- Concepts and technologies for the distributed realization of highly scalable Services (Cloud Computing) are presented.

More details can be found at http://www.aifb.kit.edu/web/Lehrangebot_des_Instituts_AIFB/en.

Remarks
The module is new in summer term 2011. It replaces part of the modules Service Technology [IW4INAIFB1], *Cloud Computing* [IW4INAIFB2], *Web Service Engineering* [IW4INAIFB3] and *Service Technologies* [IW4INSER] which are not offered an more. The course “Web Servicee Engineering” will not be offered any more from summer term 2012 on. The examination will be offered latest until summer term 2013 (repeaters only).

Module: Service Computing 2 [IW4INAIFB13]

Coordination: S. Tai
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Informatics

ECTS Credits	Cycle	Duration
9	Every term	2

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511308	Service Oriented Computing 2 (p. 356)	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511504	Cloud Computing (p. 136)	2/1	W	5	S. Tai, Kunze
2511502	Web Service Engineering (p. 411)	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization (p. 326)	2	S	3	S. Tai
25820	Lab Class Web Services (p. 288)	2	W	4	S. Tai
2511506	Business Activity Management (p. 131)	2/1		5	C. Janiesch

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
It is only possible to choose this module in combination with the module *Service Computing 1* [IW4INAIFB12]. The module is passed only after the final partial exam of *Service Computing 1* is additionally passed.

Learning Outcomes
The module advances knowledge of methods and technologies for implementing service-oriented architectures. Students will be able to structure, design, and engineer modern, Web-based service-oriented systems for enterprises and for business networks. Students will acquire advanced knowledge about current standards and tools.

Content
The module covers knowledge about designing and implementing service-oriented architectures. In this context different aspects are considered:

- The module introduces basic concepts of a service-oriented architecture and discusses differences to traditional software development.
- The module introduces technologies for implementing service-oriented architectures, including technical standards in the area of Web Services and Web Computing. In addition, an overview of existing development methodologies and tools is given.
- Concepts and technologies for the distributed realization of highly scalable Services (Cloud Computing) are presented.

More details can be found at http://www.aifb.kit.edu/web/Lehrangebot_des_Instituts_AIFB/en.

Remarks
The module is new in summer term 2011. It replaces part of the modules Service Technology [IW4INAIFB1], *Cloud Computing* [IW4INAIFB2], *Web Service Engineering* [IW4INAIFB3] and *Service Technologie* [IW4INSER] which are not offered an more. The course “Web Servicee Engineering” will not be offered any more from summer term 2012 on. The examination will be offered latest until summer term 2013 (repeaters only).

5.6 Law

Module: Intellectual Property Law [IW4JURA4]

Coordination: T. Dreier
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Law

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24821	Internet Law (p. 210)	2/0	S	3	T. Dreier
24121	Copyright (p. 399)	2/0	W	3	T. Dreier
24656	Patent Law (p. 269)	2/0	S	3	P. Bittner
24609	Trademark and Unfair Competition Law (p. 232)	2/0	W/S	3	Y. Matz, P. Sester
VGE	Computer Contract Law (p. 406)	2/0	W	3	M. Bartsch
GPR	Basic Principles of Patent Law (p. 195)	2/0	W/S	3	K. Melullis
24186	(p. 270)	2/0	W	3	K. Melullis, Markus Dammler

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes

Content

Module: Private Business Law [IW4JURA5]

Coordination: P. Sester
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Law

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24650	Civil Law for Advanced (p. 404)	2/0	S	3	P. Sester
24671	Law of Contracts (p. 405)	2/0	S	3	P. Sester
24167	Employment Law I (p. 120)	2	W	3	A. Hoff
24668	Employment Law II (p. 121)	2	S	3	A. Hoff
24168	Tax Law I (p. 379)	2/0	W	3	D. Dietrich
24646	Tax Law II (p. 380)	2/0	S	3	D. Dietrich

Learning Control / Examinations
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.

Conditions
None.

Recommendations
For the courses

- *Civil Law for Advanced* [24650]
- *Law of Contracts* [24671],

basic knowledge in civil law as taught in the courses *Civil Law for Beginners* [24012], *Advanced Civil Law* [24504], and *Commercial and Corporate Law* [24011] is required.

Learning Outcomes
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.

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.

Module: Public Business Law [IW4JURA6]

Coordination: I. Spiecker genannt Döhmann
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Law

ECTS Credits	Cycle	Duration
9	Every term	1

Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24632	Telecommunications Law (p. 392)	2/0	S	3	I. Spiecker genannt Döhmann
24082	Public Media Law (p. 259)	2	W	3	C. Kirchberg
24666	European and International Law (p. 181)	2/0	S	3	I. Spiecker genannt Döhmann
24140	Environmental Law (p. 395)	2	W	3	I. Spiecker genannt Döhmann
24018	Data Protection Law (p. 156)	2/0	W	3	I. Spiecker genannt Döhmann

Learning Control / Examinations
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.

Conditions
None.

Learning Outcomes

Content

6 Courses

6.1 All Courses

Course: Advanced Econometrics of Financial Markets [2520381]

Coordinators: Y. Kim
Part of the modules: Risk Management and Econometrics in Finance (p. 53)[IW4STAT3], Mathematical and Empirical Finance (p. 51)[IW4STAT1]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Conditions
None.

Learning Outcomes
After successful completion of the course students will have attained both knowledge and competency to comprehend the theories behind portfolio management of major financial institutions. Hence students can adapt this understanding to the more specialised needs of the intermediary.

Content
Advanced Econometrics of Financial Markets covers: Forecasting stock return, market microstructure(non-synchronised trading, spread and modelling transactions), “event studies analysis”, capital asset pricing model, multi-factor price models, intertemporal equilibrium models.

Media
transparencies, exercises.

Literature
Campbell, Lo, McKinlay: The Econometrics of Financial Markets. Princeton University Press.

Remarks
The course Advanced Econometrics of Financial Markets [2520381] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.

Course: Advanced Topics in Economic Theory [2520527]

Coordinators: C. Puppe, M. Hillebrand, K. Mitusch
Part of the modules: Allocation and Equilibrium (p. 43)[IW4VWL7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The focus of the course is the modern economic theory of (general) equilibrium. The course is divided into three parts. The first part introduces the microeconomic foundations of general equilibrium á la Debreu (”The Theory of Value”, 1959) and Hildenbrand/Kirman (”Equilibrium Analysis”,1988). The second part considers dynamic (stochastic) equilibrium models with a particular focus on the overlapping generations model which lie at the heart of modern macroeconomics. The third part deals with asymmetric information and introduces the basic models based on Akerlof’s “Market for Lemons.” The course is largely based on the textbook “Microeconomic Theory” (Chapters 1-5, 10, 13-20) by A.Mas-Colell, M.D.Whinston, and J.R.Green

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

Course: Advanced Web Applications [24604/24153]

Coordinators: S. Abeck
Part of the modules: Web Applications and Web Technologies (p. 62)[IW4INWAWT]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Knowledge in the areas of communication systems (esp. Web technologies) and software engineering.

Learning Outcomes
To understand the architecture of multi-layered and service-oriented applications.
To be able to model the software architecture of a Web application.
To understand the major principles of traditional application development and the corresponding development process.
To comprehend how high-level process models are systematically refined in order to be mapped to a service oriented architecture.

Content
The course consists of the following course units:

• BASICS OF ADVANCED WEB APPLICATIONS: Multilayered application architectures, especially Service Oriented Architectures (SOA) and the development of both traditional and advanced, service-oriented Web applications based on current standards such as XML (Extensible Markup Language) and WSDL (Web Services Description Language) are described.
• SERVICE DESIGN: The development process is extended by two aspects, (i) the mapping of business processes onto service-oriented Web applications and (ii) the design of the needed services.
• USER INTERACTION: This course unit deals with model-driven software development of advanced, human-centered Web applications based on UML (Unified Modeling Language) and MDA (Model-driven Architecture).
• IDENTITY MANAGEMENT: The main functional components of identity management are introduced and the specific needs of a service-oriented solution are derived.
• IT MANAGEMENT: The course unit investigates process-oriented management standards, which can be implemented by using standardized management components.

Media
(1) Learning material: each course unit is covered by a course document (incl. short description, learning goals, index, glossary, references)
(2) Teaching material: slides (integral part of the course documents)

Literature
Thomas Erl: Service-Oriented Architecture – Principles of Service Design, Prentice Hall, 2007.
Elective literature:
(1) Ali Arsanjani: Service-Oriented Modeling and Architecture, IBM developer works, 2004.
(2) Thomas Stahl, Markus Völter: Modellgetriebene Softwareentwicklung, dpunkt Verlag, 2005.
(3) Eric Yuan, Jin Tong: Attribute Based Access Control (ABAC) for Web Services, IEEE International Conference on Web Services (ICWS 2005), Orlando Florida, July 2005.

Remarks
The course is not offered any longer, examination is possible until winter term 2012/13.

Course: Algorithm Engineering [24123]

Coordinators: P. Sanders, D. Wagner
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Lecture *Algorithmn Design*

Learning Outcomes
The students come to know the methodology of algorithm engineering. Moreover, examples of well done algorithm engineering are presented.

Content

- What is algorithm engineering, why is it interesting, ...?
- Realistic models of machines and applications
- Practice-oriented design of algorithms
- Implementation techniques
- Experimental methods
- Analysis of measured data

The above skills are taught using concrete examples. In the past the following topics from the area of fundamental algorithms and data structures have been used for example:

- linked lists without special cases
- Sorting: parallel, external, superscalar,...
- Priority queues (chache efficiency,...)
- Search trees for integer keys
- Full-text indexing
- Graph algorithms: minimum spanning trees (external,...), route planning

The best practical and theoretical techniques known are considered. In most cases, these techniques are very different from the methods taught in a beginner's course.

Media
Slides, Scriptum, scientific papers, source codes

Literature
Elective literature:

- K. Mehlhorn, P. Sanders, Algorithms and Data Structures - The Basic Toolbox, Springer 2008

Course: Algorithms for Ad-Hoc and Sensor Networks [24693]

Coordinators: B. Katz
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1		de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of graph theory and algorithm engineering are helpful.

Learning Outcomes
Students aquire a deep and systematic understanding of algorithmic questions in geometric distributed systems and relevant technologies. They learn how to model tasks in communication and self-organization as geometric and graph-theoretic problems. They understand the development and analysis of centralized and distributed algorithms in the field of sensor networks and are able to apply this knowledge to other fields of research in computer science.

Content
Sensor networks consist of a large number of tiny computing devices that communicate with small range radio transmissions and observe their immediate environment with simple sensors.

Sensor network technology is the result of the development in the integration of microcontrollers, memory and radio chips, sensors for pressure, light, temperature, chemicals etc.

Wireless sensor networks have attracted an enormous attention among research from diverse scientific communities.

They inspired a novel class of algorithmic problems arising from the unique combination of geometry and computation, e. g. new routing paradigms and topology control.

This lecture covers a variety of fundamental algorithmic issues arising in sensor networks, especially with the different models as graph theoretic or geometric problems and with the design of distributed algorithms.

Media
Slides.

Literature
Elective literature:
Wagner, Wattenhofer (Eds.). Algorithms for Sensor and Ad Hoc Networks, Springer, 2008

Course: Algorithms for Routing [24638]

Coordinators: D. Wagner
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of graph theory and algorithm engineering is helpful.

Learning Outcomes
The goal of this course is to give the students a first impression on the problem of route planning and thereby applying knowledge from the fields of graph theory and algorithmics. On one hand, occuring problems are reduced to their algorithmic core and then solved efficiently. On the other hand, several modeling aspects and their interpretations are discussed. Students learn to to apply the presented methods and techniques to related problems autonomously

Content
Finding optimal routes in transportation networks is an everyday problem. While formerly routes used to be planned manually at the kitchen table using maps, automated route planning established in most parts of today's society: the best railway itinerary is obtained from the Internet while routes in road networks are often computed by mobile devices.
An approach to compute best connections emerges from graph theory. The transportation network is modeled as a directed graph wherein the route is computed by a shortest path algorithm. When using travel times as metric in the graph, the resulting route is the provably quickest connection. Dijkstra's algorithm - developed in 1959 - solves the shortest path problem optimally. However, realistic transportation networks are by far too big (the road network of western and central Europe consists of approximately 45 Milllion segments) for Dijkstra's algorithm to be fast enough for practical use. Hence, current research focuses on the development of so-called speed-up techniques for Dijkstra's algorithm. Thereby these methods use a two-phased approach: in a preprocessing step the network is enriched with additional information which is then used to accelerate Dijkstra's algorithm during the computation of shortest paths.

This course gives an overview of state-of-the art algorithms for efficient route planning, from which some are discussed in more detail.

Media
slides

Literature
Elective literature:
Mehlhorn/Sanders: Algorithms and Data Structures, The Basic Toolbox. Springer, 2008

Course: Algorithms II [24079]

Coordinators: P. Sanders
Part of the modules: Introduction to Algorithmics (p. 84)[IW4INEAT], Introduction to Algorithmics (p. 59)[IW4INEALGT]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (approx. 120 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
See module description.

Learning Outcomes
The student

- gains profound insight into the most important aspects of algorithmics
- identifies algorithmic problems in different areas of application and can formulate these in a formal manner
- comprehends and determines the running times of algorithms
- knows fundamental algorithms and data structures and can apply this knowledge to new problems.

Content
This course conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.

Course: Algorithms in Cellular Automata [24622]

Coordinators: T. Worsch
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
3	2/1	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students get acquainted with the basic and important approaches to and techniques for fine-grained parallel algorithms.
They are able to develop simple CA algorithms themselves which use these techniques and to asses the quality.

Content
Cellular automata are an important model for fine-grained parallelism, which was developed by John von Neumann using a suggestion by S. Ulam.

In the course important basic algorithms (e.g. for synchronization) and techniques for the design of efficient fine-grained algorithms are introduced. The application of these algorithms in different problem areas shown. Besides self-replication, which was von Neumann's motivation, pattern transformations and problem known from sequential algorithms like sorting, this also includes typical parallel problems like leader election and the modelling of real phenomena.

Contents:

- computational complexity
- pattern recognition
- self-reproduction
- sorting
- syncronization
- leader election
- discretization of continuous systems
- sandpile model

Media
lecture notes and slides in pdf format; computer demonstrations

Literature
Elective literature:

- M. Delorme, J. Mazoyer: Cellular Automata, Kluwer, 1999
- B. Chopard, M. Droz: Cellular Automata Modeling of Physical Systems, Cambridge Univ. Press, 1998
- J. von Neumann: Theory of Self-Reproducing Automata (ed. A. Burks), Univ. of Illinois Press, 1966
- T. Toffoli, N. Margolus: Cellular Automata Machines, MIT Press, 1987
- R. Vollmar: Algorithmen in Zellularautomaten, Teubner, 1979

Course: Algorithms for Visualization of Graphs [24118]

Coordinators: D. Wagner, R. Görke
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of graph theory and algorithmics is helpful.

Learning Outcomes
The students acquire a systematic understanding of algorithmic problems and solutions in the area of graph visualization, which builds upon existing knowledge in graph theory and algorithmics. The problems at hand are reduced to their algorithmic core and are subsequently solved efficiently – if possible from the complexity point-of-view. The students learn to apply the presented methods and techniques autonomously to related questions. They are enabled to work on current research questions in graph drawing.

Content
Networks are relational data that increasingly occur in various applications. Examples range from physical networks, for example, transport or supply networks, to abstract networks, for example, social networks. Network visualization is a basic tool to explore and understand such networks.

Mathematically, networks are modeled as graphs and the visualization problem reduces to the algorithmic core problem of finding a suitable graph layout, that is, determining the positions of vertices and edges in the plane. Depending on the application and the properties of the graph at hand different constraints and optimization criteria apply. The corresponding research area of graph drawing uses approaches from algorithmics, graph theory, and computational geometry.

In the course of the lecture, a representative selection of visualizationalgorithms is presented.

Media
Blackboard, slides, script.

Literature
Elective literature:

- Di Battista, Eades, Tamassia, Tollis: Graph Drawing, Prentice Hall 1999
- Kaufmann, Wagner: Drawing Graphs, Springer-Verlag, 2001

Course: Computational Geometry [24618]

Coordinators: M. Nöllenburg, D. Wagner
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of algorithms and data structures (e.g. from the lectures Algorithms I + II) is expected.

Learning Outcomes
After successful participation in this module students shall be able to

- explain concepts, structures and problem definitions that were presented in class
- execute algorithms on example instances, analyze them and explain their properties
- select which algorithms and data structures are suitable for solving a given geometric problem and adapt them appropriately
- analyze new geometric problems and design own solutions based on the concepts and techniques presented in this lecture

Content
Spatial data are processed in various subfields of computer science, e.g. in computer graphics, visualization, geographic information systems, robotics etc. The area of computational geometry deals with the design and analysis of geometric algorithms and data structures. In this module we present common techniques and concepts in computational geometry in the context of selected and applied geometric questions.

Media
blackboard, slides, excercise sheets

Literature
Mark de Berg, Otfried Cheong, Marc van Kreveld, Mark Overmars: Computational Geometry Algorithms and Applications, Springer Verlag 2008
Rolf Klein: Algorithmische Geometrie, Springer Verlag 2005

Course: Algorithms for Internet Applications [2511102]

Coordinators: H. Schmeck
Part of the modules: Ubiquitous Computing (p. 96)[IW4INAIFB7], Intelligent Systems and Services (p. 94)[IW4INAIFB5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	en

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination (called “bonus exam”, 45 min) (according Section 4(2), 3 of the examination regulation).
The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
The students will learn to master methods and concepts of essential algorithms within Internet applications and to develop capabilities for innovative improvements. The course aims at teaching advanced concepts for the design and application of algorithms with respect to the requirements in networked systems. Based on a fundamental understanding of taught concepts and methods the students should be able to select appropriate concepts and methods for problem settings in their future professional life, and - if necessary - customize and apply them in an adequate way. The students will be capable to find appropriate arguments for their chosen approach to a problem setting.
In particular, the student will

- know the structure and elementary protocols of the Internet (TCP/IP) and standard routing algorithms (distance vector and link state routing),
- know methods of information retrieval in the WWW, algorithms for searching information and be able to assess the performance of search engines,
- know how to design and use cryptographic methods and protocols to guarantee and check confidentiality, data integrity and authenticity,
- know algorithmic basics of electronic payment systems and of electronic money.

Content
Internet and World Wide Web are changing our world, this core course provides the necessary background and methods for the design of central applications of the Internet. After an introduction into Internet technology the following topics are addressed: information retrieval in the www, structure and functioning of search engines, foundations of secure communication, electronic payment systems and digital money, and - if time permits - security architectures.

Media
Powerpoint slides with annotations on graphics screen, access to Internet resources, recorded lectures

Literature

- Tanenbaum: Computer Networks, 4th edition, Prentice-Hall 2003.
- Baeza-Yates, Ribeiro-Neto: Modern Information Retrieval. Addison-Wesley, 1999.
- Wobst: Abenteuer Kryptologie : Methoden, Risiken und Nutzen der Datenverschlüsselung, 3rd edition. Addison-Wesley, 2001.
- Schneier: Applied Cryptography, John Wiley, 1996.
- Furche, Wrightson: Computer money : Zahlungssysteme im Internet [Übers.: Monika Hartmann]. - 1. Aufl. - Heidelberg : dpunkt, Verl. für Digitale Technologie, 1997.

Elective literature:

- Further references will be given in the course.

Course: Analysis and modeling of human motion sequences [ammb]

Coordinators: T. Schultz
Part of the modules: Biosignal Processing (p. 79)[IW4INBSV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

- Relating to the discussed working field, the basics of data processing in the field of captured image sequences will be introduced an the studends should take the relations of different processing steps.
- A general overview of the research field of motion analysis including image processing should be given.
- The students should learn the analysing, structuring and a formal description of problems in the research area of motion capturing, motion recognition and synthesis. The student should be able to realise the learned methods due to a further self studying in practical examples
- The student should be able to apply the presented methods and is able to tranfer them to similar scenarios.
- The student should be indroduced to the basic methods of image processing and to the relationsships of the different processing steps.

Content
Within the lecture an indroduction to the basic principles of the analysis and modeling of human motion relating to captured image sequences is given. The objectives of the field of motion analysis is discussesd which are settled in different research areas. Relating to the spezific goals the basic processing methods of the essential data processing procedures are explained. These data processing steps in detail contain the methods of capturing and processing image data, like video sequences, as well as the biomechanical and kinematic modeling of motion.
Due to a statistical modelling and the recognition of the motion sequences Hidden Markov Models are indroduced.
The methods are also demonstrated within actual research work and results.

Media
Slides (online at http://csl.anthropomatik.kit.edu)

Literature
Elective literature:
Will be announced in the lecture.

Remarks
The course is not offered any longer, examination is possible until winter term 2012/13.

Course: Requirements Analysis and Requirements Management [2511218]

Coordinators: R. Kneuper
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
The students have a full understanding of the foundations of the analysis and management of requirements as part of the development process of software and systems. They know the main terminology and approaches of this topic, and are able to express requirements themselves using different description methods.

Content
The analysis and management of requirements is a central task in the development of software and systems, addressing the border between the application discipline and computer science. The adequate performance of this task has a decisive influence on the whether or not a development project will be successful. The lecture provides an introduction to this topic, using the syllabus for the “Certified Professional for Requirements Engineering” (CPRE) as a guideline.
Lecture structure:
1. Introduction and overview, motivation
2. Identifying requirements
3. Documenting requirements (in natural language or using a modelling language such as UML)
4. Verification and validation of requirements
5. Management of requirements
6. Tool support

Literature
Literature will be given in the lecture.

Course: Applied Differential Geometry [24175]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students are introduced into an active research area and will be acquainted with the important specifics

Content
Elements of differential geometry as curvature, isophothes, geodesics, curvature lines, offset curves and surfaces, minimal surfaces, optimal parametrizations, developable surfaces, unfoldings. These concepts are introduced for smooth surfaces and similar discrete concepts are discussed for triangular meshes.

Media
Blackboard and slides

Literature
Elective literature:
See http://i33www.ira.uka.de/pages/Lehre/Vorlesungen/AngewandteDifferentialgeometrie.html

Course: Planning and Management of Industrial Plants [2581952]

Coordinators: F. Schultmann
Part of the modules: Industrial Production II (p. 37)[IW4BWLIIP2]

ECTS Credits	Hours per week	Term	Instruction language
5,5	2/2	Winter term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes

- Students shall be able to describe the tasks of plant management.
- Students shall be proficient in using selected methods of investment and cost estimates.
- Students shall be able to consider necessary processing and logistical requirements of designing industrial plants.
- Students shall be able to discuss interdependencies between capacity planning, process design and plant optimization.
- Students shall be proficient in discussing and applying selected methods of quality management, plant maintenance and plant dismantling.

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.

Media
Media will be provided on the e-learning platform.

Literature
will be announced in the course

Course: Applying Formal Verification [24625]

Coordinators: B. Beckert
Part of the modules: Software Systems (p. 64)[IW4INSWS]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Employment Law I [24167]

Coordinators: A. Hoff
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
It is the aim of this lecture to provide a solid insight into individual-related labour law. The students will understand the importance of labour law as an integral part of social market economy. They will be able to review contractual provisions in employment contracts and to evaluate labour law conflicts.

Content
Students will be introduced to all labour law regulations concerning the beginning, enforcement and termination of an employment. The lecture provides an introduction into procedural matters. A labour court's trial will be attended.

Literature
tba at the beginning of the course.

Course: Employment Law II [24668]

Coordinators: A. Hoff
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
Based on the knowledge gained in the lecture on Labour Law I, the students are to gain a deeper insight into labour law.

Content
Students will gain insight into the statutory rights of employees and tariff law. They learn about the importance of employers associations and unions for the economy and gain adequate knowledge of laws concerning industrial action, supply of temporary workers and social security law.

Literature
Tba at the beginning of the course.

Course: Asset Pricing [2530555]

Coordinators: M. Uhrig-Homburg, M. Ruckes
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2], Finance 1 (p. 29)[IW4BWLFBV1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	

Learning Control / Examinations

Conditions
None.

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

Learning Outcomes
The objective of this course is to become familiar with advanced concepts in asset pricing (in particular the stochastic discount factor model). The second half of the course will put a focus on empirical questions related to the previous part. We strongly recommend knowledge of the basic topics in investments (bachelor course), which will be necessary to be able to follow the course.

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

Literature
Basic literature

- Asset pricing / Cochrane, J.H. - Rev. ed., Princeton Univ. Press, 2005.
- The econometrics of financial markets / Campbell, J.Y., Lo, A.W., MacKinlay, A.C. - 2. printing, with corrections, Princeton Univ. Press, 1997.

Elective literature

- Investments / Bodie, Z., Kane, A., Marcus, A.J. - 8. ed., McGraw-Hill, 2009.

Course: Asymmetric Encryption Schemes [24115]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
none

Recommendations
Basic knowledge of algebra is helpful.

Learning Outcomes
• The student will learn both the methods and mechanisms of cryptography in practice, as well as the theoretical foundations of cryptography.
• The student should be able to critically assess algorithms and protocols and to identify vulnerabilities/threats.

Content
This course will show the students the theoretical and practical aspects of Public Key Cryptography.
• The most important primitives of cryptography will be covered, as there are: one-way function, hash function, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g. Diffie-Hellman) with their strengths and weaknesses.
• In addition to public-key systems, the lecture provides knowledge about number-theoretic algorithms for solving problems such as primality testing, factoring large numbers and computing discrete logarithms in finite groups. Thus the choice of parameters and the related level of security of a cryptographic system can be estimated.
• Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
• The combination of cryptographic modules will be treated on for currently used protocols such as Secure Shell (SSH), Transport Layer Security (TLS) and anonymous digital money.

Course: Auction Theory [2590408]

Coordinators: K. Ehrhart
Part of the modules: Applied Strategic Decisions (p. 42)[IW4VWL2], Market Engineering (p. 25)[IW4BWLISM3], Communications & Markets (p. 27)[IW4BWLISM5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

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

Conditions
None.

Recommendations
We suggest to attend either Game Theory I or Decision Theory beforehand.

Learning Outcomes
The student

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

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

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

Media
Script, overhead slides, additional printed material.

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

Course: Selected topics in Cryptography [24623]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

- The student will be taught that the cryptographic security of applications exceeds the question of good encryption
- The most important cryptographic building blocks for larger security applications are to be understood and can be used
- The difficulties in the composition (e.g. in a modular design) of security applications should be understood, as well as new techniques which enable a modular design.

Content

- 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

Course: Automatic Test Generation [24637]

Coordinators: M. Taghdiri
Part of the modules: Software Systems (p. 64)[IW4INSWS]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Summer term	en

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students will learn about modern software testing approaches. They will understand pros and cons of these techniques and can evaluate what else has to be done in order to make them fully applicable to real-life programs.

Content
In this lecture, we cover a number of recently-developed techniques for generating test cases for software systems. The techniques are automatic, represent different approaches, and provide various guarantees.
Topics include:

- Exhaustive test generation,
- Random test generation,
- Directed random test generation,
- Test generation based on symbolic execution,
- Concolic test generation.

For more information, please visit http://asa.iti.kit.edu/

Media
Sides, research papers

Literature
Will be announced in the lecture.

Remarks
Is not offered at the moment.
This lecture was previously called “Automatic Program Checking”.

Course: Basics of Liberalised Energy Markets [2581998]

Coordinators: W. Fichtner
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/1	Winter term	en

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

Conditions
None.

Learning Outcomes

Content
1. The European liberalisation process
1.1 The concept of a competitive market
1.2 The regulated market
1.3 Deregulation in Europe
2. Pricing and investments in a liberalised power market
2.1 Merit order
2.2 Prices and investments
2.3 Market flaws and market failure
2.4 Regulation in liberalised markets
2.5 Additional regulation mechanisms
3. The power market and the corresponding submarkets
3.1 List of submarkets
3.2 Types of submarkets
3.3 Market rules
4. Risk management
4.1 Uncertainties in a liberalised market
4.2 Investment decisions under uncertainty
4.3 Estimating future electricity prices
4.4 Portfolio management
5. Market power
5.1 Defining market power
5.2 Indicators of market power
5.3 Reducing market power
6. Market structures in the value chain of the power sector

Media
Media will likely be provided on the e-learning platform ILIAS.

Literature
Elective literature:
Power System Economics; Steven Stoft, IEEE Press/Wiley-Interscience Press, 0-471-15040-1

Course: Provable Security in Cryptography [24166]

Coordinators: D. Hofheinz
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None

Learning Outcomes
The student

- knows the foundations of the security analysis of cryptographic systems that offer provable security guarantees
- understands and explains cryptographically desirable and provable security guarantees of cryptographic systems,
- understands and explains examples of provably secure cryptographic systems

Content
When is an encryption scheme secure? What type of security is guaranteed by a digital signature scheme? How can secure cryptographic systems be constructed? These and more questions are the topic of this lecture. We put particular emphasis on concrete examples: we will present several cryptographic schemes (such as encryption schemes) and analyze their security properties. In this, the notion of a security proof will play a central role. We endeavour to find mathematical proofs that a given system achieves certain desirable properties under well-defined complexity-theoretic assumptions.

Course: Biosignals and User Interfaces [24105]

Coordinators: T. Schultz, M. Wand
Part of the modules: Biosignal Processing (p. 79)[IW4INBSV]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students are introduced to the basics of biosignal processing, including the emergence of biosignals, recording mechanisms, and interpretation methodology, and get to know their potential in applications related to human-machine interfaces. They learn to analyze and describe the challenges and chances when using biosignals for user interfaces.
In order to achieve this, students are acquainted with the basic methods of biosignal acquisition, signal processing, and machine learning and classification. The current state-of-the-art in research and development is illustrated with many application examples.
After having participated in this lecture, the students shall be able to transfer their knowledge to new requirements in modern biosignal processing.

Content
This module introduces into technologies which use different human biosignals for acquiring information and thereby revolutionize the design of user interfaces. The main focus is the interaction of humans and machines.
We first give an overview of the range of human biosignals, concentrating on those signals which may be recorded non-invasively, like the brain activity (electroencephalogram – EEG), which may be recorded from the head surface, the muscular activity (electromyogram – EMG), which may be recorded from the skin, eye activity (electrooculogram – EOG), and further signals like skin conductance, pulse and breathing frequency.
Subsequently we cover the basics of measuring, processing, and classifying and interpreting these signals. We illustrate these topics with multiple examples of how these methods are used both in literature as well as in our own research.
Further information is available at http://csl.anthropomatik.kit.edu.

Media
slides (online at http://csl.anthropomatik.kit.edu)

Literature
Elective literature:
Will be announced in the lecture.

Remarks
Language of the lecture: German (English by request)

Course: Exchanges [2530296]

Coordinators: J. Franke
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
1,5	1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students learn about current developments regarding organisation of exchanges and securities trading.

Content

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

Literature
Elective literature:
Educational material will be offered within the lecture.

Course: Business Activity Management [2511506]

Coordinators: C. Janiesch
Part of the modules: Service Computing 2 (p. 100)[IW4INAIFB13], Service Computing 1 (p. 99)[IW4INAIFB12], Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1		

Learning Control / Examinations
The assessment of this course is a written examination (60min.) in the first week after lecture period (nach §4(2), 1 SPO).

Conditions
None.

Recommendations
The course might be combined with the lecture “Service Oriented Computing 1”.

Learning Outcomes

Content

Media
Slides in PDF-format will be provided via the course webpages.

Literature
Compulsory literature will be announced in the course.

Course: Business and IT Service Management [2590484]

Coordinators: G. Satzger, J. Kunze von Bischhoffshausen
Part of the modules: Service Management (p. 28)[IW4BWLISM6]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	en

Learning Control / Examinations
The assessment of this course is a written examination (60 min.) (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4(2), 3 SPO).

Conditions
None.

Learning Outcomes
Students understand the importance of “servitization” for organizations, the challenges for the management of service-oriented enterprises and the interdependence of business and IT services.
Students learn standard concepts and methods of service-oriented management and are able to apply them in practical case studies.
Student get familiar with current research and tools and are able to critically evaluate them.
Students practice to communicate in English and to work on solutions in teams.

Content
The rapid development of information and communication technology transforms many enterprises towards service-oriented structures: with new digital services, new business models and process structures within larger service networks. Thus, strategic and operative management of service-oriented enterprises increasingly gains importance. In this course, we want to systematically acquire relevant know-how and apply this to real word examples. Particular focus will be on the interdependence of business, IT and legal aspects.
The course will be taught in English. It should provide ample opportunity for active participation of students. The course will integrate presentations of experts from business practice as well as a comprehensive case study (”en bloc” for 1 day) in which students will actively work on the strategic service-oriented shift of an enterprise.

Media
Presentation (pdf)

Literature
Fitzsimmons J./Fitzsimmons, M., Service Management, Operations, Strategy and Information Technology, 6. ed., 2007
Maister, David H., Managing The Professional Service Firm, 1997
Teboul, J. , Service is Front Stage: Positioning services for value advantage, 2006
Grönroos, Service Management and Marketing, 2007

Course: Business Dynamics [2540531]

Coordinators: A. Geyer-Schulz, P. Glenn
Part of the modules: Advanced CRM (p. 22)[IW4BWLISM1], Electronic Markets (p. 24)[IW4BWLISM2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
Students

- aquire the system thinking worldview for economics
- utilize different methods and tools to map the structure of complex economic systems
- are able to relate dynamic effects to these structures
- learn how to simulate systems within the computer for testing purposes
- use simulation results to improve models
- can independently as well as in teams model, analyze, and optimize business processes and applications
- know how to offer business dynamics as a consulting service and work together with client teams

Content
Corporate growth, the diffusion of new technologies, business processes, project management, product development, service quality management — all these are examples for application areas of business dynamics. They all are dynamic systems that are characterized by feedback loops between many different variables. By means of the tools of business dynamics such systems can be modelled. Simulations of complex systems allow the analysis, the goal centered design, as well as the optimization of markets, business processes, policies, and organizations.

Media

- Slides
- System Dynamics Software Vensim PLE: http://www.vensim.com/venple.html

Literature
John D. Sterman. Business Dynamics: Systems Thinking and Modeling for a Complex World. McGraw-Hill, 2000.

Course: Business Administration in Information Engineering and Management [2540500]

Coordinators: A. Geyer-Schulz
Part of the modules: Information Engineering and Management (p. 16)[IW4WWIW]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
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1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Recommendations
Basic knowledge from Operations Research (linear programming) and from decision theory are expected.

Learning Outcomes
The student is able to

- transfer models from Business Administration to situations in business whose basic conditions are changed due to the implementation of information and communication technology,
- apply methods from Business Administration (Decision theory, game theory, operations research, etc.) to questions of Information Engineering and Management,
- analyze the potential to automize the decision making process in businesses by data bases,
- describe the process to extract relevant data for decision making from operational accounting systems.

Content
In this lecture, 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.

Media
Slides, Audio.

Literature

- G. Bamberg und A. G. Coenenberg (2006). Betriebswirtschaftliche Entscheidungslehre. (13. edition), chapter 1 – 8, pages 1 – 270.
- Russell, S. and Norvig, P. (1995). Artificial Intelligence: A Modern Approach The Intelligent Agent Book. Prentice-Hall, Upper Saddle River. chapter 2, pages 31 – 37.

- Porter, M. E. (1998a). Competitive Advantage: Creating and Sustaining Superior Performance. The Free Press, New York, 2 edition. chapter 1, pages 1 – 30
- Porter, M. E. (1998b). Competitive Strategy: Techniques for Analyzing Industries and Competitors. The Free Press, New York, 2 edition. chapters 1+2, pages 1 – 46
- Horngren, C. T., Datar, S. M., and Foster, G. (2003). Cost Accounting: A Managerial Emphasis. Prentice-Hall, Upper Saddle River, 11 edition. chapter 13, pages 446 – 460
- Cooper,W.W., Seiford, L. M., and Tone, K. (2000). Data Envelopment Analysis. Kluwer Academic Publishers, Boston. chapter 2, pages 21– 25
- Copeland, T. and Weston, F. (1988). Financial Theory and Corporate Policy. Addison-Wesley, Reading, 3 edition. pages 18 – 41 and chapter 4.E, pages 92 – 95].
- Myerson, R. B. (1997). Game Theory. Harvard University Press, London, 3 edition. pages 99–105.
- Milgrom, P. and Roberts, J. (1992). Economics, Organization and Management. Prentice Hill [Chapter 2, pp. 25-39].

Course: Cloud Computing [2511504]

Coordinators: S. Tai, Kunze
Part of the modules: Service Computing 2 (p. 100)[IW4INAIFB13], Web Data Management (p. 93)[IW4INAIFB4], Service Computing 1 (p. 99)[IW4INAIFB12], Cloud Computing (p. 91)[IW4INAIFB2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The course introduces concepts, methods, and techniques of Cloud Computing for providing and consuming IT resources, development- and runtime environments, and software applications of all kinds as Web services.

Content
Building on compute and storage virtualization, Cloud Computing provides scalable, network-centric, abstracted IT infrastructure, platforms, and software applications as on-demand services that are billed by consumption. Innovative business models, cost efficiency, and time-to-market are further promises associated with Cloud Computing. The lecture introduces Cloud Computing, covering topics such as:

- Fundamentals: Virtualization, Service-orientation
- Commercial and Open-Source Cloud offerings
- Cloud service engineering
- Web-scale Cloud service architecture
- Cloud service management
- Obstacles and opportunities

Literature
Cloud Computing: Web-Based Dynamic IT Services, von C. Baun, M. Kunze, J. Nimis, S. Tai. Springer-Verlag 2011.

Course: Communications Economics [2540462]

Coordinators: J. Kraemer
Part of the modules: Communications & Markets (p. 27)[IW4BWLISM5], Telecommunications Markets (p. 46)[IW4VWL10]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4,(2), 3 SPO).
The total grade for this lecture will consist to 80% of the grade achieved in the written examination and to 20% of the assignments during the exercises.

Conditions
None.

Recommendations
Formally, there are no prerequisites to visiting this class. The course is aimed at MA students with a solid background in economics, preferably, but not necessarily, in Industrial Organization. The course is complementary to the course "Telekommunikations- und Internetökonomie [2561232]" which is held in German and deals with more advanced topics in communications economics.

Learning Outcomes
The course will provide students with an introduction to the economic, technological and legal (regulatory) foundations of telecommunications markets. Moreover, students will get acquainted with current regulatory economic challenges, such as local loop unbundling, regulation of the Internet, or assignment of spectrum licenses.

Content
The lessons of this course include:

- The Demand of Telecommunications Services
- Technological and Economic Principles of Telecommunications Infrastructure
- Foundations of (Telecommunications) Regulation
- One-Way Access & Access Pricing
- Frequency Licenses and Spectrum Assignment
- The Economics and the Design of Telecommunications Tariffs
- The Economics of the Internet

Term Paper:
Each student is required to submit a short term paper (4 pages) on a current topic in telecommunications regulation. The topic will be presented in the first lecture and students have time for the remainder of the course to work on the term paper. The term paper is graded and accounts for 20% of the final grade.
Tutorials:
In addition, complementary tutorials will be held every two weeks. Exercise sheets will be submitted to the students in advance. Solutions to the exercises will be presented during the tutorials.

Media

- Powerpoint
- eLearning Platform Ilias

Literature

- J.-J. Laffont, J. Tirole (2000): *Competition in Telecommunications*, MIT Press.
- R. R. Braeutigam (1989): "Optimal Policies for Natural Monopolies" in: R. Schmalensee and R. Willig (eds.): *Handbook of Industrial Organization*, Vol. 2, Ch. 23, pp. 1289–1346, North-Holland
- Steger, U., Büdenbender, U., Feess, E., Nelles, D. (2008): *Die Regulierung elektrischer Netze: Offene Fragen und Lösungsansätze*, Springer
- Varian, Hal (2006): "Intermediate microeconomics: a modern approach", 7th edition (international student edition), Norton

Remarks
The course is added to the Module Telecommunications Markets in the winter term 2011/12.

Course: Complexity Management [2511400]

Coordinators: D. Seese
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11], Organic Computing (p. 97)[IW4INAIFB8]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO). The exam will be offered every semester and may be repeated at every ordinary exam date.
Questions are in German and English, answers are possible in German or in English.
In case that only a small number of candidates apply for the examination there will be offered an oral examination according to Section 4(2),1 of the examination regulation.

Conditions
None.

Recommendations
A basic knowledge in informatics is suitable.

Learning Outcomes
Students will be enabled to acquire abilities, methods and instruments in the area of complexity management and learn to use them in an innovative way. The students should be enabled to find arguments for the solution of problems in this area. The basic goal of the lecture is to enable to understand the difficulties to manage complex systems and processes.

Content
Complexity is one of the biggest challenges of our time. Central questions are: - Why humans often fail in complex situations? - What is complexity? -What are reasons for complexity? - Which parameters are essential to control complexity? - How systems have to be designed to reduce their complexity and to enable management of complexity?
The lecture gives a survey on fundamental results and handles the following topics: - Understanding of the difficulties produced by complex systems and complex processes - Foundations: modelling complex systems, complexity theory, descriptive, structural and parametric complexity, dynamic systems, topology, dimension, non-linearity, chaos, randomness and emerging structures, human shortcomings, simulation - Complexity of products and production - Complexity of markets - How to improve complexity management? - Decision support by intelligent use of IT

Media
The slides of the lectures will be provided on the website of the lecture.

Literature

- Franz Reither: Komplexitätsmanagement. Gerling Akademie Verlag, München 1997
- Dietrich Dörner: The Logic of Failure, Basic Books 1996
- G. Schuh, U. Schwenk: Produktkomplexität managen. Carl Hanser Verlag, München 2001
- Ch. Perrow: Normal Accidents. Living with High-Risk technologies, Basic Books, New York, 1984.
- J.D. Sterman: Business Dynamics, Systems Thinking and Modeling for a Complex World, McGraw-Hill Higher Education, 2000.
- R. G. Downey, M.R. Fellows: Parameterized Complexity. Springer 1999
- Heinz-Otto Peitgen, Hartmut Jürgens, Dietmar Saupe: Chaos and Fractals, Springer-Verlag New York, 1992, 2004 (second edition).
- S. Wolfram: A new kind of Science. Wolfram Media Inc. 2002

Elective literature:

- M.R. Garey, D. S. Johnson: Computers and intractability A guide to the theory of NP-completeness, W. H. Freeman and Company, New York, 1979
- N. Immerman: Descriptive Complexity; Springer-Verlag, New York 1999
- R. Diestel: Graphentheorie, Springer 1996
- J. A. Bondy, U.S.R. Murty: Graph Theory, Springer 2008
- H.D. Ebbinghaus, J. Flum, W. Thomas: Mathematical Logic, Springer-Verlag, New York 1984
- Christos H. Papadimitriou: Computational Complexity, Addison-Wesley, Reading, Massachusetts, 1994

- R. Niedermeier: Invitation to Fixed-Parameter Algorithms, Oxford University Press 2006
- W. Metzler: Nichtlineare Dynamik und Chaos, Teubner Studienbücher Mathematik, Stuttgart 1998
- G. Frizelle, H. Richards (eds.): Tackling industrial complexity: the ideas that make a difference. University of Cambridge, Institute of Manufacturing 2002
- W. Bick, S. Drexl-Wittbecker: Komplexität reduzieren, Konzept. Methoden. Praxis, LOG_X Verlag GmbH, Stuttgart, 2008
- U. Lindemann, M. Maurer, T. Braun: Structural Complexity Management, An Approach for the field of Product Design, Springer-Verlag, Berlin, Heidelberg, 2009
- M. J. North, Ch. M. Macal: Managing Busieness Complexity, Discovering Strategic Solutions with Agent-Based Modeling and Simulation, Oxford University Press 2006
- S. Bornholdt, H. G. Schuster (Eds.): Handbook of Graphs and Networks, From the Genome to the Internet, Wiley-VCH, 2003
- Further references will be given in each lecture.

Remarks
The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described contend and schedule.
The course “Complexity Management” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

Course: Computational Economics [2590458]

Coordinators: P. Shukla, S. Caton
Part of the modules: Market Engineering (p. 25)[IW4BWLISM3], Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4,(2), 3 SPO).
The total grade for this lecture will consist to 70% of the grade achieved in the written examination and to 30% of the assignments during the exercises.

Conditions
None.

Learning Outcomes
The student

- understands the methods of Computational Economics and applies them on practical issues
- evaluates agent models considering bounded rational behaviour and learning algorithms,
- analyses agent models based on mathematical basics,
- knows the benefits and disadvantages of the different models and how to use them,
- examines and argues the results of a simulation with adequate statistical methods,
- is able to support the chosen solutions with arguments and can explain them.

Content
Examining complex economic problems with classic analytical methods usually requires making numerous simplifying assumptions, for example that agents behave rationally or homogeneously. Recently, widespread availability of computing power gave rise to a new field in economic research that allows the modeling of heterogeneity and forms of bounded rationality: Computational Economics. Within this new discipline, computer based simulation models are used for analyzing complex economic systems. In short, an artificial world is created which captures all relevant aspects of the problem under consideration. Given all exogenous and endogenous factors, the modelled economy evolves over time and different scenarios can be analyzed. Thus, the model can serve as a virtual testbed for hypothesis verification and falsification.

Media

- Lecture slides and exercises as pdf-files.

Literature

- R. Axelrod: “Advancing the art of simulation in social sciences”. R. Conte u.a., Simulating Social Phenomena, Springer, S. 21-40, 1997.
- R. Axtel: “Why agents? On the varied motivations for agent computing in the social sciences”. CSED Working Paper No. 17, The Brookings Institution, 2000.
- K. Judd: “Numerical Methods in Economics”. MIT Press, 1998, Kapitel 6-7.
- A. M. Law and W. D. Kelton: “Simulation Modeling and Analysis”, McGraw-Hill, 2000.
- R. Sargent: “Simulation model verification and validation”. Winter Simulation Conference, 1991.
- L. Tesfation: “Notes on Learning”, Technical Report, 2004.
- L. Tesfatsion: “Agent-based computational economics”. ISU Technical Report, 2003.

Elective literature:

- Amman, H., Kendrick, D., Rust, J.: “Handbook of Computational Economics”. Volume 1, Elsevier North-Holland, 1996.
- Tesfatsion, L., Judd, K.L.: “Handbook of Computational Economics”. Volume 2: Agent-Based Computational Economics, Elsevier North-Holland, 2006.
- Marimon, R., Scott, A.: “Computational Methods for the Study of Dynamic Economies”. Oxford University Press, 1999.
- Gilbert, N., Troitzsch, K.: “Simulation for the Social Scientist”. Open University Press, 1999.

Remarks
This course is offered in cooperation with the Institute of Applied Informatics and Formal Description Models (AIFB).
Summer Term 2011: The course has been added to the Module [IW3INAIFB5] “*Algorithms and Applications*” and is thus also eligible for 3rd year B.Sc. students majoring in Information Engineering and Management.

Course: Computer-based Production Planning and Control, Process Simulation and Supply Chain Management [2581975]

Coordinators: M. Fröhling, F. Schultmann
Part of the modules: Industrial Production III (p. 38)[IW4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
2	2/0	Summer term	de

Learning Control / Examinations
The examination will be in form of an oral or written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes

- Students shall be able to discuss problems arising out of IT-based PPS, process simulations and Supply Chain Management.
- Students shall be able to apply general approaches to solve the addressed problems.

Content
Following an introduction into the structure, the history and still existing shortcomings of systems for planning and control of production, this lecture introduces different approaches for computer-assisted planning. The approaches are subdivided into methodologies for the simulation of processes on the one hand and optimising and descriptive planning models on the other hand. Finally, commercially available, industry-specific software tools are presented and discussed, which focus on production planning (PP) and materials management (MM) in the SAP ERP system.
Furthermore, process engineering software tools are presented and discussed in the light of integration into production planning as well as tools to simulate material flows and supply chains (with respect to Advanced Planning Systems).

Media
Media will be provided on the e-learning platform.

Literature
will be announced in the course

Course: Corporate Financial Policy [2530214]

Coordinators: M. Ruckes
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students are told profound knowledge about appropriate financing of firms.

Content
The course deals with the theory of corporate finance:

- Financing contracts
- Financing capacity
- Issuance of securities
- Capital structure
- Payout policy
- Liquidity management
- Corporate acquisitions and restructurings

Literature
Elective literature:
Tirole, J. (2006): The Theory of Corporate Finance. Princeton University Press.

Course: Current Issues in the Insurance Industry [2530350]

Coordinators: W. Heilmann
Part of the modules: Insurance Management II (p. 32)[IW4BWLFBV7], Insurance Management I (p. 31)[IW4BWLFBV6]

ECTS Credits	Hours per week	Term	Instruction language
2,5	2/0	Summer term	de

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

Conditions
None.

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

Learning Outcomes
Knowledge and understanding of important current characteristics of insurance, e.g. insurance markets, lines, products, investment, company pension schemes, corporate structures and governance as well as controlling.

Content
Current topics in insurance markets.

Literature
Elective literature:
Farny, D. Versicherungsbetriebslehre. Verlag Versicherungswirtschaft; Auflage: 5. 2011
Koch, P. Versicherungswirtschaft - Ein einführender Überblick. Verlag Versicherungswirtschaft. 2005
Tonndorf, F., Horn, G., and Bohner, N. Lebensversicherung von A-Z. Verlag Versicherungswirtschaft. 1999
Fürstenwerth, J., andWeiß, A. Versicherungsalphabet (VA). Verlag Versicherungswirtschaft. 2001
Buttler, A. Einführung in die betriebliche Altersversorgung. Verlag Versicherungswirtschaft. 2008
Liebwein, P. Klassische und moderne Formen der Rückversicherung. Verlag Versicherungswirtschaft. 2009
Gesamtverband der Deutschen Versicherungswirtschaft. *Jahrbuch 2011 Die deutsche Versicherungswirtschaft.* http://www.gdv.de/wp-content/uploads/2011/11/GDV_Jahrbuch_2011.pdf. 2011
Deutsch, E. Das neue Versicherungsvertragsrecht. Verlag Versicherungswirtschaft. 2008
Schwebler, Knauth, Simmert. Kapitalanlagepolitik im Versicherungsbinnenmarkt. 1994
Seng. Betriebliche Altersversorgung. 1995
von Treuberg, Angermayer. Jahresabschluss von Versicherungsunternehmen. 1995

Remarks
Block course. For organizational reasons, please register with the secretay of the chair: thomas.mueller3@kit.edu.

Course: Customer Relationship Management [2540508]

Coordinators: A. Geyer-Schulz
Part of the modules: Advanced CRM (p. 22)[IW4BWLISM1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The students

- understand service management as an economic basis for Customer Relationship Management and learn the resulting consequences for the management, the organisation itself and their departments,
- design and develop service concepts and service systems at a conceptual level,
- work on case studies in the CRM-area in small groups with limit time,
- learn English as the technical language in the area of CRM and consult internationale literature from this field for the case studies.

Content
The course begins with an introduction into Service Management as the strategic concept which also covers all CRM applications. The course is divided in the basics of Service Management as well as different topics within this concept like external and internal marketing, quality management and organizational requirements.

Media
Slides, Audio, Reader

Literature
Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chichester, 2nd edition, 2000.
Elective literature:
Jill Dyché. The CRM Handbook: A Business Guide to Customer Relationship Management. Addison-Wesley, Boston, 2nd edition, 2002.
Ronald S. Swift. Accelerating Customer Relationships: Using CRM and RelationshipTechnologies. Prentice Hall, Upper Saddle River, 2001.
Stanley A. Brown. Customer Relationship Management: A Strategic Imperative in theWorld of E-Business. John Wiley, Toronto, 2000.

Course: Data and Storage Management [24074]

Coordinators: B. Neumair
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Course: Data Mining [2520375]

Coordinators: G. Nakhaeizadeh
Part of the modules: Statistical Methods in Risk Management (p. 52)[IW4STAT2]

ECTS Credits	Hours per week	Term	Instruction language
5	2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Part one: Data Mining
Why Data Mining?

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

Part two: Examples of application of Data Mining

- Success parameters of Data Mining Projects
- Application in industry
- Application in Commerce

Literature
U. Fayyad, G. Piatetsky-Shapiro, P. Smyth, R. Uthurusamy, editors, Advances in Knowledge Discovery and Data Mining, AAAI/MIT Press, 1996 (order on-line from Amazon.com or from MIT Press).

- Jiawei Han, Micheline Kamber, Data Mining : Concepts and Techniques, 2nd edition, Morgan Kaufmann, ISBN 1558609016, 2006.
- David J. Hand, Heikki Mannila and Padhraic Smyth, Principles of Data Mining , MIT Press, Fall 2000
- Trevor Hastie, Robert Tibshirani, Jerome Friedman, The Elements of Statistical Learning: Data Mining, Inference, and Prediction, Springer Verlag, 2001.
- Pang-Ning Tan, Michael Steinbach, Vipin Kumar, Introduction to Data Mining, Pearson Addison wesley (May, 2005). Hardcover: 769 pages. ISBN: 0321321367
- Ripley, B.D. (1996) Pattern Recognition and Neural Networks, Cambridge: Cambridge University Press.
- Ian witten and Eibe Frank, Data Mining: Practical Machine Learning Tools and Techniques, 2nd Edition, Morgan Kaufmann, ISBN 0120884070, 2005.

Course: Data Mining Paradigms and Methods for Complex Databases [24647]

Coordinators: K. Böhm, E. Müller
Part of the modules: Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
It will be announced at least 6 weeks in advance if the assessment consists of a written exam (approx. 60 minutes) according to sec. 4 subsec. 2 no. 1 study and examination regulations or of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Recommendations
Knowledge about database systems, e.g. from the lecture Database Systems.
Basics in data mining, e.g. from the lecture Data Warehousing and Mining

Learning Outcomes
At the end of the lecture, the participants should be aware of – and able to explain – the necessity of advanced data mining concepts. They should be able to assess and compare different approaches of data analysis on large and complex databases with respect to efficiency and applicability. The participants should have gained insights into the current research issues in the area of data mining and should understand which problems are currently unsolved.

Content
The lecture provides insights into advanced data mining methods that form the basis for an ermerging research area. Traditional data mining methods have been considered for several years in the literature and are covered by basic data mining lectures. However, due to the large and complex databases used in today's applications, some of these traditional methods are applicable only on relatively small and simple problem instances. Recently, research has addressed this challenge by proposing novel data mining paradigms for large and high dimensional databases. They aim at scalability with respect to size and dimensionality of databases in todays and future applications.
The lecture will derive novel challenges for data mining out of recent application scenarios. The focus will be on advanced data mining paradigms for knowledge discovery in high dimensional data. We will highlight the characteristic properties of different paradigms and discuss algorithmic solutions in each of these paradigms. Furthermore, novel evaluation techniques will be presented that enable evaluation of these data mining methods in real world applications.
Overview of the content:

- Motivation of novel challenges based on today's application demands.
- Overview of traditional data mining techniques and their drawbacks.
- Abstract challenges due to high dimensional databases.
- Novel data mining paradigms: Subspace Clustering and Projected Clustering aiming at cluster detection in projections of high dimensional data.
- Novel solutions aiming at elimination of redundancy in data mining results. Quality improvement by optimization techniques.
- Knowledge extraction by alternative views on the data. Search for alternatives compared to given results. Analysis of orthogonal subspace projections.
- Outlier mining techniques in high dimensional databases. Challenges and recent solutions in research and industrial projects.
- Overview on our future work in this research area.

Media
Slides

Course: Data Warehousing and Mining [24114]

Coordinators: K. Böhm
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
This course cannot be combined with the courses *Knowledge Discovery* [2511302] and/or *Data Mining* [2520375].

Recommendations
Knowledge about database systems, e.g. from the lecture *Database Systems*

Learning Outcomes
At the end of the lecture, the participants should be aware of – and able to explain – the necessity of data warehousing and of data mining concepts. They should be able to assess and compare different approaches of management and analysis of large datasets with respect to efficiency and applicability. The participants should have gained an insight into the current research issues in the area of data warehousing and data mining and should understand which problems are currently unsolved.

Content
Data warehouses and data mining raise much interest from practitioners with huge amounts of data, e.g., in retail, finance and the insurance sector. Both warehousing and mining are motivated by the desire for keeping track of large and possibly distributed datasets and for extracting interesting relations from such data, ideally with minimal effort. A data warehouse is a repository which is fed with data from one or more operational database systems. The data is preprocessed allowing for a fast evaluation of complex analytical queries (OLAP, Online Analytical Processing). In contrary, data mining provides techniques for discovering patterns in large datasets.

Media
Slides.

Literature

- Jiawei Han, Micheline Kamber: Data Mining: Concepts and Techniques. 2nd edition, Morgan Kaufmann Publishers, March 2006.

Elective literature:
Further literature will be mentioned at the end of each chapter in the lecture slides.

Remarks
From October 2010 the oral exam is offered to students only who failed the first exam.

Course: Deployment of Database Systems [dbe]

Coordinators: K. Böhm
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
It will be announced at least 6 weeks in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge about database systems, e.g., from the lecture *Database Systems* [24516] and *Introduction in Computer Networks* [24519].

Learning Outcomes
At the end of the course, the participants should be able to explain and compare database concepts (especially data models and query languages) – in more breadth, compared to database courses at the undergraduate level. They should know and be able to assess the different possibilities to store complex user data using database technology.

Content
This course introduces students to the deployment of modern database technology, in both breadth and depth. 'Breadth' is reached by the detailed study and comparison of different data models (especially the relational and the semi-structured/XML data models) and appropriate query languages (SQL, XQuery). 'Depth' is reached by the study of several non-trivial applications, such as management of XML or e-commerce data, implementation of retrieval-models using relational database technology, or the usage of SQL for accessing sensor networks. Since all these applications are generic problems themselves, the study of such applications is interesting in itself already.

Media
Slides.

Literature

- Andreas Heuer, Gunther Saake: Datenbanken - Konzepte und Sprachen. 2. Aufl., mitp-Verlag, Bonn, Januar 2000.
- Alfons Kemper, Andre Eickler: Datenbanksysteme. 6. Aufl., Oldenbourg Verlag, 2006.

Elective literature:

- Hector Garcia-Molina, Jeffrey D. Ullman, Jennifer Widom: Database Systems: The Complete Book. Prentice Hall, 2002
- Ramez Elmasri, Shamkant B. Navathe: Fundamentals of Database Systems.

Course: Moving Objects Databases [24109]

Coordinators: K. Böhm
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge of database systems, e.g. from the lectures *Database Systems* [24516] and *Introduction in Computer Networks* [24519].

Recommendations
It is recommended to attend the lecture *Data Privacy Protection in Interconnected Information Systems* [24605] in the summer term.

Learning Outcomes
At the end of the course, the participants are aware of the different kinds of information one is interested in and can be relevant in the presence of moving objects, and they are able to categorise them. They are aware of the management of spatial and temporal data, as well as data characterising moving objects. Further, the participants are able to formulate the various interests in information in the respective query languages and can comment on the efficient evaluation of such queries.

Content
Advancements in the field of information technology have made it easy to collect huge amounts of data describing the movement of objects, e.g., vehicles, air planes, robots, cell-phone users, natural phenomena such as cyclones or snowstorms, historic developments (e.g., exact locations of certain countries), or - last but not least - body movements and processes within the human body. In consequence, the problem how to organise such data and how to analyse it comes to the fore. This course targets at exactly this subject matter.
Keywords:

- query languages for temporal data (i.e., data where data objects are furnished with temporal information such as timestamps),
- query languages for moving objects in the past and query languages for future movements,
- constraint databases,
- spatial data structures,
- data structures for past and for future movements.

The topic is important for many areas of business/industry such as (obviously) logistics, but also vehicle manufacturing, avionics and the aerospace industry, telecommunication and - last but not least - web search and is in line with other focal points (”Vertiefungsgebieten”) of the Fakultät für Informatik such as robotics, anthropomatics and telematics. I.e., on the one hand, this lecture targets for students who are interested in such applications. On the other hand, another objective of this lecture is to generate a broader and deeper understanding of database technology and its mode of operation. I.e., strictly speaking, it is also of interest for students who are not particularly interested in this specific application domain from a database perspective (’moving objects’), but just want to delve more into database technology and learn more. We are well aware of the fact that the issue of data privacy (”Datenschutz”) is closely related to the content of this lecture. However, we plan to - largely - ignore this aspect in the context of this lecture. The reason is that we offer the separate lecture “Datenschutz und Privatheit in vernetzten Informationssystemen” the summer semester.

Media
Slides.

Literature
Ralf Hartmut Güting, Markus Schneider: Moving Objects Databases, Academic Press, 2005
Elective literature:
Will be announced in the lecture.

Course: Database Implementation and Tuning [db_impl]

Coordinators: K. Böhm
Part of the modules: Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge about database systems, e.g. from the lectures *Database Systems* and *Introduction in Computer Networks*.

Learning Outcomes
The lecture follows several goals. From the point of view of methodical engineering of large scale systems, the role of architecture and non functional properties should be understood. From the algorithmically point of view, it should be comprehensible at which point in the architecture which functional and non functional properties define the building blocks of the implementation. Furthermore, it will be important to understand how the architectural properties influence the algorithms and which range of possibilities is feasible. As well, the participants of the lecture should become familiar with the classical algorithms of database technology and get a feeling for its fields of application. From the point of view of a database administrator, the participants should understand which performance related parameters are vital if a certain query profile is given and how such parameters are connected with the underlying algorithms.

Content
Database systems form the backbone of all kinds of information processing. Without such systems, business management, commerce, research and development – as well as everything in the areas of mobile communication, genetics and the web – is not possible. Therefore, nowadays it belongs to the general knowledge of computer science, to understand how such systems are composed. In addition to that, many techniques which are today common sense in in computer science, have there roots in database technology. Finally, many specialists are needed, so called database administrators, who are able to configure the functionality and performance of database systems. Without the knowledge of what happens inside such systems, it is hardly possible to configure and tune them.
Such knowledge will be thought in this lecture. As an orientation framework serves a reference architecture which primarily comes from performance optimisation. Its essential components are the memory and query engine as well as transaction management. These components are discussed following a layered architecture from file management at the bottom to the user interface at the top level. This layered architecture allows for determining methodically the necessary and possible means of performance improvement as well as identifying their place within the architecture. Therefore, the lecture also contributes in the area of software engineering of large scale systems.

Media
Slides.

Literature
Elective literature:

- T.Härder, E.Rahm: Datenbanksysteme – Konzepte und Techniken der Implementierung. Springer, 1999
- G.Saake, A.Heuer, K.-U.Sattler: Datenbanken: Implementierungstechniken. 2. Aufl. mitp-Verlag, 2005
- A.Kemper, A.Eickler: Datenbanksysteme – Eine Einführung. 6. Aufl. Oldenbourg, 2006
- H.Garcia-Molina, J.D.Ullman, J.Widom: Database Systems – The Complete Book. Prentice-Hall, 2002
- P.C.Lockemann, K.R.Dittrich: Architektur von Datenbanksystemen. dpunkt.verlag 2004

Course: Practical Course Database Systems [24286]

Coordinators: K. Böhm
Part of the modules: Theory and Practice of Database Technology (p. 77)[IW4INDBTP]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts (projects, experiments, presentations and reports). The course will be assessed with “passed” or “failed” (according to sec. 9 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully. If the course is dropped after the first session, it will be marked with “failed”.

Conditions
Knowledge about database systems, e.g. from the lecture “Communications and Database Systems”.

Learning Outcomes
In the practical course, the knowledge from the lecture “Deployment of Database Systems” is reinforced on a practical level. The focus is on database-application programming, the usage of interactive query languages and database design. Furthermore, the students should learn to work in teams in order to work on various projects successfully.

Content
The practical course database systems lets students learn how to deploy database systems in practice, as a supplement to the different lectures on database technology. The participants will work in selected projects with commercial (object-)relational and XML database technology. Furthermore, database design will be practised with real-world examples. The following projects are planned for the course:

- Accessing databases, in particular from user programs,
- data management with non-conventional database technology,
- database design.

Working in teams is another important aspect of all projects.

Media

- Slides.
- Practical course notes.

Literature
Please refer to the literature from the lecture “Deployment of Database Systems”.
Elective literature:
Please refer to the literature from the lecture “Deployment of Database Systems”.

Course: Database Systems [24516]

Coordinators: K. Böhm
Part of the modules: Communication and Database Systems (p. 73)[IW4INKD]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Recommendations
It is recommended but not mandatory to attend lectures covering communication networks, system architecture and software engineering.

Learning Outcomes
The student

- is able to explain the benefits of database technology,
- has understood the development of database applications including its models and methods,
- is able to set up and query simple databases,
- is familiar with the terminology and the fundamentals of the underlying theory.

Content
Database systems are one of the crucial software fundamentals in modern information systems. Therefore, they belong to the core subjects in university curriculums in the area of computer science. The goal of the lecture is to obtain the basic knowledge to work with database systems. Key aspects are database models for design and implementation (ER models, relational model), languages for database systems (SQL) and its theoretical foundation (relational algebra) as well as aspects of transaction processing, data integrity and views.

Media
Slides.

Literature

- Andreas Heuer, Kai-Uwe Sattler, Gunther Saake: Datenbanken - Konzepte und Sprachen, 3. Aufl., mitp-Verlag, Bonn, 2007
- Alfons Kemper, André Eickler: Datenbanksysteme. Eine Einführung, 7. Aufl., Oldenbourg Verlag, 2009

Elective literature:

- S. Abeck, P. C. Lockemann, J. Seitz, J. Schiller: Verteilte Informationssysteme, dpunkt-Verlag, 1. Aulage,2002, ISBN-13: 978-3898641883
- R. Elmasri, S.B. Navathe: Fundamentals of Database Systems, 4. Auflage, Benjamin/Cummings, 2000.
- Gerhard Weikum, Gottfried Vossen: Transactional Information Systems, Morgan Kaufmann, 2002.
- C. J. Date: An Introduction to Database Systems, 8. Auflage, Addison-Wesley, Reading, 2003.

Course: Database Systems and XML [2511202]

Coordinators: A. Oberweis
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11], Intelligent Systems and Services (p. 94)[IW4INAIFB5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

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

Conditions
None.

Learning Outcomes
Students know the basics of XML, as well as appropriate data models and are capable of generating XML documents. They are able to use XML database systems and to formulate queries to XML documents. Furthermore, they know to assess the use of XML in operational practice in different application contexts.

Content
Databases are a proven technology for managing large amounts of data. The oldest database model, the hierarchical model, was replaced by different models such as the relational or the object-oriented data model. The hierarchical model became particularly 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.

Media
Slides, access to internet resources.

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. 2002
- G. Vossen: Datenbankmodelle, Datenbanksprachen und Datenbankmanagementsysteme. Oldenbourg 2000

Course: Data Privacy Protection in Interconnected Information Systems [24605]

Coordinators: K. Böhm, Buchmann
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge about database systems, distributed information systems, system architecture and communication infrastructures, e.g. from the lectures *Database Systems* [24516] and *Introduction in Computer Networks* [24519].

Learning Outcomes
At the end of the lecture, the participants are aware of the objectives and basic principles of informational self-determination. The participants are able to name and explain the fundamental challenges and impacts of data privacy protection for both individuals and society. Furthermore, the participants are expected to know and to apply current methods and technologies for data privacy protection, e.g., spatial and temporal cloaking. The objective of the lecture is to enable the participants to assess and analyze the risks of unknown technologies towards privacy, to propose methods that can be expected to deal with such risks, and to measure the effectiveness of the methods proposed.

Content
This lecture is intended to explain the impacts of interconnected information systems on data privacy. The lecture addresses both current information systems that can be observed on the Internet and information systems that are under development yet. In order to tackle these challenges, a number of technical methods have been proposed and discussed in research and practice. The lecture introduces such approaches, and points out how effective they are in ensuring data privacy. An examination of the social implications of data privacy challenges and privacy enhancing technologies concludes the lecture.

Media
lecture slides

Literature
Will be announced in the lecture.

Course: Data Protection Law [24018]

Coordinators: I. Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 103)[IW4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
Assessment will consist of a written exam (following §4(2), 1 SPO).

Conditions
None.

Recommendations
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes
Increasing significance of information technology for data processing and interconnectedness of the society by means of telecommunication does not only enhance the social and economical relevance of data in general, it raises the question about legal rules for the protection of personalised data as well. The problem for those who are responsible for the application of law is that national rules in this area are in constant flux due to technological progress and Europeanisation of law. Additionally there is a vast number of sector-specific regulation (such as labour law). Bearing all this in mind, the lecture's main focus is the presentation of the basic principles of the German Federal Act on Data Protection (Bundesdatenschutzgesetz). In doing so, new concepts of data protection like self-data protection or system data protection will be analysed. A further focal point is the examination of evolution of sector-specific data protection law, considering as example regulation of data protection in connection with teleservice or mediaservice. Students should learn how to negotiate their ways in the interaction of different levels of legal norms and solve simple problems of data protection law.

Content
After illustrating contents and history of data protection law there will be presented backgrounds with respect to Community law and under constitutional law. Further on, the German Federal Act on Data Protection will be focussed. At this will be set forth basic principles of regulation (such as necessity), personalised data as an object of regulation, rights of those who are affected as well as the legitimacy of different procedures of data processing. Oranisational regulations, particularly data security official will be approached as well. Further on, in a case study current concepts of data protection and the problem of video surveillance will be discussed. Finally, there are three units on sector-specific regulation of telecommunication and teleservice / mediaservice.

Media
extensive script with cases; content structure, further information in the lectures

Literature
Will be announced in the course.
Elective literature:
Wil be announced in the course.

Remarks
In cooperation with the House of Competence, Students should be rhetorical trained asking and answering questions (short-answer-and-question-technique). Therefor most likely a coach will attend several lessons.

Course: Derivatives [2530550]

Coordinators: M. Uhrig-Homburg
Part of the modules: Finance 1 (p. 29)[IW4BWLFBV1], Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations

Conditions
None.

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

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

Media
Slides, Exercises/Exercise sheets

Literature

- Hull (2005): Options, Futures, & Other Derivatives, Prentice Hall, 6th Edition

Elective literature:
Cox/Rubinstein (1985): Option Markets, Prentice Hall

Course: Design and Evaluation of innovative user interfaces [24103]

Coordinators: T. Schultz, F. Putze
Part of the modules: Speech Processing (p. 80)[IW4INSV], Biosignal Processing (p. 79)[IW4INBSV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge in the area of biosignal processing or cognitive systems is helpful.

Learning Outcomes
Students have a general overview of the methods from design to evaluation of user interfaces which make use of technique for natural or implicit interaction. Students can classify systems according to the scientific state of the art, evaluate their abilities and limitations and they have basic knowledge for the design of new interfaces.

Content
The lecture centers on innovative user interfaces which make use of technique for biosignal- or speech processing. This comprises on the one hand systems which support natural explicit interaction like spoken dialog systems or systems with gesture input. On the other hand, this comprises also interfaces for implicit interaction, for example by employing biosignal based recognition of emotion or mental workload. The lecture begins with an introduction of the necessary theoretical foundation. Following lectures deal with the design and evaluation of end-to-end systems. A focus of the lecture are the advantages but also the new challenges of such systems, for example in the area of multimodality. Another key point is how real users deal with innovative interfaces and with which methods strengths and weaknesses of such interfaces can be investigated systematically.

Media
Slides.

Literature
Will be announced in the lecture.

Course: The logic of security [24828]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Some knowledge of the fundamental concepts of cryptography (signatures, hash functions and encryption schemes) is useful to follow the lecture.

Learning Outcomes

- The student gains insight into contemporary formal methods that are used to analyse cryptographic protocols as well as their security properties within the symbolic model introduced by Dolev and Yao.
- She/He learns how to express a given protocol within a formal calculus (e.g. the “applied pi-calculus”).
- Furthermore the student understands how to bridge the gap between the symbolic models introduced in this lecture and the common model used in cryptography. This follows the ideas of Abadi and Rogaway.
- Altogether the student will be capable to understand ongoing research on the topic of this lecture.

Content
The analysis of cryptographic protocols is often a tedious and error-prone work. Formal models that use symbols to abstract from cryptographic primitives (e.g. a signature, hash function or encryption) enable us to do a computer-aided analysis. The basic idea of an abstract analysis of cryptographic protocols was already brought forward by Dolev and Yao during the Eighties and gained new momentum due to the work of Abadi and Rogaway in 2000. The latter shows a way to bridge the gap between the formal symbolic setting and the “real” computational setting. This lecture teaches the basic knowledge of “symbolic cryptography”. The student will learn how to properly express and prove security properties in a formal setting. The lecture conveys the above-mentioned idea of so called “computational soundness” of Abadi and Rogaway and partially explores the path from a secure protocol to a secure implementation. It enables the student to follow ongoing research on the field of “symbolic cryptography”.

Course: Digital signatures [24654]

Coordinators: Tibor Jager
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student
- knows important signature schemes that are relevant in theory and practice
- understands basic security notions and their relation
- is able to understand and apply basic proof techniques

Content
Digital signatures are a fundamental primitive of modern cryptography. Their practical applications include, for instance, authenticated e-mail or certificate hierarchies on the internet.
This lecture will give an overview of important signature schemes with theoretical or practical relevance. This includes:
- One-time signatures, tree-based signatures, and chameleon hash functions
- RSA-based signatures
- Signatures in bilinear groups

Goal of this lecture is not only to describe these schemes, but also to discuss their security. Therefore we will introduce various security notions for digital signatures, and analyze whether the presented schemes provably meet these notions (under certain hardness assumptions).
Depending on the student's preferences, the remaining time will be used to discuss advanced topics, such as:
- Schnorr signatures
- Programmable hash functions
- Tightness of reductions
- Analysis of hardness assumptions in the generic group model

Course: Document Management and Groupware Systems [2511212]

Coordinators: S. Klink
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam in the first week after lecture period according to Section 4(2), 1 of the examination regulation).

Conditions
None.

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

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

Media
Slides, access to internet resources.

Literature

- Klaus Götzer, Udo Schneiderath, Berthold Maier, Torsten Komke: Dokumenten-Management. Dpunkt Verlag, 2004, 358 Seiten, ISBN 3-8986425-8-5
- Jürgen Gulbins, Markus Seyfried, Hans Strack-Zimmermann: Dokumenten-Management. Springer, Berlin, 2002, 700 Seiten, ISBN 3-5404357-7-8
- Uwe M. Borghoff, Peter Rödig, Jan Scheffcyk, Lothar Schmitz: Langzeitarchivierung – Methoden zur Erhaltung digitaler Dokumente. Dpunkt Verlag, 2003, 299 Seiten, ISBN 3-89864-258-5

Elective literature:
Further literature is given in each lecture individually.

Course: Wireless Sensor-Actuator-Networks [24104]

Coordinators: M. Zitterbart
Part of the modules: Future Networking (p. 70)[IW4INFN], Wireless Networking (p. 67)[IW4INWN], Networking Labs (p. 68)[IW4INNL]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
The objective of this lecture is to present topics in research. As sensor networks are more and more becoming part of our daily-life, this lecture does not only focus on classical topics, such as time-synchronization and routing, but also on security and safety.

Content
Due to the emerging miniaturization of microcontrollers during the past years a new field of research established: wireless sensor networks. These are networks that consist of huge amounts of tiny, autonomous sensor nodes which are able to fulfill some assigned sensing task totally unattended and self-organizing. One important characteristic is their restricted ressources wrt/ computational power, memory and communication capacity, which is due to the node's scarce energy ressources. Under these conditions, traditional communication architectures and protocols seem to be not well suited. The lecture will cover essential concepts, protocols and architectures which were developed with respect to the special needs of those networks. Topics of the course will be: hardware platforms for sensornetworks, media access control protocols, naming and addressing, time synchronization, localization of sensor nodes, topology control, a bunch of specialized routing protocols, service- and data-centric view of communication, security, and robustness.

Media
Slides.

Literature
H. Karl, and A. Willig, *Protocols and Architectures for Wireless Sensor Networks*, Wiley and Sons, 2005, ISBN 0470095105.

Course: eEnergy: Markets, Services, Systems [2540464]

Coordinators: C. van Dinther, C. Weinhardt
Part of the modules: Market Engineering (p. 25)[IW4BWLISM3], Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4,(2), 3 SPO).
The total grade for this lecture will consist to 70% of the grade achieved in the written examination and to 30% of the assignments during the exercises.

Conditions
None.

Learning Outcomes
The student

- understands the tasks and basic structure of the energy economy, in particular concerning electricity markets,
- understands the change in the energy economy and the necessity for the development of a Smart Grid,
- knows the market mechanisms in the energy market and their role in coordination and allocation of electric energy,
- is able to describe the relation between OTC, spot and balancing energy markets,
- knows the regulation specifications for energy markets and can reflect them critically,
- is able to model smart grid mechanisms and to evaluate them by simulation based methods.

Content
Scope of the lecture *eEnergy: Markets, Services, Systems* is economics and information management in energy markets. Integration of the growing number of renewable energy sources imposes new challenges on energy markets and the power system. To improve coordination between supply and demand it is necessary to interlink centralized and decentralized generators as well as consumers by means of ICT. Current electricity networks are extended by intelligent IT components thus incorporating the “Smart Grid”. Existing market structures for electricity have to be adjusted for a successful implementation of demand side management and integration of an increasing number of renewable energy producers as well as electric vehicles. Apart from regulatory and economic concepts, methods for modeling and analysis of energy markets are introduced and explained during the course.
The lecture is structured as follows:

1. **Electricity Markets**
   Market Models, EEX (spot and futures market), OTC Trading, Market Coupling
2. **Regulation**
   Charges and Incentives, Network Congestion (Management)
3. **Demand Side Management**
   Smart Meters, Tariffs, Price Elasticity, Storage Systems, Electric Mobility
4. **Modeling and Analysis of Energy Markets**

Media

- Powerpoint
- eLearning Plattform Ilias

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.

Remarks
The lecture has also been added in the IIP Module “Basics of Liberalised Energy Markets”.

Course: Efficient Energy Systems and Electric Mobility [2581006]

Coordinators: R. McKenna, P. Jochem
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes

- Understand the concept of energy efficiency as applied to specific systems
- Obtain an overview of the current trends in energy efficiency
- Be able to determine and evaluate alternative methods of energy efficiency improvement
- Overview of technical and economical stylized facts on electric mobility
- Judging economical, ecological and social impacts through electric mobility

Content
This lecture series combines two of the most central topics in the field of energy economics at present, namely energy efficiency and electric mobility. The objective of the lecture is to provide an introduction and overview to these two subject areas, including theoretical as well as practical aspects, such as the technologies, political framework conditions and broader implications of these for national and international energy systems.
The energy efficiency part of the lecture provides an introduction to the concept of energy efficiency, the means of affecting it and the relevant framework conditions. Further insights into economy-wide measurements of energy efficiency, and associated difficulties, are given with recourse to several practical examples. The problems associated with market failures in this area are also highlighted, including the Rebound Effect. Finally and by way of an outlook, perspectives for energy efficiency in diverse economic sectors are examined.
The electric mobility part of the lecture examines all relevant issues associated with an increased penetration of electric vehicles including their technology, their impact on the electricity system (power plants and grid), their environmental impact as well as their optimal integration in the future private electricity demand (i.e. smart grids and V2G). Besides technical aspects the user acceptance and behavioral aspects are also discussed.

Media
Media will likely be provided on the e-learning platform ILIAS.

Literature
Will be anounced in the lecture.

Course: eFinance: Information Engineering and Management for Securities Trading [2540454]

Coordinators: R. Riordan
Part of the modules: Market Engineering (p. 25)[IW4BWLISM3], Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

Learning Control / Examinations
70% of the mark is based on the written examination and 30% is based on assignments during the exercises.

Conditions
None.

Learning Outcomes
The students

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

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

Media

- Powerpoint presentations
- recorded lecture available on the internet

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

Elective literature:

- 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

Course: Introduction in Computer Networks [24519]

Coordinators: M. Zitterbart
Part of the modules: Communication and Database Systems (p. 73)[IW4INKD]

ECTS Credits	Hours per week	Term	Instruction language
4	2/1	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
It is recommended but not mandatory to attend lectures covering system architecture and software engineering.

Learning Outcomes

Content
Today's Internet is arguably the most well-known and most complex artefact ever created by mankind: hundreds of millions connected
computers and connecting networks. Millions of users who connect at any time to the Internet via various devices such as mobile phones, PDAs or laptops. Given the large scale as well as the diversity of the Internet, the question arises to which extent it is possible to understand the complex structures behind. Here, this lecture tries to provide an introduction to the world of computer networks by presenting theoretical and practical aspects of computer networks. Therefore, it covers basics of telecommunications engineering, fundamental protocol mechanisms as well as the layers model of current computer networks. Hence, we present all layers starting with the physical medium layer up to the application layer.

Media
Slides.

Literature

- J.F. Kurose, K.W. Ross: Computer Networking - A Top-Down Approach featuring the Internet. Addison-Wesley, 2007.
- W. Stallings: Data and Computer Communications. Prentice Hall, 2006.

Elective literature:

- F. Halsall: Computer Networking and the Internet. Addison-Wesley, 2005.
- P. Lockemann, G. Krüger, H. Krumm: Telekommunikation und Datenhaltung. Hanser Verlag, 1993.
- S. Abeck, P.C. Lockemann, J. Schiller, J. Seitz: Verteilte Informationssysteme. dpunkt-Verlag, 2003

Remarks
This lecture replaces the communication part of the lecture *Kommunikation und Datenhaltung*.

Course: Electronic Markets (Principles) [2540502]

Coordinators: A. Geyer-Schulz
Part of the modules: Electronic Markets (p. 24)[IW4BWLISM2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The student

- has an overview about the different organizational form and their efficiency,
- names coodination methods and motivation methods and evaluates them regarding their efficiency,
- knows, in the context of markets as a coordination form, the conditions under which markets are not efficient (market failure),
- knows phenomena like adverse selections and moral hazard,
- names reasons for these phenomena and develops methods to encounter them.

Content
What are the conditions that make electronic markets develop? The first part of the lecture treats the selection of the type of organization as an optimization of transaction costs. The second part includes the efficiency of electronic markets (price, information and allocation efficiency) as well as reasons for market failure.
Besides a centralistic approach, markets can be used for decentral coordination of plans and activities. Hereby, optimality can be garuanteed, if the coordination problem has no design or innovation characteristics. Viewed from a bottom-up perspective, given the coordination problem, it is possible to answer questions regarding the centralization or decentralization, the design of coordination mechanisms, and the coherence of business strategies. The last part of the lecture consists of motivation problems, like bounded rationality and information assymetries (private information and moral hazard) and the development of incentive systems.

Literature
Kapitel “Management Control Systems, Dezentralisierung, interne Märkte und Transferpreise” (S. 745-773) in Charles T. Horngren, Srikant M. Datar, and George Foster. Cost Accounting: A Managerial Emphasis. Prentice Hall, Upper Saddle River, 11 edition, 2003.
Paul Milgrom and John Roberts. Economics, Organisation and Management. Prentice Hall, 1 edition, 1992.
Elective literature:
Michael Dell and Catherine Fredman. Direct from DELL: Strategies that Revollutionized an Industry. Harper Collins Publisher, London, 1999.

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.
Friedrich A. Hayek. The use of knowledge in society. The American Economic Review, 35(4):519 – 530, Sep 1945.
Norbert Hochheimer. Das kleine QM-Lexikon. Wiley-UCH, Weinheim, 2002.
Adam Smith. An Inquiry into the Nature and Causes of the Wealth of Nations, volume II. 1976.

Course: Embedded Security [EmSec]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Recommendations
Basic knowledge of cryptography and system security is helpful.

Learning Outcomes
The student should

- be able to evaluate the security of embedded systems and can identify security problems.
- have an overview of the theoretical and practical aspects of security issues of embedded systems

Content
In the last few years it has been shown that the way of embedding security modules (hardware and software) is one of the key problems for quality of service. This became publicly known, e.g. through power analysis. This is an attack on hardware for cryptographic applications that makes use of properties of the implementation. The power consumption is used to gain information about the secret key. Such attacks have continued to expand, as well as the countermeasures.
In the lecture, these side-channel attacks (e.g. differential power analysis) and possible countermeasures will be presented. Further more, “correlative attacks” will be dealt with. They provide a unified description of side channel attacks. These attacks and countermeasures are presented with many examples.

Remarks
The course is not offered in the summer term 2011.

Course: Emissions into the Environment [2581962]

Coordinators: U. Karl
Part of the modules: Industrial Production II (p. 37)[IW4BWLIIP2]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Winter term	de

Learning Control / Examinations
The examination will be in form of an written exam acc. to §4(2), 1 ER with a duration of 1h.

Conditions
None.

Learning Outcomes
The student should identify problems of industrial pollution control.
The student knows solutions to these problems and their ways of application.

Content
The course will provide an overview of sources of air pollution, waste and municipal waste; methods to monitor and to reduce/manage pollutant flows; regulatory framework on national and international level.
A Air pollution control

- Indtroduction and definitions
- Sources an dpoluutants
- Regulatory framework
- Emission monitoring
- Air pollution control measures

B Waste management and Recycling

- Introduction and regulatory framework
- Statistics and logistics
- Recycling and disposal
- Waste treatment

C Waste water treatment

- Municipal waste water treatment systems
- Sewage sludge disposal

Media
Media will be provided on learning platform.

Literature
Elective literature:
A compilation of documents is made available on the web.

Course: Empirical Software Engineering [24156]

Coordinators: W. Tichy
Part of the modules: Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of statistics.

Learning Outcomes
At the end of the course the student should be able...

- to describe empirical methodology in software engineering
- to list common sources of errors and how to avoid them
- to explain and to apply statistical analysis methods
- to name and to comment on examples of empirical studies in software engineering
- to plan and to implement empirical studies

Content
The course illustrates the role of empiricism in software engineering. It presents well-established empirical methods and points out common pitfalls in empirical studies. Statistical methods for data analysis and representation are taught. Recent scientific publications are used to exemplify the theoretical concepts.

Course: Energy and Environment [2581003]

Coordinators: U. Karl, n.n.
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	

Learning Control / Examinations
The examination will be in form of an written exam acc. to §4(2), 2 ER.

Conditions
None.

Learning Outcomes

Content

Course: Energy Trade and Risk Management [2581020]

Coordinators: K. Hufendiek
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/1	Summer term	de

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

Conditions
None.

Learning Outcomes

Content

Media
Media will likely be provided on the e-learning platform ILIAS.

Literature
Elective literature:
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

Course: Energy Policy [2581959]

Coordinators: M. Wietschel
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The course deals with material and energy policy of policy makers and includes the effects of such policies on the economy as well as the involvement of industrial and other stakeholders in the policy design. At the beginning the neoclassical environment policy is discussed. Afterwards the Sustainable Development concept is presented and strategies how to translate the concept in policy decision follows. In the next part of the course an overview about the different environmental instruments classes, evaluation criteria for these instruments and examples of environmental instruments like taxes or certificates will be discussed. The final part deals with implementation strategies of material and energy policy.

Literature
Will be anounced in the lecture.

Course: Energy Systems Analysis [2581002]

Coordinators: A. Eßer-Frey
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

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

Conditions
None.

Learning Outcomes

Content

Media
Media will likely be provided on the e-learning platform ILIAS.

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

Course: Enterprise Risk Management [2530326]

Coordinators: U. Werner
Part of the modules: Operational Risk Management I (p. 33)[IW4BWLFBV9], Operational Risk Management II (p. 34)[IW4BWLFBV10]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. term papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
Learning to identify, to analyse and to assess business risks; this serves as a basis for strategy and policy design regarding risks and opportunities of an enterprise. Introduction to approaches that allow to consider area-specific risk objectives, risk-bearing capacity and risk acceptance.

Content

1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and policies for the identification, analysis, assessment and management of risks
3. Insurance as an instrument for loss-financing
4. Selected aspects of risk management: e.g. environmental protection, organizational failure and D&O-coverage, development of a risk management culture
5. Organisation of risk management
6. Approaches for determining optimal combinations of risk management measures considering their investment costs and outcomes.

Literature

- K. Hoffmann. Risk Management - Neue Wege der betrieblichen Risikopolitik. 1985.
- R. Hölscher, R. Elfgen. Herausforderung Risikomanagement. Identifikation, Bewertung und Steuerung industrieller Risiken. Wiesbaden 2002.
- W. Gleissner, F. Romeike. Risikomanagement - Umsetzung, Werkzeuge, Risikobewertung. Freiburg im Breisgau 2005.
- H. Schierenbeck (Hrsg.). Risk Controlling in der Praxis. Zürich 2006.

Elective literature:
Additional literature is recommended during the course.

Remarks
For organizational reasons, please register with the secretariy of the chair: thomas.mueller3@kit.edu.

Course: Decision Theory [2520365]

Coordinators: K. Ehrhart
Part of the modules: Applied Strategic Decisions (p. 42)[IW4VWL2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

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

Conditions
None.

Recommendations
See corresponding module information.
Knowledge in mathematics and statistics is required.

Learning Outcomes
The student will be made familiar with the basics in modern decision making particularly under uncertainty so that she will be able to analyze concrete decision problems and to develop simple solution procedures. By being confronted with experimental results in decision making the student should also be able to evaluate the behavioral part of decision making.

Content
This course deals with problems of decision making particularly under uncertainty. We introduce the expected utility theory of Neumann/Morgenstern and the prospect theory of Kahnemann/Tversky and discuss the concepts of stochastic dominance, risk aversion, loss aversion, reference points etc. We also consider the empirical validity of the different approaches. Additionally, the lecture provides an introduction to the theory of findings (epistemology), particularly with respect to decision theory.

Media
Script, overhead slides, additional printed material.

Literature

- Ehrhart, K.-M. und S.K. Berninghaus (2012): Decision Theory, Script, KIT.
- Hirshleifer und Riley (1997): The Analytics of Uncertainty and Information. London: Cambridge University Press, 4. Edtion.
- Berninghaus, S.K., K.-M. Ehrhart und W. Güth (2006): Strategische Spiele. Berlin u.a.: Springer, 3., Edtion

Remarks
Until summer term 2010 this lecture was called “Economic Theory of Uncertainty.”

Course: Decision Theory and Objectives in Applied Politics [25537]

Coordinators: A. Melik-Tangyan
Part of the modules: Social Choice Theory (p. 45)[IW4VWL9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
A decision model usually consists of a utility function which represents the decision maker's preference to be maximized, and constraints which represent financial, juridical and other restrictions. In policy making, the bottle neck is the definition of the utility function which can be viewed as an aggregated indicator for policy monitoring and evaluation. The lecture course deals with theoretical methods for (i) constructing quadratic and additive utility functions, (ii) eliciting the required data from policy makers, (iii) constructing aggregated indicators with their applications to labour market policies (flexicurity, decent work, aiding regions), and (iv) finding equilibrium prices.

Course: Gas-Markets [2581022]

Coordinators: A. Pustisek
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

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

Conditions
None.

Learning Outcomes

Content

Media
Media will likely be provided on the e-learning platform ILIAS.

Course: Discrete-event Simulation in Production and Logistics [n.n.]

Coordinators: S. Nickel, S. Spieckermann
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	

Learning Control / Examinations
The assessment consists of a written paper and an oral exam (according to §4(2), 3 of the examination regulation).

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

Recommendations
Besides knowledge of Operations Research students are assumed to be familiar with the following topics:

- Introduction in Statistics
- Programming basics (algorithms and data structures)
- Basic knowledge in production and logistics

Learning Outcomes
The course covers basic concepts of discrete event simulation models and qualifies students for the computer-based usage of simulation systems. This enables students to structure simulation studies according to process models. Additionally, students deepen their knowledges for logical issues and discover the importance of statistical methods in in modeling and evaluation of simulation models. Students gain insight to coupled systems of simulation and meta-heuristics, and they are able to characterize simulation programs.

Content
Simulation of production and logistics systems is an interdisciplinary subject connecting expert knowledge from production management and operations research with mathematics/statistics as well as computer science and software engineering. With completion of this course, students know statistical foundations of discrete simulation, are able to classify and apply related software applications, and know the relation between simulation and optimization as well as a number of application examples. Furthermore, students are enabled to structure simulation studies and are aware of specific project scheduling issues.

Remarks
The course is planned to be held every summer term.
The planned lectures and courses for the next three years are announced online.

Course: European and International Law [24666]

Coordinators: I. Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 103)[IW4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (following §4(2), 1 SPO).

Conditions
None.

Recommendations
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes
Due to the Europeanization of national law, the examination of European law is indispensable for everyone aiming to gain basic legal knowledge. Hardly any national activity can be imagined without the consideration of presetting of European Community law. By comparison, the influence of international law is of small importance. In light of this, the lecture predominantly deals with European law and imparts the knowledge of the EU law necessary for the students in order to comprehend how the national law is being covered by European Community law defaults. Afterwards, the student should be able to solve questions regarding European legislation in a problem-oriented manner. As the subject matter partly will be acquired in discourse with the students, it is necessary to acquire a corpus juris (e.g. Beck-Texte “Europarecht”).

Content
The lecture predominantly deals with the European law: in the origin, this contains an analysis of history from the EEC to EC and EU, of participants (parliament, commission, council, European Court of Justice), of sources of law (regulations, directives, final judgements, opinions, recommendations) and legislative procedure. Further, the lecture focuses on the basic liberties of the EC, which enable a free flow of goods (for example of beer not matching the German purity law), persons (like the professional footballer Bosman), services (like entrepreneurial activities) and capital. In addition, the charter of fundamental rights of the EC and the rules of competition will be discussed, in each case in the light of a concrete legal case. Moreover, the fundamental rights of the European Convention on Human Rights (ECHR) are being introduced. Concluding, a short survey of international law, especially of the World Trade Organization (WTO), will be given.

Media
extensive script with cases; content structure, further information in the lectures

Literature
Further details will be announced in the lecture.
Elective literature:
Further details will be announced in the lecture.

Course: Experimental Economics [2520373]

Coordinators: M. Adam, Ch. Weinhardt
Part of the modules: Market Engineering (p. 25)[IW4BWLISM3], Applied Strategic Decisions (p. 42)[IW4VWL2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO).

Conditions
See corresponding module information.

Learning Outcomes
The students should learn

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

Content
Experimental Economics have become a separate field in Economics. Nearly all fields of the economic discipline use economic experiments to verify theoretical results. Besides being used for empricial validation, this method is applied in political and strategic consulting. The lecture gives an introducation to experimental methods in economics and shows differences to experiments in natural sciences. Scientific studies are used to show exemplary applications.

Media
Classroom experiments or experiments in the computer laboratory will be conducted. To some extent, slides are made available online.

Literature

- Strategische Spiele; S. Berninghaus, K.-M. Ehrhart, W. Güth; Springer Verlag, 2nd ed., 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.

Remarks

- The Lecture was taken over by Marc Adam, PhD, in the winter term 2011/12.

Course: The Management of R&D Projects with Case Studies [2581963]

Coordinators: H. Schmied
Part of the modules: Industrial Production III (p. 38)[IW4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/2	Winter / Summer Term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes

- Students shall be able to discuss different tasks of R&D-management.
- Students shall be able to apply common approaches to solve these general problems.

Content

- The communication between R&D, production and marketing.
- Problems concerning measuring the productivity of the R&D system.
- Methods for improving the productivity of R&D systems.
- Planning of R&D projects with the help of the Communication-Matrix-Methods for controlling R&D projects' progress.
- The marketing of scientific skills.
- The communication matrix as a tool for the implementation of simultaneous engineering.
- Case studies.

Literature
will be announced in the course

Course: Fixed Income Securities [2530260]

Coordinators: M. Uhrig-Homburg
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations

Conditions
None.

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

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

Literature

- Bühler, W., Uhrig-Homburg, M., Rendite und Renditestruktur am Rentenmarkt, in Obst/Hintner, Geld-, Bank- und Börsenwesen - Handbuch des Finanzsystems, (2000), S.298-337.
- Sundaresan, S., Fixed Income Markets and Their Derivatives, South-Western College Publising, (1997).

Elective literature:

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Financial Intermediation [2530232]

Coordinators: M. Ruckes
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students are introduced to the theoretical fundamentals of financial intermediation.

Content

- Arguments for the existence of financial intermediaries
- Bank loan analysis, relationship lending
- Competition in the banking sector
- Stability of the financial system
- The macroeconomic role of financial intermediation

Literature
Elective literature:

- Hartmann-Wendels/Pfingsten/Weber (2006): Bankbetriebslehre, 4. Auflage, Springer Verlag.
- Freixas/Rochet (1997): Microeconomics of Banking, MIT Press.

Course: Mixed Integer Programming I [25138]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of linear mixed integer programming,
- is able to choose, design and apply modern techniques of linear mixed integer programming in practice.

Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.
The lecture treats methods for the numerical solution of optimization problems which depend linearly on continuous as well as discrete variables. It is structured as follows:

- Existence results
- Concepts of linear optimization
- Mixed-integer linear programming (Gomory cuts, Benders decomposition)

Part II of the lecture treats nonlinear mixed integer programs.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective 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.

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

Course: Mixed Integer Programming II [25140]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Mixed Integer Programming I* [25138]. In this case, the duration of the written examination takes 120 minutes.

In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

In a combined examination of *Mixed Integer Programming I* [25138] and *Mixed Integer Programming II* [25140], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of convex and of nonconvex mixed integer programming,
- is able to choose, design and apply modern techniques of nonlinear mixed integer programming in practice.

Content
Many optimization problems from economics, engineering and natural sciences are modeled with continuous as well as discrete variables. Examples are the energy minimal design of a chemical process in which several reactors may be switched on or off, or the time minimal covering of a distance with a vehicle equipped with a gear shift. While optimal points can be defined straightforwardly, for their numerical identification an interplay of ideas from discrete and continuous optimization is necessary.
Part I of the lecture deals with linear mixed integer programs.
Part II treats methods for the numerical solution of optimization problems which depend nonlinearly on continuous as well as discrete variables. It is structured as follows:

- Concepts of convex optimization
- Mixed integer convex programming (branch and bound methods)
- Mixed integer nonconvex programming
- Generalized Benders decomposition
- Outer approximation methods
- Heuristics

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- 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.

Remarks
The lecture is offered irregularly. The curriculum of the next three years is available online (kop.ior.kit.edu).

Course: Geometric Optimzation [24657]

Coordinators: H. Prautzsch
Part of the modules: (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content
Method of least squares, Levenberg-Marquardt-algorithm, best fitting planes, iterated closed point algorithm, FEM, animation trandfer, approximation with developable surfaces, smoothing of surfaces, parametrizations with minimal distortion, numerical stability, exact arithmetic, smallest enclosing spheres etc.

Media
Blackboard, slides.

Literature
Various papers and textbook chapters as announced during the course.

Course: Business Models in the Internet: Planning and Implementation [2540456]

Coordinators: C. Weinhardt
Part of the modules: Business & Service Engineering (p. 26)[IW4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
50% of the mark is based on the written mid term examination, 10% is based on assignments during the exercises, and 40% of the mark is based on a project work, which includes a term paper and a presentation.

Conditions
None.

Learning Outcomes
The student

- is able to list the most important features of web application lifecycles
- analyses, designs and implements web applications
- evaluates and argues internet business models with special requirements and features
- is able to estimate the practicability of business models

Content
The emergence of internet economy has resulted in an accelerated evolution of commerce models in eBusiness. Early adopters have experimented with a variety of new business models, technologies and application designs. At the same time, there has been a growing demand for new standards to facilitate the exchange of information, catalogue content and transactions between buyers and sellers. But the true understanding of how to bring buyers and sellers together is still widely missing, leading to multiple cases of costly missed investments. This course focuses on the design and implementation of successful business models for eBusiness applications for the World Wide Web (WWW), imparting the basic knowledge for building successful eBusiness applications. We consider not only technical foundations of eBusiness applications but also economical aspects. In small groups, students develop and implement an eBusiness model that is eventually discussed with a representative from the venture capitalist industry.

Media

- Powerpoint presentations
- recorded lecture available on the internet
- videoconferencing, if circumstances allow

Literature
Will be announced within the course.

Course: Business Strategies of Banks [2530299]

Coordinators: W. Müller
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students are told the basics of commercial banking.

Content
The management of a bank is in charge of the determination and implementation of business policy - taking into account all relevant endogenous and exogenous factors - that assures the bank's success in the long run. In this context, there exists a large body of banking models and theories which are helpful in describing the success and risk of a bank. This course is meant to be the bridging of banking theory and practical implementation. In the course of the lectures students will learn to take on the bank management's perspective.
The first chapter deals with the development of the banking sector. Making use of appropriate assumptions, a banking policy is developed in the second chapter. The design of bank services (ch. 3) and the adequate marketing plan (ch. 4) are then built on this framework. The operational business of banks must be guided by appropriate risk and earnings management (ch. 5 and 6), which are part of the overall (global) bank management (ch. 7). Chapter eight, at last, deals with the requirements and demands of bank supervision as they have significant impact on a bank's corporate policy.

Literature
Elective literature:

- A script is disseminated chapterwise within the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 2. Auflage, Springer

Course: Global Optimization I [2550134]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Global Optimization II* [2550136]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of deterministic global optimization,
- is able to choose, design and apply modern techniques of deterministic global optimization in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.
Part I of the lecture treats methods for global optimization of convex functions under convex constraints. It is structured as follows:

- Introduction, examples, and terminology
- Existence results
- Optimality in convex optimization
- Duality, bounds, and constraint qualifications
- Numerical methods

Nonconvex optimization problems are treated in part II of the lecture.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
- A. Neumaier *Interval Methods for Systems of Equations* Cambridge University Press 1990

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Global Optimization II [2550136]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
The examination is held in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration to the written examinationen is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Global Optimization I* [2550134]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Global Optimization I* [2550134] and *Global Optimization II* [2550136], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands the fundamentals of deterministic global optimization,
- is able to choose, design and apply modern techniques of deterministic global optimization in practice.

Content
In many optimization problems from economics, engineering and natural sciences, numerical solution methods are only able to efficiently identify *local* optimizers, while it is much harder to find *globally* optimal points. This corresponds to the fact that by local search it is easy to find the summit of the closest mountain, but that the search for the summit of Mount Everest is rather elaborate.
The global solution of convex optimization problems is subject of part I of the lecture.
Part II of the lecture treats methods for global optimization of nonconvex functions under nonconvex constraints. It is structured as follows:

- Introduction and examples
- Convex relaxation
- Interval arithmetic
- Convex relaxation via αBB method
- Branch and bound methods
- Lipschitz optimization

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- W. Alt *Numerische Verfahren der konvexen, nichtglatten Optimierung* Teubner 2004
- C.A. Floudas *Deterministic Global Optimization* Kluwer 2000
- R. Horst, H. Tuy *Global Optimization* Springer 1996
- A. Neumaier *Interval Methods for Systems of Equations* Cambridge University Press 1990

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Graph Theory and Advanced Location Models [2550484]

Coordinators: S. Nickel
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Learning Outcomes
The lecture is divided into two parts: In the first part "Graph Theory", basic concepts and algorithms of Graph Theory are presented, which are used in engineering, economic and socio-scientific problems. The students become acquainted with models and methods in order to optimize on graphs and networks. The second part "Advanced Location Models" addresses some selected advanced topics of location theory. The students become familiar with praxis-relevant and current research topics and learn about solution concepts of different location problems.

Content
Graph Theory is an important part of Discrete Mathematics. A special attraction is in its clearness and variety of proof techniques. Object of the first part "Graph Theory" is the mediation of basic graph theoretical concepts and algorithms, which are deployed in many areas. In focus is the modeling of different problems with graph theoretical methods und their solutions with efficient algorithms. Significant focal points are Shortest Paths, Flows, Matchings, Colorings and Matroids.
A variety of application areas of location theory has attracted increasing research interest within the last decades, because location decisions are a critical factor in strategic planning. In the second part "Advanced Location Models", some current research questions of modern industrial location theory are discussed after a short introduction. Thereby, practical models and suitable solution methods for location problems in general networks are presented. The lecture goes into details about Pareto Solutions in Networks, Ordered Median Problems, Covering Problems and Allocation Problems.

Literature

- Jungnickel: Graphs, Networks and Algorithms, 2nd edition, Springer, 2005
- Diestel: Graph Theory, 3rd edition, Springer, 2006
- Bondy, Murt: Graph Theory, Springer, 2008
- Nickel, Puerto: Location Theory, Springer, 2005
- Drezner: Facility Location – Applications and Theory, 2nd edition, Springer, 2005

Remarks
The lecture is planned to be held in the summer term 2013.
The planned lectures and courses for the next three years are announced online.

Course: Principles of Automatic Speech Recognition [24145]

Coordinators: A. Waibel, Sebastian Stüker
Part of the modules: Speech Processing (p. 80)[IW4INSV]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students are introduced to the principles of the automatic recognition of speech. They are going to get to know the basic layout of a speech recognition system as well as the application of concepts and methods from the area of machine learning, that are utilized in automatic speech recognition.

In order to gain a deeper understanding and in order to motivate the applied techniques, the students shall get to understand the basic concept of human speech production. From this the students shall be able to derive the construction of a speech recognition system.

Further, the students shall be able to analyze different application scenarios for speech recognition systems, and, based on the complexity of the application scenario, be able to design an appropriate speech recognition system.

In particular, the students shall study the details of the components of a speech recognition system - pre-processing, acoustic model, language model and search. After completing this class the students shall be able to implement and apply these components themselves. The students will further gain the ability to access and evaluate the performance of concrete instances of speech recognition systems.

Finally, the students shall be introduced to the principles of advanced techniques in automatic speech recognition, such as the use of model space and feature space adaption and their application.

Content
This class explains the layout of state-of-the-art speech recognition systems. The layout will be motivated based on the human speech production process und its properties. The class treats all processing steps of automatic speech recognition systems in detail: signal pre-processing, training of suitable, statistical models, and the actual recognition process.
The focus will be on statistical methods, as they are being used in current speech recognition systems. In this way the state-of-the-art of the area of automatic speech recognition will be communicated. Further the class will introduce alternative Methods, which were the foundation of the current methods and which are still being used in special circumstances.
Using sample applications und examples from current research projects, the current state-of-the-art and the performance of current systems will be illustrated.
In addition to the basic techniques, the class will also introduce advanced technologies in speech recognition, in order to illustrate the training and application of modern, high-performing speech recognition systems.

Media
Slides, additional materials

Literature

- Xuedong Huang, Alex Acero, Hsiao-wuen Hon, Spoken Language Processing, Prentice Hall, NJ, USA, 2001
- Fredrick Jelinek (editor), Statistical Methods for Speech Recognition, The MIT Press,1997, Cambridge, Massachusetts, London, England

Elective literature:

- Lawrence Rabiner and Ronald W. Schafer, Digital Processing of Speech Signals, Prentice Hall, 1978
- Schukat-Talamazzini, Automatische Spracherkennung

Course: Basic Principles of Patent Law [GPR]

Coordinators: K. Melullis
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a written seminar thesis and the presentation thereof as a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

Conditions
None.

Learning Outcomes

Content

Media
slides

Literature
Nirk/Ullmann, Patent- Gebrauchsmuster- und Sortenschutzrecht, C.F. Müller, 3. Aufl. 2007, ISBN: 3811433687
Elective literature:
Schulte, Rainer, Patentgesetz, Carl Heymanns Verlag, 8. Aufl. 2008, ISBN:3406555055
Kraßer, Rudolf, Patentrecht, Verlag C.H. Beck, 6. Aufl. 2009, ISBN: 3-406-384552
Jestaedt, Bernhard, Patentrecht - Ein fallbezogenes Lehrbuch, Heymanns, 2. Aufl. 2008, ISBN: 3452261832
Bekard, Patent- und Gebrauchsmustergesetz, Verlag C.H. Beck, 10. Aufl. 2006, ISBN: 3406539548

Remarks
This course was previously announced as *Aktuelle Fragen des Patentrechts.*

Course: Principles of Information Engineering and Management [2540450]

Coordinators: C. Weinhardt
Part of the modules: Information Engineering and Management (p. 16)[IW4WWIW]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4(2), 3 SPO). The total grade for this lecture will consist to 90% of the grade achieved in the written examination and to 10% of the assignments during the exercises.

Conditions
None.

Learning Outcomes
The students should be able to understand and analyze the central role of information as an economic good, a production factor, and a competitive factor in today's societies. Students are supposed to be able to identify, evaluate, price, and market information goods with the help of the concepts and methods taught in the lecture. Furthermore, students learn basic aspects about information systems and information flows within and between organizations, as well as their design parameters.

Content
Information plays a central role in today's society. The resulting structures and processes cannot be explained intuitively with traditional approaches of economic theory. Formerly, information has only been implicitly treated as a production factor; its role as a competitive factor used to be neglected. In order to deal with the central role of information we developed the concept of the "information lifecycle" that systematizes all phases from information generation to information distribution. The single phases of that cycle,

- extraction/generation,
- storage,
- transformation,
- evaluation,
- 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 across this information lifecycle within the lectures. The content of the lecture is deepened in accompanying lecture courses.

Media

- PowerPoint slides
- eLearning Platform Ilias

Literature

- Shapiro, C., Varian, H., Information Rules: A Strategic Guide to the Network Economy. Harvard Business School Press 1999.
- Stahlknecht, P., Hasenkamp, U., Einführung in die Wirtschaftsinformatik. Springer Verlag 7. Auflage, 1999.
- Wirth, H., Electronic Business. Gabler Verlag 2001.

Course: Heterogeneous Parallel Computing Systems [24117]

Coordinators: W. Karl
Part of the modules: Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
The successful completion of the module *Computer Architecture* is required.

Learning Outcomes

Content

Media
Slides

Course: High Performance Communication [24110]

Coordinators: M. Zitterbart
Part of the modules: Networking (p. 71)[IW4INNW]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
The goal of the course is to introduce the fundamental technologies of todays and future wide area networks.

Content
The main focus of this course are current developments in the area of network technologies. Part of this is the well-established Multi-Protocol Label Switching (MPLS) and the precursor ATM (Asynchronous Transfer Mode). Additionally, methods to support Quality of Service, signalling of requirements for Quality of Service, and the establishment of network-internal switching and routing systems are discussed. The lecture also goes into current developments in the domain of optical networks (SONET: Synchronous Optical Networking, WDM: Wavelength Division Multiplexing).

Media
Slides.

Literature
H. Perros. Connection-oriented Networks. John Wiley & Sons, 2005, ISBN 0-470-02163-2.
Elective literature:

- W. Haaß. Handbuch der Kommunikationsnetze. Springer-Verlag, 1996, ISBN 3-540-61837-3.
- J. Jahn. Photonik: Grundlagen, Komponenten und Systeme. Oldenbourg-Verlag, 2001, ISBN 3-486- 25425-1.
- D. Minoli, A. Alles. LAN, ATM and LAN Emulation Technologie. Artech-House, 1996, ISBN 0-89006- 916-6.
- E. Rathgeb, E. Wallmeier. ATM-Infrastruktur für die Hochleistungskommunikation. Springer-Verlag, 1997, ISBN 3-540-60370-0.
- G. Siegmund. ATM – Die Technik. 3. Auflage, Hüthig Verlag, 1997, ISBN 3-7785-2541-7.
- W. Stallings. High-Speed Networks. Prentice Hall, 1998, ISBN 0-13-525965-7.
- M. Zitterbart Hochleistungskommunikation, Band 1: Technologie und Netze. R. Oldenbourg Verlag, 1995, ISBN 3-486-22707-6.

Course: Information Integration and Web Portals [24141]

Coordinators: J. Mülle, Andreas Schmidt
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge about database systems, e.g. from the lecture *Database Systems* [24516].

Learning Outcomes
The students obtain...

- Knowledge about state-of-the-art technologies (e.g., J2EE, JSF, .NET, XML) for building web applications and ability to evaluate their usage in concrete scenario.
- Proficiency in architectural approaches for building scalable web applications and integration of heterogeneous systems (e.g., multi-tier architectures, Model-View-Controller, mediator architectures, service-oriented architectures).
- Ability to analyze integration problems at different levels (presentation, services, information, technology).
- Proficiency in applying virtual and materialized integration approaches to concrete scenarios.
- Knowledge about core concepts and technologies for service-oriented architectures.
- Knowledge about potentials of ontologies for integration on service and information level.

Content
Building web portals, bundling an information offer from different information sources for a specific target group, serves as a showcase problem for the lecture. Using a fictional sample port, this problem is approached from different viewpoints within the three major parts of the lecture. The first part is dedicated to scalable and maintainable web applications. Multi-tier architectures and component frameworks (J2EE, .NET) are the main topics. In addition to that, the principle of separation of content, layout and behavior is illustrated for different web technologies (e.g., JSP, JSF, AJAX). The second part follows the theme of integration of autonomous systems, which are typically encountered in inter-organizational cooperation. Within this part, information integration approaches (virtual vs. materialized) and service-oriented integration are presented and assessed. Usage potentials of ontologies for integration scnearios complement this part. The third part is dedicated to recent developments and real-world systems and products, presented by company representatives in the areas of portal, web and integration technology.

Media

- Slides.
- Tutorial materials (Execution-Environment, Source-Code, Examples).

Literature

- Wassilios Kazakos, Andreas Schmidt, Peter Tomczyk: Datenbanken und XML. Konzepte, Anwendungen, Systeme, Heidelberg/Berlin: Springer, März 2002

Elective literature:

- Serge Abiteboul, Peter Buneman, Dan Suciu: Data on the Web: from Relations to Semistructured Data and XML, Morgan Kaufmann, 1999, ISBN: 155860622X
- N. Kassem. Designing Enterprise Applications with the Java 2 Platform: Enterprise Edition. Longman 2000

Course: Insurance Accounting [2530320]

Coordinators: E. Schwake
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6], Insurance Management II (p. 32)[IW4BWLFBV7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter term	de

Learning Control / Examinations
The assessment consists of an oral or a written exam (according to Section 4 (2), 2 or 1 of the examination regulation).

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:
K. Küting, C.-P. Weber. Bilanzanalyse, Lehrbuch zur Beurteilung von Einzel- und Konzernabschlüssen. 1997
W. Rockel, E. Helten, H.Loy. Versicherungsbilanzen - Rechnungslegung nach HGB, US-GAAP und IAS/IFRS. 2005
H.Treuberg, B.Angermayer. Jahresabschluss von Versicherungsunternehmen. 1995.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Marketing [2530323]

Coordinators: E. Schwake
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6], Insurance Management II (p. 32)[IW4BWLFBV7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Summer term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective literature:

- Farny, D.. Versicherungsbetriebslehre (Kapitel III.3 sowie V.4). Karlsruhe 2011
- Kurtenbach / Kühlmann / Käßer-Pawelka. Versicherungsmarketing. . . . Frankfurt 2001
- Wiedemann, K.-P./Klee, A. Ertragsorientiertes Zielkundenmanagement für Finanzdienstleister, Wiesbaden 2003

Remarks
For organizational reasons, please register with the secretary of the chair: thomas.mueller3@kit.edu.

Course: Insurance Production [2530324]

Coordinators: U. Werner
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6], Insurance Management II (p. 32)[IW4BWLFBV7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective literature:
P. Albrecht. Zur Risikotransformationstheorie der Versicherung: Grundlagen und ökonomische Konsequenzen. Mannheimer Manuskripte zur Versicherungsbetriebslehre und Risikotheorie Nr. 36
D. Farny. Versicherungsbetriebslehre. 2011.
H. Neugebauer. Kostentheorie und Kostenrechnung für Versicherungsunternehmen. 1995
A. Wiesehan. Geschäftsprozessoptimierung für Versicherungsunternehmen. München 2001

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.uni-karlsruhe.de
For organizational reasons, please register with the secretary of the chair:thomas.mueller3@kit.edu.

Course: Insurance Risk Management [2530335]

Coordinators: H. Maser
Part of the modules: Insurance Management II (p. 32)[IW4BWLFBV7], Insurance Management I (p. 31)[IW4BWLFBV6]

ECTS Credits	Hours per week	Term	Instruction language
2,5	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written or an oral exam (according to Section 4 (2), 1 or 2 of the examination regulation) .

Conditions
None.

Learning Outcomes
Getting to know basic principles of risk management in insurance companies and credit institutions.

Content

Literature
Elective literature:

- ”Mindestanforderungen an ein (Bank-)Risikomanagement”, www.bafin.de
- V. Bieta, W. Siebe. Strategisches Risikomanagement in Versicherungen. in: ZVersWiss 2002 S. 203-221.
- A. Schäfer. Subprime-Krise, in: VW2008, S. 167-169.
- B. Rudolph. Lehren aus den Ursachen und dem Verlauf der internationalen Finanzkrise, in: zfbf 2008, S. 713-741.

Remarks
Block course. For organizational reasons, please register with the secretary of the chair: thomas.mueller3@kit.edu.

Course: Intelligent Systems in Finance [2511402]

Coordinators: D. Seese
Part of the modules: Intelligent Systems and Services (p. 94)[IW4INAIFB5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment is a written examination.
See the German part for special requirements to be admitted for the examination.

Conditions
None.

Learning Outcomes

- The students acquire abilities and knowledge of methods and systems from the area of machine learning and learn how to use them in the area of finance, which is the core area of application of this lecture.
- It is taught the ability to choose and change these methods and systems adequate to the situation and to use them for problem solving in the area of finance.
- The students get the ability to find strategic and creative answers in their search for solutions for precisely defined, concrete and abstract problems.
- At the same time the lecture aims to give foundational knowledge and methods in the context of their application in practise. On the basis of the basic understanding of concepts and methods of informatics the students should be able to comprehend quickly the new developments in the area and to use them correctly.

Content
A new generation of computing methods, commonly known as “intelligent systems”, has recently been successfully applied to a variety of business and financial modelling tasks. In many application fields these novel methods outperform traditional statistical techniques. The lecture provides a comprehensive coverage of the area, including foundations and applications. In particular it deals with intelligent software agents, genetic algorithms, neural networks, support vector machines, fuzzy-logic, expert systems and intelligent hybrid systems. The presented applications focus on the finance area and are related to risk management (credit risk, operational risk), financial trading, portfolio management and economic modelling. The lecture is given in cooperation with the company msgGILLARDON. The lecture starts with an introduction of the central problems of application in this area, e.g. decision support for investors, Portfolioselection under constraints, information retrieval from business reports, automatic development of trading rules for the capital market, modelling of time series at the capital market, explanation of phenomena at capital markets by simulation, decision support in risk management (credit risk, operational risk). After this the basics of intelligent systems are discussed. Basic ideas and essential results for different stochastic heuristics for local search are discussed next, especially Hill Climbing, Simulated Annealing, Threshold Accepting and Tabu Search. After this different population-based approaches of evolutionary methods are presented, e.g. Genetic Algorithms, Evolutionary Strategies and Programming, Genetic Programming, Memetic Algorithms and Ant-Algorithms. It follows an introduction into Neural Networks, Support Vector Machines and Fuzzylogic. Softwareagents and agentbased stock market models are the next topic. The lecture ends with an overview on the complexity of algorithmic problems in the area of finance, giving in this way one of the key reasons for the necessity to use heuristics and intelligent systems. Essential examples and basic applications are choosen from the area of finance.

Media
Slides.

Literature
There is no text book covering completely the content of the lecture.

- Z. Michalewicz, D. B. Fogel. How to Solve It: Modern Heuristics. Springer 2000.
- J. Hromkovic. Algorithms for Hard Problems. Springer-Verlag, Berlin 2001.
- Christopher M. Bishop: Pattern Recognition and Machine Learning,Springer 2006
- P. Winker. Optimization Heuristics in Econometrics. John Wiley & Sons, Chichester 2001.
- A. Brabazon, M. O’Neill. Biologically Inspired Algorithms for Financial Modelling. Springer, 2006.
- A. Zell. Simulation Neuronaler Netze. Addison-Wesley 1994.
- R. Rojas. Theorie Neuronaler Netze. Springer 1993.
- N. Cristianini, J. Shawe-Taylor. An Introduction to Support Vector Machines and other kernal-based learning methods. Cambridge University Press 2003.

- G. Klir, B. Yuan. Fuzzy Sets and Fuzzy Logic: Theory and Applications. Prentice-Hall, 1995.
- F. Schlottmann, D. Seese. Modern Heuristics for Fiance Problems: A Survey of Selected Methods and Applications. In S. T. Rachev (Ed.) Handbook of Computational and Numerical Mrthods in Finance, Birkhäuser, Boston 2004, pp. 331 - 359.

Further references will be given in each lecture.

Elective literature:

- S. Goonatilake, Ph. Treleaven (Eds.). Intelligent Systems for Finance and Business. John Wiley & Sons, Chichester 1995.
- F. Schlottmann, D. Seese. Financial applications of multi-objective evolutionary algorithms, recent developments and future directions. Chapter 26 of C. A. Coello Coello, G. B.Lamont (Eds.) Applications of Multi-Objective Evolutionary Algorithms, World Scientific, New Jersey 2004, pp. 627 - 652.
- D. Seese, F. Schlottmann. Large grids and local information flow as reasons for high complexity. In: G. Frizelle, H. Richards (eds.), Tackling industrial complexity: the ideas that make a difference, Proceedings of the 2002 conference of the Manufacturing Complexity Network, University of Cambridge, Institute of Manufacturing, 2002, pp. 193-207. (ISBN 1-902546-24-5).
- R. Almeida Ribeiro, H.-J. Zimmermann, R. R. Yager, J. Kacprzyk (Eds.). Soft Computing in Financial Engineering. Physica-Verlag, 1999.
- S. Russel, P. Norvig. Künstliche Intelligenz Ein moderner Ansatz. 2. Auflage, Pearson Studium, München 2004.
- M. A. Arbib (Ed.). The Handbook of Brain Theory and neural Networks (second edition). The MIT Press 2004.
- J.E. Gentle, W. Härdle, Y. Mori (Eds.). Handbook of Computational Statistics. Springer 2004.
- F. Schweitzer. Brownian Agents and Active Particles. Collective Dynamics in the Natural and Social Sciences, Springer 2003.
- D. Seese, C. Weinhardt, F. Schlottmann (Eds.) Handbook on Information Technology in Finance, Springer 2008.
- Further references will be given in the lecture.

Remarks

The content of the lecture will permanently be adapted to actual developments. This can be the cause to changes of the described contend and schedule.

The course “Intelligent Systems in Finance” will not be offered any more from summer term 2016 on. The examination will be offered latest until summer term 2015 (repeaters only).

Course: Interdisciplinary Seminar in Information Engineering and Management [2540530]

Coordinators: A. Geyer-Schulz, T. Dreier
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
6	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment for this module is conducted using a “Erfolgskontrolle anderer Art” following §4 (2), 3 of the “Prüfungsordnung des Master-Studiengangs Informationswirtschaft”. The exact form and composition of this assessment is defined for each Interdisciplinary Seminar seperately.

Conditions
None.

Learning Outcomes
Participants of the Interdisciplinary Seminar in Information Engineering and Management should

- analyze a current issue of information engineering and management using the scientific methods of the participating disciplines and
- derive interdisciplinary approaches based on the state of the arts of the corresponding disciplines,
- justify the chosen solutions and methods during discussions using scientific arguments,
- and write down the results in a form appropriate to be published in a scientific journal.

Content
The Interdisciplinary Seminar is regulated in §14 of the “Prüfungsordnung des Master-Studiengangs Informationswirtschaft”. During the work on the interdisciplinary topic, students are supervised by a group of tutors. This group consists of one participant from computer science, one from business economics and one from law.

Course: International Risk Transfer [2530353]

Coordinators: W. Schwehr
Part of the modules: Operational Risk Management I (p. 33)[IW4BWLFBV9], Operational Risk Management II (p. 34)[IW4BWLFBV10]

ECTS Credits	Hours per week	Term	Instruction language
2,5	2/0	Summer term	de

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

Conditions
None.

Learning Outcomes
Becoming acquainted with the various possibilities of international risk transfer.

Content
How are the costs of potential major damages financed and covered on a global scale? Traditionally, direct insurers and, especially, reinsurers are conducting a global business, Lloyd's of London is a turntable for international risks, and global industrial enterprises are establishing captives for self insurance. In addition to this, capital markets and insurance markets are developing innovative approaches to cover risks, which were hard to insure in the past (e.g. weather risk). The lecture will elucidate the functioning and the background of these different possibilities of international risk transfer.

Literature

- P. Liebwein. Klassische und moderne Formen der Rückversicherung. Karlsruhe 2000
- Brühwiler/ Stahlmann/ Gottschling. Innovative Risikofinanzierung - Neue Wege im Risk Management. Wiesbaden 1999.
- Becker/ Bracht. Katastrophen- und Wetterderivate. Finanzinnovationan auf der Basis von Naturkatastrophen und Wettererscheinungen, Wien 1999.

Remarks
Block course. For organizational reasons, please register at the secretary of the chair: thomas.mueller3@kit.edu.

Course: International Finance [2530570]

Coordinators: M. Uhrig-Homburg, Walter
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with the basics of investment decisions on international markets and to manage foreign exchange risks.

Content
The main aspects of this course are the chances and the risks which are associated with international transactions. We carry out our analysis from two distinct perspectives: First the point of view of an international investor second that, of an international corporation. Several alternatives to the management of foreign exchange risks are shown. Due to the importance of foreign exchange risks, the first part of the course deals with currency markets. Furthermore current exchange rate theories are discussed.

Literature
Elective literature:

- D. Eiteman et al. (2004): Multinational Business Finance, 10. Auflage

Course: Cost and Management Accounting [2530210]

Coordinators: T. Lüdecke
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (60 min) taking place in the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
This course aims at providing students with the understanding of the purposes of alternative costing systems as well as the use of relevant information for decision making. The course will also examine techniques for the purpose of cost management and accounting for control.

Content

- Design of Cost Systems
- Cost Classifications, Cost Behavior, and Principles of Cost Allocation
- Activity-based Costing
- Product Costing
- Production Decisions
- Cost-based Pricing
- Cost Management
- Decisions under Risk
- Cost Accounting for Control

Literature
Elective literature:

- Coenenberg, A.G. Kostenrechnung und Kostenanalyse, 6. Aufl. 2007.
- Ewert, R. und Wagenhofer, A. Interne Unternehmensrechnung, 7. Aufl. 2008.
- Götze, U. Kostenrechnung und Kostenmanagement. 3. Aufl. 2007.
- Kilger, W., Pampel, J., Vikas, K. Flexible Plankostenrechnung und Deckungsbeitragsrechnung , 11. Aufl. 2002.

Course: Internet Law [24821]

Coordinators: T. Dreier
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
It is the aim of this course to give the students an overview of the legal rules that are touched upon when the Internet is used as a means of communications and for doing business. These legal rules range from the law governing domain names, issues concerning the electronic formation of contracts, distance and electronic commerce contracts, to the issue liability and questions of unfair competition. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Content
The course deals with the legal rules that are touched upon when the Internet is used as a means of communications and for doing business. These legal rules range from the law governing domain names, issues concerning the electronic formation of contracts, distance and electronic commerce contracts, to the issue liability and questions of unfair competition. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Media
Slides

Literature
Script, Internetrecht (Internet Law)
Elective literature:
Additional literature tba in class.

Remarks
It is possible that this course will be taught in the summer instead of the winter semester.

Course: IT-Security Management for Networked Systems [24149]

Coordinators: H. Hartenstein
Part of the modules: Ubiquitous Computing (p. 96)[IW4INAIFB7], Networking Security - Theory and Praxis (p. 72)[IW4INNTP], Networking Labs (p. 68)[IW4INNL], Dynamic IT-Infrastructures (p. 78)[IW4INDITI]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Basics in computer networks, according to the lectures *Database Systems* [24516] and *Introduction in Computer Networks* [24519] and *Networked IT-Infrastructures* [24074] respectively are required.

Learning Outcomes
The goal of this lecture is to introduce the basics of IT-security management for distributed systems. The focus is on technical as well as underlying management concepts.

Content
The course of this module teaches how to manage modern highly distributed IT systems and services. As a foundation, key concepts and models commonly used in the areas of IT Security Management, Network Management, Identity Management, and IT Service Management are introduced and discussed. Based on these concepts, selected technical architectures, protocols, and tools found within the mentioned areas of interest are evaluated.
Among others, IT security workflows are illustrated by means of the “BSI Grundschutz”. It is explained how highly distributed computer networks can be monitored and controlled, and the management of public IP networks is evaluated. The course also focusses on Identity and Access Management as well as Firewalls, Intrusion Detection, and Prevention. Furthermore, concrete examples taken from the daily operation of the Steinbuch Centre for Computing (SCC). for instance in the context of the glass fiber backbone KITnet, are discussed to underline presented conclusions. By presenting current research activities in the areas of Peer-to-Peer networks (e.g. BitTorrent) and social networks (e.g. Facebook) management approaches are put into a global context.

Media
Slides

Literature
Jochen Dinger, Hannes Hartenstein, Netzwerk- und IT-Sicherheitsmanagement : Eine Einführung, Universitätsverlag Karlsruhe, 2008.
Elective literature:
Heinz-Gerd Hegering, Sebastian Abeck, Bernhard Neumair, Integriertes Management vernetzter Systeme - Konzepte, Architekturen und deren betrieblicher Einsatz, dpunkt-Verlag, Heidelberg, 1999.
James F. Kurose, Keith W. Ross, Computer Networking. A Top-Down Approach Featuring the Internet, 3rd ed., Addison-Wesley Longman, Amsterdam, 2004.
Larry L. Peterson, Bruce S. Davie, Computer Networks - A Systems Approach, 3rd ed., Morgan Kaufmann Publishers, 2003.
William Stallings, SNMP, SNMPv2, SNMPv3 and RMON 1 and 2, 3rd ed., Addison-Wesley Professional, 1998.
Claudia Eckert, IT-Sicherheit. Konzepte - Verfahren - Protokolle, 4. Auflage, Oldenbourg, 2006.
Michael E. Whitman, Herbert J. Mattord, Management of Information Security, Course Technology, 2004.

Remarks
The course was known as „Network and IT-Security Management“ until the winter term 11/12.

Course: Knowledge Discovery [2511302]

Coordinators: R. Studer
Part of the modules: Intelligent Systems and Services (p. 94)[IW4INAIFB5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation.
Students can be awarded a bonus on their final grade if they successfully complete special assignments.

Conditions
None.

Learning Outcomes
Familiarity with fundamentals of Knowledge Discovery, Data Mining and Machine Learning. Standard algorithms, representations, applications and processes needed for knowledge discovery projects are covered.

Content
The lecture provides an overview of machine learning and data mining techniques for knowledge discovery from large data sets. These techniques are examined in respect of algorithms, applicability to different data representations and application in the real world.Topics of the lectures comprise the whole Machine Learning and Data Mining process like CRISP, data warehousing, OLAP-techniques, learning algorithms, visualization and empircial evaluation. Covered learning techniques range from traditional approaches like decision trees, neural networks and support vector machines to selected approaches resulting from current research. Discussed learning problems are amongst others feauturevector-based learning, text mining and social network analysis.

Media
Slides.

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

Course: Cognitive Modeling [24612]

Coordinators: T. Schultz, F. Putze
Part of the modules: Biosignal Processing (p. 79)[IW4INBSV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge in the area of cognitive systems or biosignal processing is helpful.

Learning Outcomes
Students have a general overview of the methods for modeling human cognition and affect in the context of human-machine interaction. They are capable of modeling human behavior in a given application, e.g. to simulate realistic virtual environments or to enable natural interaction between user and machine.

Content
The lecture centers on the modeling of human cognition and affect in the context of human-machine interaction. It deals with models which can be used by computer systems to describe, explain and predict human behavior. Important topics of the lecture are: human behavior models, human learning (similarities and differences to machine learning), knowledge representation, models of affect and cognitive architectures. The relevance of cognitive modeling for future computer systems is pointed out and examples of open research questions in the area of human-machine interaction are given.

Media
Slides.

Literature
Elective literature:
Will be announced in the lecture.

Course: Computational Complexity Theory, with a View Towards Cryptography [24652]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (approx.20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Learning Outcomes
The student

- knows the theoretical foundations of the complexity analysis of a problem of algorithm,
- understands and explains the structure of common computational complexity classes such as P, NP, or BPP,
- is able to assess the asymptotic complexity of a given problem.

Content
What is an “efficient” algorithm? Can every algorithmic task be solved efficiently? Or are there inherently hard problems? Computational complexity provides a rigorous, mathematical foundation to reason about problems like these. In this course, we will discuss concepts such as

- machine model, time and space complexity, separations,
- nondeterminism, reductions, completeness,
- the polynomial hierarchy,
- probabilism, one-way functions,
- alternation, interactive proofs, zero-knowledge,

and illustrate them with practical examples. The course provides an outlook to applications of computational complexity theory, with a view towards cryptography.”.

Course: Component Based Software Architecture [24667]

Coordinators: R. Reussner, Andreas Rentschler
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students learn the advantages of component-based software development and understand its connection to software engineering and software architectures. Basic concepts such as design of component-based architectures, interoperability checks and parametric contracts for interfaces form the foundations for understanding current component models and meta-models from industry and research. The students analyse the advantages and disadvantages of these component models, thus learning to evaluate them in a critical way. Important techniques and approaches from practice and academia are presented, such as Enterprise Java Beans, SOA, middleware, product line, design-time performance prediction and code generation from models. The students become acquainted with languages for architecture description and modeling (e.g. UML), as well as with structured methods for evaluation of architectures (e.g. SAAM). An introduction to model-driven software development (MDSD) and model-driven architectures (MDA) showcases the ongoing developments and is illustrated using architectural patterns.

Content
Enterprise Java Beans (EJBs), CORBA or COM - component-based software development is successful in industry, and shows widespread and growing support within the software engineering discipline. The advantages of component-based software development include the reusability of components and thereby an increased efficiency in the development, shortened development cycles and hence a reduction of time-to-market.
From a scientific point of view, statements about the compatibility and functionality of connected components need particular attention. In addition, component-based approaches are particularly suited for the engineering of software with predictable quality attributes. This allows, for example, determining performance and reliability characteristics before the actual implementation of a software system. On this basis, one can make informed decisions about alternatives during the design phase of software.

In the lecture, paradigms and techniques for a systematic approach to design, implementation and testing of software components will be taught. These include, among other things, UML for the description of static and dynamic aspects of components, interface design, parameterized contracts, component adaptation and interoperability. Using the Palladio component model, trends and advanced technologies are presented, such as performance prediction at design time, role models for design and development of component-based software, and model-driven code generation.

The course deals with UML as a language for describing components and architectures. The evaluation of architectures is illustrated by the SAAM and ATAM process. Attention is also paid to the development process, where the emphasis is placed on developing using model-driven architecture (MDA). In this context, the lecture deals with technologies such as MOF, OCL and architecture-and model-driven software development (AC-MDSD). Modern middleware such as Java EE / EJB is presented together with taxonomy of different types of middleware. Furthermore, software product lines, SOA (service-oriented architectures) and architectural pattern are covered in the course. The treatment of functional architectural features will be complemented by presentation of the methods for analysis of extra-functional properties of architectures, including model-based method for predicting the performance.

Media
Slides

Literature

- Ralf Reussner, Wilhelm Hasselbring: “Handbuch der Software-Architektur”, 2. Auflage (dPunkt-Verlag, Heidelberg, 2008)
- Torsten Posch et al.: “Basiswissen Software-Architektur” (dPunkt-Verlag, Heidelberg, 2004)Johannes Siedersleben: “Moderne Software-Architektur” (dPunkt-Verlag, Heidelberg, 2004)
- Paul Clements et al.: “Documenting Software Architectures: Views and Beyond” (Addison-Wesley, Boston, 2005)
- C. Szyperski, D. Gruntz, S. Murer, ***Component Software***, Addison-Wesley, 2002, 2nd Ed.Ian Gorton: “Essential Software Architecture” (Springer, Berlin, 2006)

Elective literature:

- W. Beer, D., H.-P. Mössenböck, A. Wöß, ***Die . NET- Technologie. Grundlagen und Anwendungsprogrammierung,*** dPunkt Verlag, 2002
- S. W. Ambler, T. Jewell, E. Roman, ***Mastering Enterprise Java Beans,*** Wiley, 2006, 3rd Ed.
- P. Herzum, O. Sims, ***Business Component Factory,*** Wiley, 1999
- A. W. Brown, ***Large-scale Component-based Development,*** Prentice-Hall, 2000
- J. Cheesman, J Daniels, ***UML Components,*** Addison-Wesley, 2000
- C. Atkinson et al., ***Component-based Product Line Engineering with UML,*** Addison-Wesley, 2002
- Buschmann et al., **Pattern-oriented Software Architecture,** vol. 1-5, Wiley, 1996-2003
- Martin Fowler, **Analysis Patterns - Reusable Object Models** Addison-Wesley, 1997
- d'Souza, Wills, **Object, Components and Frameworks with UML - The Catalysis Approach,** Addison-Wesley, 1998
- Stephen J. Mellor: "MDA Distilled" (Addison-Wesley, Boston, 2004)
- W. Beer, D. Birngruber, H. Mössenböck, A. Wöß: "Die .NET- Technologie. Grundlagen und Anwendungsprogrammierung" (dPunkt-Verlag, Heidelberg, 2003)
- Ed Roman, Rima Patel Sriganesh, Gerald Brose: "Mastering Enterprise Java Beans" (Wiley, New York, 2006, 3rd Ed.)
- John Cheesman and John Daniels: "UML Components" (Addison-Wesley, Boston, 2001)
- Colin Atkinson et al.: "Component-based Product Line Engineering with UML" (Addison-Wesley, Boston, 2002)
- Frank Buschmann et al.: "Pattern-oriented Software Architecture" (Wiley, New York, 1996-2004)
- Desmond Francis D'Souza, Alan Cameron Wills: "Object, Components and Frameworks with UML - The Catalysis Approach" (Addison-Wesley, Boston, 1999)
- Markus Völter and Thomas Stahl: "Model-Driven Software Development" (Wiley, New York, 2006)

Remarks
This lecture will be offered from the summer term 2011 on. It replaces the lectures *Component Based Software Engineering* and *Software Architecture*.

Course: Theory of Business Cycles [25549]

Coordinators: M. Hillebrand
Part of the modules: Macroeconomic Theory (p. 44)[IW4VWL8], Allocation and Equilibrium (p. 43)[IW4VWL7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

Learning Control / Examinations
According to the attendance the assessment consists of a written or an oral exam at the beginning of the recess period (according to Section 4 (2), 1 or 2 of the examination regulation.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Learning Outcomes

Content

Literature
Elective literature:
David Romer, *Advanced Macroeconomics*, 3rd edition, MaGraw-Hill (2006)
Lutz Arnold: Makroökonomik. Eine Einführung in die Theorie der Güter-, Arbeits- und Finanzmärkte (2003)

Course: [24658]

Coordinators: M. Beigl
Part of the modules: (p. 82)[IN4INKUS]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Literature
Introduction: John Krumm, Ubiquitous Computing Fundamentals, 2009, Chapter 7-9.
Further literature will be announced.

Course: Mechanisms and Applications of Workflow Systems [24111]

Coordinators: J. Mülle, Silvia von Stackelberg
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Winter term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of a written exam (approx. 60 minutes) according to section 4 subsection 2 no. 1 study and examination regulations or of an oral exam (approx. 20 minutes) following according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
None.

Recommendations
Knowledge about database systems, e.g. from the lecture *Database Systems* [24516].

Learning Outcomes
A goal of the course is that the participants are able to model workflows, to explain modelling aspects and their relationships, to compare modelling methods, and to evaluate the usability of these methods in different application areas. They should understand the technical construction of workflow-management systems with the most important components and different architectures and implementation alternatives. Finally, the participants should have obtained an overview on actual relevant standardization proposals and how to use these approaches, and they should be aware of actual research topics.

Content
Workflow Management Systems (WFMS) support the management of business processes according to pre-defined process descriptions. Managing processes flexibly, i.e., handle deviations, e.g., in order to catch exceptions, adapt processes to modified process environments or to support ad-hoc workflows, becomes more and more important.
The course starts with discussing WFMS in the context of business-information systems and their relationship with the more common business-process modelling. Petri nets and pi-calculus are introduced as basic formalisms. Then, methods to model workflows and the design process for workflow-management applications are presented in detail and supplemented with exercises.
An advanced aspect is new research in WFMS technology. In particular, the use of internet techniques like web services and standardization approaches for process modeling, orchestration, and choreography in service-oriented architectures will be presented.
In the realization part of the course, various implementation techniques and architectural issues to realize workflow-management systems as well as diverse system types and concrete workflow-management systems are presented.
Further, the course presents application-driven procedures for changing and adapting workflows to new reqirements, especially business process reengineering and continous process improvement.
The course concludes with recent research areas and results, e.g., methods and techniques to support flexible, adaptive workflows, security of workflows and process mining.

Media
Slides.

Literature

- Matthias Weske: Business Process Management. Springer, 2007
- Frank Leymann, Dieter Roller: Production Workflows - Concepts and Techniques. Prentice-Hall, 2000
- W.M.P. van der Aalst: Workflow Management: Models, Methods, and Systems. MIT Press, 368 pp., 2002
- W.M.P. van der Aalst: Workflow Management: Models, Methods, and Systems. MIT Press, 368 pp., $40.00, ISBN 0-262-01189-1, 2002
- Michael Havey: Essential Business Process Modeling. O´Reilly Media, Inc., 2005
- S. Jablonski, M. Böhm, W. Schulze (Hrsg.): Workflow-Management - Entwicklung von Anwendungen und Systemen. dpunkt-Verlag, Heidelberg, 1997

Elective literature
Will be announced in the lecture.

Course: Hospital Management [2550493]

Coordinators: S. Nickel, Hansis
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of attendance, a seminar thesis and a final exam (according to §4(2), 1 of the examination regulation). The examination is held in the term of the lecture and the following lecture.

Conditions
None.

Learning Outcomes
Students gain insight into fundamental work flows in hospitals. They learn that the application of Operations Research methods can also be useful in so-called non-profit-organisations. In addition, the most important application areas for mathematical models, e.g. personnel planning or quality management, will be discussed.

Content
The lecture “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. Students have the possibility to participate in a final exam.

Remarks
The lecture is held in every semester.
The planned lectures and courses for the next three years are announced online.
The name of the lecture was changed from “Enterprise Hospital” and updated from 2 to 3 credits.

Course: Credit Risk [2530565]

Coordinators: M. Uhrig-Homburg
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations

Conditions
None.

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

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

Literature

- Lando, D., Credit risk modeling: Theory and Applications, Princeton Univ. Press, (2004).
- Uhrig-Homburg, M., Fremdkapitalkosten, Bonitätsrisiken und optimale Kapitalstruktur, Beiträge zur betriebswirtschaftlichen Forschung 92, Gabler Verlag, (2001).

Elective literature:

- Bluhm, C., Overbeck, L., Wagner, C. , Introduction to Credit Risk Modelling, Chapman & Hall, CRC Financial Mathematics Series, (2002).
- Duffie, D., Singleton, K.J., Credit Risk: Pricing, Measurement and Management, Princeton Series of Finance, Prentice Hall, (2003).

Course: Cryptographic Voting Schemes [24691]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student will be introduced to the basics of cryptographic voting schemes.
• The student should be able to understand different cryptographic voting systems and to describe properties as well as advantages and disadvantages.
• The student should be able to understand and employ cryptographic primitives necessary for cryptographic voting schemes.
• The student should be able to understand and employ the fundamental definitions and security notions for election schemes.
• The student should learn to assess the security requirements of an election, identify potential attacks and appraise security measures.

Content
This course will present a detailed overview over current cryptographic voting systems for booth voting as well as remote voting (mail voting and internet voting).
• The most important cryptographic primitives such as commitments, homomorphic encryption schemes, mix nets and zero-knowledge proofs will be covered.
• The course presents and explains current security notions for cryptographic voting schemes.
• During the course the requirements of an election, especially with regard to booth and remote voting, will be discussed. From this, attack scenarios are developed and compared to the security properties of the voting schemes and to established security notions.

Course: Curves and Surfaces in CAD I [KFCAD2]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Knowledge of basic techniques enabling the student to attend advanced courses as „Curves and Surfaces II and III", „ Rational Splines" or „Subdivision algorithm"

Content
Bèzier-and B-spline techniques, constructive algorithms, underlying geometric structures, as described in the book "Bèzier-and B-spline techniques".
The first course covers curves and tensor product surfaces, the second course is on constructions of smooth free form surfaces and the third course is devoted to box splines, multivariate splines, fair surfaces, scattered data interpolation and selected topics.

Media
Blackboard, slides.

Literature

- Prautzsch, Boehm, Paluszny: Bézier and B-Spline Techniques, Springer 2002

Elective literature:

- Farin: Curves and Surfaces for CAGD, Fifth Edition, 2002
- de Boor: A practical guide to splines, 2001

Course: Curves and Surfaces in CAD II [CFD2]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Knowledge of the lecture “Curves and surfaces in CAD I” or otherwise aquired knowledge of bezier and b-spline techniques for curves.

Learning Outcomes
Knowledge of basic techniques enabling the student to attend advanced courses as „Curves and Surfaces III”, „ Rational Splines” or „Subdivision algorithm”.

Content
Bèzier-and B-spline techniques, constructive algorithms, underlying geometric structures, as described in the book “Bèzier-and B-spline techniques”.

The first course covers curves and tensor product surfaces, the second course is on constructions of smooth free form surfaces and the third course is devoted to box splines, multivariate splines, fair surfaces, scattered data interpolation and selected topics.

Media
Blackboard, slides.

Literature

- Prautzsch, Boehm, Paluszny: Bézier and B-Spline Techniques, Springer 2002

Elective literature:

- Farin: Curves and Surfaces for CAGD, Fifth Edition, 2002
- de Boor: A practical guide to splines, 2001

Course: Curves and Surfaces in CAD III [KFCAD3]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
It is recommended to attend the lecture “Curves and Surfaces in CAD II”.

Learning Outcomes
Knowledge of basic techniques enabling the student to attend advanced courses as „Curves and Surfaces III”, „ Rational Splines” or „Subdivision algorithm”

Content
Bèzier-and B-spline techniques, constructive algorithms, underlying geometric structures, as described in the book “Bèzier-and B-spline techniques”. The first course covers curves and tensor product surfaces, the second course is on constructions of smooth free form surfaces and the third course is devoted to box splines, multivariate splines, fair surfaces, scattered data interpolation and selected topics.

Remarks
The lecture will presumably be offered again in the summer term 2011.

Course: [24696]

Coordinators: M. Beigl
Part of the modules: (p. 82)[IN4INKUS]

ECTS Credits	Hours per week	Term	Instruction language
1	1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: [24697]

Coordinators: M. Beigl
Part of the modules: (p. 83)[IN4INMMI]

ECTS Credits	Hours per week	Term	Instruction language
1	1	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Reading Group [24673]

Coordinators: R. Reussner
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
1	1	Winter / Summer Term	de

Learning Control / Examinations
The assessment (not graded) consists of participation in discussions and presentation of an article from a learned journal or conference proceedings.

Conditions
None.

Learning Outcomes
Through critical reading and analysis of scientific publications, the participants of the reading group learn to evaluate and to review related work and scientific publications in general. Thus, they learn how to write good papers, and how to avoid the usual pitfalls. By analysing cutting-edge research papers, the participants gain additional knowledge in the area of software engineering, and the discussions of the reading group complement the conventional self-study for the lectures and exams. The reading group also serves as a forum for networking with peers working in the area of software engineering.

Content
The contents of the reading group cover a broad area, from multi-core programming and performance prediction for enterprise software, over SOA and software evolution and evaluation of software architectures. The concrete scientific publications that are read and discussed are suggested by the participants, and the organisers then select papers that promise the largest benefits to the participants. Thus, the publications are selected dynamically, allowing for new and “hot” papers to be read and discussed. Additionally, visionary and ground-breaking papers of the last few years are discussed where appropriate.

Media
Electronic versions of learned journals will be made available to all participants.

Literature
The learned journals covered in the reading group.
Elective literature:
Sources referenced in the learned journals covered in the reading group.

Course: Managing New Technologies [2545003]

Coordinators: T. Reiß
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Conditions
None.

Learning Outcomes
New technologies can contribute substantially to the international competitiveness of different industrial sectors. This course provides the necessary knowledge for understanding how industrial enterprises and policy-makers are dealing with the challenge to realise in time the potentials of new technologies and to use them most efficiently. Key tasks of the management of new technologies will be practised.

Content
The course provides an overview of the international development of a selected number of key technologies such as biotechnology, nanotechnology, neurotechnologies, converging technologies. Methods for monitoring new technologies including foresight approaches will be presented and the economic and social impacts of new technologies will be discussed.

Media
Slides.

Literature

- Hausschildt/Salomo: Innovationsmanagement; Borchert et al.: Innovations- und Technologiemanagement;
- Specht/Möhrle; Gabler Lexikon Technologiemanagement

Course: Management of IT-Projects [2511214]

Coordinators: R. Schätzle
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written examination (60 min) in the first week after lecture period according to Section 4(2), 1 of the examination regulation.

Conditions
None.

Learning Outcomes
Students know the terminology of IT project management and typical used methods for planning, handling and controlling. They are able to use methods appropiate to current project phases and project contexts and they know how to consider organisational and social impact factors.

Content
The lecture deals with the general framework, impact factors and methods for planning, handling, and controlling of IT projects. Especially following topics are addressed:

- project environment
- project organisation
- project planning including the following items:
  - plan of the project structure
  - flow chart
  - project schedule
  - plan of resources
- effort estimation
- project infrastructur
- project controlling
- risk management
- feasibility studies
- decision processes, conduct of negotiations, time management.

Media
Slides, access to internet resources.

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.

Further literature is given in each lecture individually.

Course: IT Complexity in Practice [2511404]

Coordinators: D. Seese, Kreidler
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
see German version.

Conditions
see German version.

Learning Outcomes
see German version.

Content
see German version

Literature
Elective literature:
Will be announced in the lecture.

Course: Trademark and Unfair Competition Law [24609]

Coordinators: Y. Matz, P. Sester
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of trademark rights in the national as well as the European and International context. The course deals with the structure of trademark rights, especially with the procedures of registration and the claims, that result from the infringements of trademark rights, as well as with the right of other marks in the MarkenG.

Content
The course deals with the subject matter of trademark rights: what is a trademark, how can I get the registration of a trademark, what rights and claims do owner of trademarks have, which other marks do exist? The students shall learn about the rules of national, European an international trademark law.

Literature

- Berlit, Wolfgang: Markenrecht, Verlag C.H.Beck, ISBN 3-406-53782-0, neueste Auflage.

Course: Market Engineering: Information in Institutions [2540460]

Coordinators: C. Weinhardt, M. Adam
Part of the modules: Applied Strategic Decisions (p. 42)[IW4VWL2], Market Engineering (p. 25)[IW4BWLISM3], Electronic Markets (p. 24)[IW4BWLISM2], Communications & Markets (p. 27)[IW4BWLISM5]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4(2), 3 SPO). The total grade for this lecture will consist to 70% of the grade achieved in the written examination and to 30% of the assignments during the exercises.

Conditions
None.

Learning Outcomes
The students

- understand the role of an economist as an engineer to design markets
- compare different markets and market mechanisms to evaluate their efficiency
- apply game theoretic modelling and mechanism design as well as auction theory for interdisciplinary evaluation.

Content
The ongoing advancements in information technology have revolutionized traditional business processes and given rise to electronic marketplaces. In contrast to physical marketplaces, electronic markets do not just evolve, but must be carefully designed, implemented and monitored and evaluated. Moreover electronic markets demand open and flexible platforms as well as adequate standards and information services. Future Market Engineers must therefore be able to consider the economic, legal and technological dimension of markets simultaneously. The lecture focuses on the discussion of (1) Microstructure, (2) IT infrastructure, and (3) Business Structure of electronic markets. Hence, students will be taught the economic incentives that a market can impose on market participants, development models for implementing markets, and business models for the application of markets.

Media

- Powerpoint
- eLearning Platform Ilias

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

Course: Market Microstructure [2530240]

Coordinators: T. Lüdecke
Part of the modules: Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations

Conditions
Knowledge of the content of the course *Asset Pricing* [2530555] is assumed.

Learning Outcomes
This lecture makes students familiar with the fundamental models of trading in financial markets. It starts with generic design features of financial markets which are used to frame price discovery as the key element of the trading process. The link between market design and market quality is pointed out by using alternative measures of market quality. Seminal models of market microstructure are used to show how dealer inventoy and/or asymmetric information affect market prices and the pricing of securities. Theoretical models are shown to provide predictions which are consistent with empiricial evidence.

Content
The focus of this lecture is on the question how the microstructure of financial markets affects price discovery and market quality. First, issues in designing market structure are presented and linked to fundamental dimensions of market quality, i.e liquidity and trading costs. In particular, the services and privileges of market makers are stressed. The main part of the lecture covers inventory-models of dealer markets and models of information-based trading. The final part gives attention to some econometric models to analyze the short-term behavior of security prices.

Media
Slides.

Literature
keine
Elective literature:
See reading list.

Remarks
This lecture was not exceptionally taught in the winter semester 2011/2012. The corresponding exams however took place as usual.
Only in the winter term 2011/2012 the lecture could be replaced by the lecture eFinance: Information Engineering and Management for Securities Trading [2540454] within the corresponding module. Who wanted to replace it in this way had to make the first attempt at passing the examination at the regular examination dates of this winter term 2011/2012. The general regulation concerning the second attempt at passing the examination remains unchanged.

Course: Master Seminar in Information Engineering and Management [2540510]

Coordinators: A. Geyer-Schulz
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis and a presentation.
The grade is given, if the presentation is held and the seminar thesis is handed in.
The grade of this course is based on the grade of the seminar thesis. The presentation can improve or worsen the grade of the seminar thesis by up to two grade levels (up to 0.7 grades).

Conditions
None.

Learning Outcomes
The student is able to

- to perform a literature search for a given topic, to identify, find, value and evaluate the relevant literature.
- to write his seminar thesis of 15-20 pages in a structured scientific manner.
- to communicate his results in a presentation with discussion afterwards.

Content
The seminar servers on one hand to improve the scientific working skills. On the other hand, the student should work intensively on a given topic and develop a scientific work, that is based on a profound literature research.

Course: Mathematical Theory of Democracy [25539]

Coordinators: A. Melik-Tangyan
Part of the modules: Social Choice Theory (p. 45)[IW4VWL9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The mathematical theory of democracy deals with the quantitative evaluation of the representative capacity of single decision makers and representative bodies like president, parliament, or council of ministers. The model is used to analyse the Athenian democracy with its selection of representatives by lottery, to estimate the popularity of parties and coalitions in Germany, and to revise Arrow's paradox about the inevitability of a dictator. Moreover, the idea of representativeness is applied to non-societal OR-domains like MCDM, DAX predictions, or traffic control, based on the observation that certain objects can represent properties/behavior of other objects.

Course: Medical Simulation Systems I [24173]

Coordinators: R. Dillmann, Röhl, Speidel
Part of the modules: (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student gains insight into medical computer science. In particular, special methods and algorithms in medical image acquisition, image processing, segmentation, registration and visualization are covered. After attending the lecture, the student should be able to analyze a given problem, choose appropriate methods and design a system in the field of preoperative diagnosis and intraoperative assistance.

Content
The research field of medical computer science and simulation systems is an expanding area with lots of ongoing research projects. Systems are needed for preoperative diagnosis as well as intraoperative assistance. The lecture covers the process chain starting with image acquisition up to intraoperative assistance.

The lecture focuses on imaging, image processing, segmentation, registration and visualization with augmented reality. The design of special systems system in the field of preoperative diagnosis and intraoperative assistance is shown and explained on different examples. Numerous examples of research projects and clinical life give an insight in this area of computer science.

Media
Slides.

Course: Medical Simulation Systems II [24676]

Coordinators: R. Dillmann, Unterhinninghofen, Suwelack
Part of the modules: (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Prior attendance of the lecture *Medical Simulation Systems I* [24173] is recommended.

Learning Outcomes
The student will gain insight into the field of medical informatics. In particular methods concerning medical fluid and structure mechanics as well as finite-element-methods are imparted. On successful completion of this lecture the student will be able to conceive systems and to make important design decisions correctly. Furthermore team work and free speech are trained.

Content
The lecture deals with the field of medical simulation systems. Continuing lecture Medical Simulation Systems I, modeling and simulation of biological systems are considered. The focus is on solid mechanics for describing soft tissue and on fluid mechanics for describing blood flow. Furthermore finite element methods are presented as a numerical technique for the computation of the simulations. Insights in clinical problems and applications as well as in clinical validation methods complete the lecture.

Media
Slides.

Course: [24659]

Coordinators: M. Beigl, Takashi Miyaki
Part of the modules: (p. 83)[IN4INMMI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
120h

Content

Literature
David Benyon: Designing Interactive Systems: A Comprehensive Guide to HCI and Interaction Design. Addison-Wesley Educational Publishers Inc; 2nd Revised edition edition; ISBN-13: 978-0321435330
Steven Heim: The Resonant Interface: HCI Foundations for Interaction Design. Addison Wesley; 1 edition (March 15, 2007) ISBN-13: 978-0321375964

Course: Methods of Biosignals Processing [24641]

Coordinators: M. Wand, T. Schultz
Part of the modules: Biosignal Processing (p. 79)[IW4INBSV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lecture „Biosignals and User Interfaces“ or „Multilingual Human-Machine Communication“ or an equivalent lecture is required.

Learning Outcomes
This lecture imparts an in-depth insight into the algorithmics of Biosignal processing. We particularly focus on dealing with signals which consist of multiple sources, and on fusing classification decisions in multimodal systems.
This lecture shall enable the students to independently apply the methods of this lecture to current problems in modern biosignal processing.

Content
This lecture deals with algorithmic methods of modern biosignal processing. Topics which are taught in-depth include source separation of biosignals, i.e. the analysis of measurements which consist of multiple superposed components.
A further main topic is the fusion of information which may, for example, be obtained from several parts of a multimodal classification system.
The theoretical framework is illustrated by application examples from the literature and from our own research.
Remark: Knowledge of the contents of the lecture „Biosignals and User Interfaces“ or „Multilingual Human-Machine Communication“, or any lecture with related content, is required.

Media
slides (online at http://csl.anthropomatik.kit.edu), black board

Literature
Literature will be announced in the lecture.

Course: Microprocessors II [24161]

Coordinators: W. Karl
Part of the modules: Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Media
Slides

Course: Mobile Communications [24643]

Coordinators: O. Waldhorst
Part of the modules: Future Networking (p. 70)[IW4INFN], Wireless Networking (p. 67)[IW4INWN]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
The goal of the course is to introduce the technical foundations of mobile communication systems (signal propagation, medium access, etc.). An additional focus is on topics of current research (Mobile IP, Ad hoc Networks, Mobile TCP, etc.).

Content
The course “Mobile Communications” uses prominent examples for systems of currently deployed mobile communication systems, to explain typical architectures of such systems, e.g. mobile telecommunication systems, wireless personal, local, and metropolitan area networks. Additional topics related to current research efforts include TCP/IP-based communication over mobile networks and positioning systems. The goal of the course is not to teach facts on particular architectures and standards, but to show typical problems in mobile communications and present typical solutions. The fundamental principles of digital wireless transmissions including the frequency bands, signal propagation, modulation, and multiplexing are explained by application examples.

Media
Slides.

Literature
J. Schiller; Mobilkommunikation; Addison-Wesley, 2003.
Elective literature:
C. Eklund, R. Marks, K. Stanwood, S. Wang; IEEE Stadard 802.16: A Technical Overview of the WirelessMANTM Air Interface for the Broadband Wireless Access; IEEE Communications Magazine, June 2002.
H. Kaaranen, A. Ahtiainen, et. al., UMTS Networks – Architecture, Mobility and Services, Wiley Verlag, 2001.
B. O’Hara, A. Petrick, The IEEE 802.11 Handbook – A Designers Companion IEEE, 1999.
B. A. Miller, C. Bisdikian, Bluetooth Revealed, Prentice Hall, 2002
J. Rech, Wireless LAN – 802.11-WLAN-Technologien und praktische Umsetzung im Detail, Verlag Heinz Heise, 2004.
B. Walke, Mobilfunknetze und ihre Protokolle, 3. Auflage, Teubner Verlag, 2001.
R. Read, Nachrichten- und Informationstechnik; Pearson Studium 2004.
What You Should Know About the ZigBee Alliance http://www.zigbee.org.
C. Perkins, Ad-hoc Networking, Addison Wesley, 2000.
H. Holma, WCDMA For UMTS, HSPA Evolution and LTE, 2007

Course: Models of Parallel Processing [24606]

Coordinators: T. Worsch
Part of the modules: Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students know the basic methods of parallel processing and different possibilities to realize them on models which use different approaches to parallelism,and the relevant basic notions from computational complexity.
Students are able to assess the efficiency of parallel algorithms for different parallel models, to identify weak points and to the develop approaches to remove them.

Content

- Models of the first machine class (Turing machines, cellular automata, random access machines with weak instruction sets) and models of the second machine class (PRAM, uniform circuit families, alternating TM, tree CA, RAM with powerful instruction sets) and models „beyond" the second machine class (NL-PRAM)
- aspects of physical realizability
- MPI

Media
Slides.

Literature
Vollmar, Worsch: Modelle der Parallelverarbeitung, Teubner
Elective literature:
Scientific articles of journals and conferences.

Course: Modeling Strategic Decision Making [2577908]

Coordinators: H. Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 35)[IW4BWLUO1], Strategic Decision Making and Organization Theory (p. 36)[IW4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2	Summer term	de

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Conditions
None.

Learning Outcomes
Starting from the basic model of economic decision theory, fundamental decision principles and calculi for multi-attribute decisions in certain and uncertain conditions up to subjective expected utility theory and the economic assessment of information are described. To confront numerous infringements by decision-makers against principles and axioms of this calculus, in addition non-expected utility calculi and advanced models for decisions by economic agents are discussed; these are especially important for management decisions.
Within the chapter concerning leadership frameworks the students are given the possibility to individually analyze their management style on the basis of classical concepts of leadership. These concepts will be presented and discussed in detail.

Content

- Principles of strategic management decisions
- Leadership: Classical leadership concepts
- Basic economic decision models
- Limits of the basic models and advanced concepts
- Advanced models: individual decisions with uncertainty and vague information

Media
Slides.

Literature

- Eisenführ, F.; Weber, M.: *Rationales Entscheiden*. Springer, 4. Aufl. Berlin 2003.[1]
- Laux, H.: Entscheidungstheorie. Springer, 6. Aufl. Berlin 2005.[2]
- Lindstädt, H: *Entscheidungskalküle jenseits des subjektiven Erwartungsnutzens*. In: Zeitschrift für betriebswirtschaftliche Forschung 56 (September 2004), S. 495 - 519.
- Scholz, C.: *Personalmanagement*. Vahlen, 5. Aufl. München 2000, Kap. 9.4, S.923 - 948

Course: [24657]

Coordinators: R. Reussner, Lucia Kapova
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The students should be enabled to understand model-driven approaches to software engineering, as well as to use and assess them. Specifically, this includes creating own meta-models and transformations in accordance with established development processes as well as applying current standards defined by the OMG (MOF, QVT, XMI, UML, etc.). Moreover, the theoretical backgrounds of model transformation languages should be known. Beyond that, students are expected to critically reflect the standards and techniques and to be able to name the respective advantages and disadvantages as well as to weigh them up against each other.

Content
Model-driven software development is directed towards developing software systems based on models. To this end, models are used not only for documentational purposes within the analysis or design phase, as it is common for classical software development, but rather are perceived as primary artifacts of the software development process, ideally allowing for the system to be fully generated from the models. Perceiving models as primary artifacts yields a number of advantages, such as an increased abstraction level of the system specification, an improved communication between stakeholders by the use of domain-specific languages (DSL), and an improved efficiency of the software creation using automatic transformations from created models to the source code constituting the system. However, there are yet unsolved challenges when using model-driven software development, such as model versioning and evolution of DSLs, maintenance of transformations or the combination of teamwork and MDSD. Although MDSD is due to the mentioned benefits already employed in practice, these challenges pose a potential for current research.
The lecture introduces concepts and techniques related to MDSD. As a foundation, the systematic design of meta-models and DSLs is covered along with all required parts (concrete and abstract syntax, static and dynamic semantics). Thereafter, the lecture discusses concepts of transformation languages and gives an introduction into a number of selected transformation languages. The integration of MDSD into the software development process lays the foundation for their practical use. The remainder of the lecture deals with advanced issues like model versioning, model coupling, MDSD standards, teamwork based on models, testing of software created using model-driven techniques, as well as the maintenance and evolution of models, meta-models and transformations. Finally, model-driven approaches for the analysis of software architecture models are covered. The lecture delves deeper into concepts of existing lectures like software engineering and compiler construction. Beyond that, transformation languages make use of graph grammars, logical calculi or relational algebras.

Course: Modeling and Simulation of Networks and Distributed Systems [24669]

Coordinators: H. Hartenstein
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI], Networking (p. 71)[IW4INNW], Networking Labs (p. 68)[IW4INNL], Wireless Networking (p. 67)[IW4INWN]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Basic knowledge in computer networks, according to the lectures *Database Systems* and *Introduction in Computer Networks* is required. Additionally the lecture *Wahrscheinlichkeitstheorie und Statistik* is required.

Learning Outcomes
The goal of this lecture is on the one hand to introduce the theoretical basics of discrete event-based simulation and on the other hand to give insight into the practical work of conducting simulation studies, particularly for Internet protocols and services as well as for ubiquitous networks and systems. Special emphasis is given to the appropriate modeling of the different building blocks of simulation environments for networks and distributed systems.

Content
The simulation of networks and distributed systems is a means to analyze and evaluate protocols in a quick and cost-efficient way and is therefore a valuable tool in the research of networks and distributed systems. While analytical approaches are often challenged by the complexity of scenarios and field tests are challenged by a high hardware configuration effort and resulting costs, simulations allow for the efficient investigation of the parameter space regarding network topologies, communication patterns and dependencies to other protocols. However, simulation results are only of relevance if the modeling and evaluation has been done accurately. Therefore, the lecture provides the required basics in mathematics and algorithms, practical experience in the use of simulators and simulation tools as well as an illustration of how simulations can be applied to answer recent research questions,e.g. in the field of vehicular networks or social networks.

Media
Slides

Literature

- Averill Law, W. David Kelton, Simulation Modeling and Analysis, 4th ed., McGraw-Hill, 2006.

Remarks
The course was known as *Simulation von Rechnernetzen* till the winter term 09/10.

Course: Modern Development Environments using the example of .NET [24634]

Coordinators: W. Tichy, Gelhausen, Ladani
Part of the modules: Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Good programming skills in Java are required.

Learning Outcomes

- Being able to explain and compare the concepts of modern programming platforms;
- Being able to compare performance predictions for miscellaneous implementation methods;
- Being able to judge effects of newly introduced programming constructs and make behavioral predictions.

Content
The first part of the course is to thoroughly elaborate on the programming language C# on the basis of the ECMA standard 334. The focus will be on extensions in comparison with Java. The main part of the lecture will be to study the exact semantics and the complete syntax of programming constructs. Going into detail especially with marginal cases will help to understand the internal functionality of a modern programming language.
The second part of the lecture will deal with the runtime environment CLR. In the course of this, tasks as well as protection and performance potentials of modern virtual machines will be discussed.

Course: Multidisciplinary Risk Research [2530328]

Coordinators: U. Werner
Part of the modules: Operational Risk Management II (p. 34)[IW4BWLFBV10], Operational Risk Management I (p. 33)[IW4BWLFBV9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Summer term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes

- Getting an overview of the various theoretical, empirical and methodological approaches used in risk research.
- Learning to assess disciplinary perspectives and approaches.
- Detailed examination of at least one theoretical and one methodological approach by the analysis of research papers and case studies.

Content
The course consists of two parts:
In the theoretical part risk concepts of various disciplines are discussed as well as categorisations of risk (e.g. technical or natural origin) and of risk carriers. Based on empirical research, processes of risk perception, risk assessment, and risk taking – at the individual, institutional, and global level - are described and explained.
The methodological part of the course deals with hazard research, approaches for identification and mapping of risks and their accumulations, as well as with safety culture research. Using empirical studies, survey methods regarding risk perception and risk assessment are discussed. Specific problems in the context of intercultural research are considered too.
All students participate actively in the lecture. Per person, at least one presentation and one elaboration are expected.

Literature

- U. Werner, C. Lechtenbörger. Risikoanalyse & Risikomanagement: Ein aktueller Sachstand der Risikoforschung. Arbeitspapier 2004
- Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen (WBGU). Welt im Wandel: Strategien zur Bewältigung globaler Umweltrisiken. Jahresgutachten 1998, http://www.wbgu_jg1998.html.
- R. Löfstedt, L. Frewer. Risk and Modern Society, London 1998.
- http://www.bevoelkerungsschutz.ch

Elective literature:
Additional literature is recommended during the course.

Remarks
For organizational reasons, please register with the secretary of the chair: thomas.mueller3@kit.edu.

Course: Multicore Computers and Computer Clusters [24112]

Coordinators: W. Tichy, V. Pankratius
Part of the modules: Software Systems (p. 64)[IW4INSWS], Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
None.

Recommendations
The course requires basic knowledge of C/C++, Java, operating systems, computer architecture. The course is is self-contained, but can be taken in conjuction with the summer course „Software Engineering for Modern, Parallel Platforms“.

Learning Outcomes
Understand basics of systems architecture, programming models, algorithms for parallel shared-memory and distributed-memory systems.

Content
This course discusses system architectures and programming approaches for parallel shared-memory and distributed-memory systems. For shared-memory systems, the course explains how to write parallel programs in OpenMP, Java, and other models (e.g., Transactional Memory); it elaborates on MPI and ZPL for distributed-memory architectures. The course also discusses basics of networking (Gigabit Ethernet, Myrinet, Infiniband), resource management and scheduling, as well as parallel algorithms needed for cluster programming.

Media
Lecture presentations

Literature
Elective literature:
Additional literature will be announced in class.

Course: Multilingual Human-Machine Communication [24600]

Coordinators: T. Schultz, F. Putze
Part of the modules: Biosignal Processing (p. 79)[IW4INBSV], Speech Processing (p. 80)[IW4INSV]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The students will be introduced to the foundations of automatic speech recognition and processing. The lecture begins with the theoretical background on signal processing and models of speech production and perception. The focus here is on statistical methods. The current state of the art is presented using many real-world applications. After attending the lecture, students should be able to assess the potential as well as the challenges and limitations of modern speech technology and applications.

Content
The lecture offers an introduction to the foundations of automatic speech recognition and processing. The lecture begins with the theoretical background on signal processing and models of speech production and perception. The focus here is on statistical methods. Then, the central approaches and methods for a successful transition from theory to practice are presented. The current requirements for speech recognition and processing regarding globalization and multilingualism are illustrated using several examples of state of the art systems.
For further information, see http://csl.anthropomatik.kit.edu.

Media
slides (online at http://csl.anthropomatik.kit.edu)

Literature
Elective literature:
Xuedong Huang, Alex Acero und Hsiao-wuen Hon, Spoken Language Processing, Prentice Hall PTR, NJ, 2001
Tanja Schultz und Katrin Kirchhoff (Hrsg.), Multilingual Speech Processing, Elsevier, Academic Press, 2006

Remarks
Language of the lecture: German (English by request)

Course: Multimedia Communications [24132]

Coordinators: R. Bless
Part of the modules: Future Networking (p. 70)[IW4INFN], Networking (p. 71)[IW4INNW]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
Objective of the lecture is to present techniques, procotols, and latest developments in Internet-based multimedia communications. Especially in the context of increasing amount of voice communications over the Internet (Voice over IP), key technologies and protocols such as RTP and SIP are intensively discussed so that their function and principles are understood in detail.

Content
This lecture describes techniques and protocols to transmit audio and video data over the Internet. Topics are audio/video conferences, audio/video transport protocols, Voice over IP SIP for signaling, establishment and control of multimedia sessions, RTP for transport of multimedia data over the Internet, RTSP for control of A/V streams, ENUM, A/V Streaming, Middleboxes and Caches, DVB, and Video on Demand.

Media
Slides. Protocol traces.

Literature
James F. Kurose, and Keith W. Ross *Computer Networking* 4th edition, Addison-Wesley/Pearson, 2007, ISBN 0-321-49770-8, Chapter Multimedia Networking.
Elective literature:
Stephen Weinstein *The Multimedia Internet* Springer, 2005, ISBN 0-387-23681-3
Alan B. Johnston *SIP – understanding the Session Initiation Protocol* 2nd ed., Artech House, 2004
R. Steinmetz, K. Nahrstedt *Multimedia Systems* Springer 2004, ISBN 3-540-40867-3
Ulrick Trick, Frank Weber: *SIP, TPC/IP und Telekommunkationsnetze*, Oldenbourg, 3.
Auflage, 2007

Course: Multivariate Methods [2520317]

Coordinators: W. Heller
Part of the modules: Statistical Methods in Risk Management (p. 52)[IW4STAT2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Literature

- Fahrmeir L., Hamerle A., Tut G.: Multivariate statistische Verfahren; de Gruyter 1996
- Jobson J.D.: Applied Multivariate Data Analysis Vol. I/II, Springer 1991
- Dobson A.J.: An Introduction to Statistical Modelling, Chapman and Hall
- Hosmer D.W., Lemeshow S.: Applied Logistic Regression, J. Wiley 1989
- Jambu M.: Explorative Datenanalyse, G. Fischer 1992

Course: Nature-inspired Optimisation Methods [2511106]

Coordinators: S. Mostaghim, P. Shukla
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Organic Computing (p. 97)[IW4INAIFB8], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	en

Learning Control / Examinations
The assessment consists of a written exam (60 min) (according to Section 4(2), 1 of the examination regulation) and an additional written examination called “bonus exam”, 60 min (according Section 4(2), 3 of the examination regulation) or a selection of exersices . The bonus exam may be split into several shorter written tests.
The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
To learn:

1. Different nature-inspired methods: local search, simulated annealing, tabu search, evolutionary algorithms, ant colony optimization, particle swarm optimization
2. Different aspects and limitation of the methods
3. Applications of such methods
4. Mlti-objective optimization methods
5. Constraint handling methods
6. Different aspects in parallelization and computing platforms

Content
Many optimization problems are too complex to be solved to optimality. A promising alternative is to use stochastic heuristics, based on some fundamental principles observed in nature. Examples include evolutionary algorithms, ant algorithms, or simulated annealing. These methods are widely applicable and have proven very powerful in practice. During the course, such optimization methods based on natural principles are presented, analyzed and compared. Since the algorithms are usually quite computational intensive, possibilities for parallelization are also investigated.

Media
Powerpoint slides with annotations on graphics screen, access to Internet resources, recorded lectures

Literature
F. Glover and M. Laguna. „Tabu Search” In: Handbook of Applied Optimization, P. M. Pardalos and M. G. C. Resende (Eds.), Oxford University Press, pp. 194-208, 2002. G. Raidl and J. Gottlieb: Empirical Analysis of Locality, Heritability and Heuristic Bias in Evolutionary Algorithms: A Case Study for the Multidimensional Knapsack Problem. Evolutionary Computation, MIT Press, 13(4), pp. 441-475, 2005.
Weiterführende Literatur:
E. L. Aarts and J. K. Lenstra: „Local Search in Combinatorial Optimization”. Wiley, 1997. D. Corne and M. Dorigo and F. Glover: „New Ideas in Optimization”. McGraw-Hill, 1999. C. Reeves: „Modern Heuristic Techniques for Combinatorial Optimization”. McGraw-Hill, 1995. Z. Michalewicz, D. B. Fogel: „How to solve it: Modern Heuristics”. Springer, 1999. E. Bonabeau, M. Dorigo, G. Theraulaz: „Swarm Intelligence”. Oxford University Press, 1999. A. E. Eiben and J. E. Smith: „Introduction to Evolutionary Computing”. Springer, 2003. K. Weicker: „Evolutionäre Algorithmen”. Teubner, 2002. M. Dorigo, T. Stützle: „Ant Colony Optimization”. MIT Press, 2004. K. Deb: „Multi-objective Optimization using Evolutionary Algorithms”, Wiley, 2003.

Course: Meshes and point clouds [24122]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF], (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students are introduced into an active research area and will be acquainted with the important specifics techniques.

Content
Data structures for point clouds and triangular meshes, triangulation algorithms, marching cubes, fairing and mesh smoothing, parametrization, hierarchical representations, segmentation, deformation transfer, animation.

Media
Blackboard and slides

Literature
Elective literature:
See http://i33www.ira.uka.de/pages/Lehre/Vorlesungen/NetzeUndPunktwolken.html

Course: Network Security: Architectures and Protocols [24601]

Coordinators: M. Schöller
Part of the modules: Wireless Networking (p. 67)[IW4INWN], Networking Security - Theory and Praxis (p. 72)[IW4INNTP], Networking Labs (p. 68)[IW4INNL], Networking (p. 71)[IW4INNW]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
The course aims at teaching fundamental concepts of the design of secure communication protocols. More advanced topics include existing security protocols of the internet and local networks.

Content
The lecture Network Security: Architectures and Protocols considers challenges and technologies in the design of secure communication protocols, as well as topics of data security and privacy. Complex systems like Kerberos will be discussed explicitly and their design decision considering security aspects will be outlined. A special focus is set on PKI-basics, infrastructures, as well as on specific PKI-formats. Furthermore, an emphasis is set on the commonly used security protocols IPSec, TLS/SSL, and protocols of infrastructure security.

Media
Slides.

Literature
Roland Bless et al. Sichere Netzwerkkommunikation. Springer-Verlag, Heidelberg, Juni 2005.
Elective literature:

- Charlie Kaufman, Radia Perlman, and Mike Speciner. Network Security: Private Communication in a Public World. 2nd Edition. Prentice Hall, New Jersey, 2002.
- Carlisle Adams and Steve Lloyd. Understanding PKI. Addison Wesley, 2003
- Rolf Oppliger. Secure Messaging with PGP and S/MIME. Artech House, Norwood, 2001.
- Sheila Frankel. Demystifiying the IPsec Puzzle. Artech House, Norwood, 2001.
- Thomas Hardjono and Lakshminath R. Dondeti. Security in Wireless LANs and MANs. Artech House, Norwood, 2005.
- Eric Rescorla. SSL and TLS: Designing and Building Secure Systems. Addison Wesley, Indianapolis, 2000.

Course: Next Generation Internet [24674]

Coordinators: R. Bless
Part of the modules: Future Networking (p. 70)[IW4INFN], Networking (p. 71)[IW4INNW], Networking Labs (p. 68)[IW4INNL]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowledge of the lectures *Introduction in Computer Networks* [24519] (or similar lectures) and *Telematics* [24128].

Learning Outcomes
Objective of the lecture is to present latest developments in Internet-based networks and to explain the related advanced methods and techniques that are used. Furthermore, architectural principles of the current Internet are discussed and it is described which new challenges threaten the Internet architecture.

Content
In the main focus of the lecture are latest developments in the area of Internet-based network technologies. At first architectural principles of the current Internet are described and discussed. Next, nowadays and future challenges are presented. Methods to support quality of service (QoS), signaling of QoS requirements as well as IPv6 and multicast support for group communications are described. Application of the presented technologies in IP-based networks are discussed. Advanced approaches like active and programmable networks are presented in this lecture and recent developments in peer-topeer networks.

Media
Slides

Literature
James F. Kurose, and Keith W. Ross *Computer Networking* 4th edition, Addison-Wesley/Pearson, 2007, ISBN 0-321-49770-8, Chapters 1, 2.6 (P2P), 4 (Network Layer), 75 - 76 (Scheduling, IntServ, DiffServ, RSVP)
Elective literature:
Ralf Steinmetz, Klaus Wehrle (Eds) Peer-to-Peer Systems and Applications LNCS 3854, Springer 2005
M. Blanchet: *Migrating to IPv6: A Practical Guide to Implementing IPv6 in Mobile and Fixed Network*,
John Wiley & Sons, ISBN 0-471-49892-0, November 2005

Course: Nonlinear Optimization I [2550111]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessmentconsits of a written exam (60 minutes) according to Section 4(2), 1 of the examination regulation.
The exam takes place in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.
The examination can also be combined with the examination of *Nonlinear Optimization II* [2550113]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
In a combined examination of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands fundamentals of nonlinear optimization,
- is able to choose, design and apply modern techniques of nonlinear optimization in practice.

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. The lecture is structured as follows:

- Introduction, examples, and terminology
- Existence results for optimal points
- First and second order optimality condtions for unconstrained problems
- Optimality conditions for unconstrained convex problems
- Numerical methods for unconstrained problems (line search, steepest descent method, variable metric methods, Newton method, Quasi Newton methods, CG method, trust region method)

Constrained problems are the contents of part II of the lecture.
The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- 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

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Nonlinear Optimization II [2550113]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (120 minutes) according to §4(2), 1 of the examination regulation.
The exam takes place in the semester of the lecture and in the following semester.
Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registrationfor the written examination is subject to fulfilling the prerequisite.
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.
In a combined exam of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the exercise points, the grade of the passed exam is improved by a third of a grading step.
In a combined exam of *Nonlinear Optimization I* [2550111] and *Nonlinear Optimization II* [2550113], upon attaining more then 60% of the computer exercise points, the grade of the passed exam is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student

- knows and understands fundamentals of nonlinear optimization,
- is able to choose, design and apply modern techniques of nonlinear optimization in practice.

Content
The lecture treats the minimization of smooth nonlinear functions under nonlinear constraints. For such problems, which occur very often in economics, engineering, and natural sciences, we derive optimality conditions that form the basis for numerical solution methods. Part I of the lecture treats unconstrained optimization problems. Part II of the lecture is structured as follows:

- Topology and first order approximations of the feasible set
- Theorems of the alternative, first and second order optimality conditions for constrained problems
- Optimality conditions for constrained convex problems
- Numerical methods for constrained problems (penalty method, multiplier method, barrier method, interior point method, SQP method, quadratic optimization)

The lecture is accompanied by computer exercises in which you can learn the programming language MATLAB and implement and test some of the methods for practically relevant examples.

Literature
Elective literature:

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- 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

Remarks
Part I and II of the lecture are held consecutively in the *same* semester.

Course: Public Media Law [24082]

Coordinators: C. Kirchberg
Part of the modules: Public Business Law (p. 103)[IW4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
As the traditional media (print, radio, TV) the “new media” (online-services and the Internet) is governed by public law, yet with a different extent of regulation and with apparent effects on private law. The main influences for the media law are constitutional law and European community law. The lectures aims at providing an overview of the common grounds and differences of the current media law regime and of the conceivable perspectives of media convergence. Current developments in politics and economics, which are relevant for public media law, will be used as examples in the lecture. Besides, it is planned to attend a court hearing of the Federal Constitutional Court (Bundesverfassungsgericht) and/or the Federal Court (Bundesgerichtshof).

Content
Initially, the lecture will deal with the constitutional basis of the media law regime. i.e. the responsibilities of the Federal and the State legislatures, freedom of speech, freedom of information, constitutional media rights (Art. 5 para. 1 Constitutional Law) and its limitations by general laws, the ban on censorship and the counterstatement law. In addition, the European community principles on broadcasting and media law will be part of the lecture. Next will be an overview of the individual media laws, namely the broadcasting law (especially Rundfunkstaatsvertrag) the press law of the States and the statute on the so-called “telemedia” services. Finally, the protection of minors in the media will be dealt with (Act on Protection of Minors and Treaty on the Protection of Minors in the Media).

Literature
To understand the legal framework it is necessary for the students to have the relevant statutes, for example “Telemediarecht, Telekommunikations- und Multimediarecht”, beck-Texte im dtv , 7. Auflage 2007.
As an introduction it is recommended to read: Frank Fechner, Medienrecht, Verlag Mohr Siebeck, Verlag Mohr Siebeck, 8. Auflage 2007.

Course: Operations Research in Health Care Management [2550495]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Learning Outcomes
The target of this lecture is to show possible applications of well-known methods of Operations Research applied to health services. The students gain the ability to use quantitative models for the operations planning and logistics in a hospital environment, e.g. appointment, transportation, operating room planning or nurse rostering as well as inventory management and layout planning. Furthermore the advantages and benefits of simulation models and OR methods to plan home health care services are discussed.

Content
In the last years reforms of the German health system, e.g. the introduction of the G-DRG-system, have put an increasing cost pressure on hospitals. Therefore their target is to improve quality, transparency, and efficiency of hospital services, e.g. by reducing the length of stay of patients. To achieve this, processes have to be analyzed in order to optimize them if necessary. When looking at the targets of optimization not only efficiency but also quality of care and patient satisfaction (e.g. waiting times) have to be taken into account.
Besides hospitals also home health care services and their planning are discussed in this lecture. Because of the demographic development this is an emerging field in the health care sector. Here, e.g. nurse rosters have to be built which give details about which nurse visits which patient at what time. While doing so different targets have to be regarded, e.g. the continuity of nurse-patient relationship or the minimization of the distances the nurses have to travel.

Literature
Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

Remarks
The lecture is planned to be held in the summer term 2014.
The planned lectures and courses for the next three years are announced online.

Course: Operations Research in Supply Chain Management [2550480]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	en

Learning Control / Examinations
The assessment is a 120 minutes written examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

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

Recommendations
Advanced knowledge of Operations Research (e.g., as conveyed in the lectures *Facility Location and Strategic SCM*, *Tactical and operational SCM*) is recommended.

Learning Outcomes
The lecture conveys basic and advanced modeling techniques playing an important role in today's problem solving occurring in supply networks. The focus is set on mathematical approaches to technical-economical problems, and the derivation of optimal solutions. Students are enabled to classify problems both conceptually and mathematically, and to identify central variables and parameters in a specific problem setting. Additionally, current developments in operations research and supply chain management are reflected and evaluated by students.

Content
Supply Chain Management constitutes a general tool for logistics process planning in supply networks. To an increasing degree quantitative decision support is provided by methods and models from Operations Research. The lecture "OR in Supply Chain Management" conveys concepts and approaches for solving practical problems and presents an insight to current research topics. The lecture's focus is set on modeling and solution methods for applications originating in different domains of a supply chain. The emphasis is put on mathematical methods like mixed integer programming, valid inequalities or column generation, and the derivation of optimal solution strategies.
In form and content, the lecture addresses all levels of Supply Chain Management: After a short introduction, the tactical and operational level will be discussed with regard to inventory models, scheduling as well as cutting and packing. The strategic level will be discussed in terms of layout planning. Another main focus of the lecture is the application of methods from online optimization. This optimization discipline has gained more and more importance in the optimization of supply chains over the several past years due to an increasing amount of dynamic data flows.

Literature

- Simchi-Levi, D.; Chen, X.; Bramel, J.: The Logic of Logistics: Theory, Algorithms, and Applications for Logistics and Supply Chain Management, 2nd edition, Springer, 2005
- Simchi-Levi, D.; Kaminsky, P.; Simchi-Levi, E.: Designing and Managing the Supply Chain: Concepts, Strategies, and Case Studies, McGraw-Hill, 2000
- Silver, E. A.; Pyke, D. F.; Peterson, R.: Inventory Management and Production Planning and Scheduling, 3rd edition, Wiley, 1998
- Blazewicz, J.: Handbook on Scheduling - From Theory to Applications, Springer, 2007
- Pinedo, M. L.: Scheduling - Theory, Algorithms, and Systems (3rd edition), Springer, 2008
- Dyckhoff, H.; Finke, U.: Cutting and Packing in Production and Distribution - A Typology and Bibliography, Physica-Verlag, 1992
- Borodin, A.; El-Yaniv, R.: Online Computation and Competitive Analysis, Cambridge University Press, 2005
- Francis, R. L.; McGinnis, L. F.; White, A.: Facility Layout and Location: An Analytical Approach, 2nd edition, Prentice-Hall, 1992

Remarks
The lecture is planned to be held in the winter term 2013/14.
The planned lectures and courses for the next three years are announced online.

Course: Optimization in a Random Environment [25687]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (§4(2), 3 SPO).

Conditions
None.

Learning Outcomes
Students are enabled to apply their knowledge about techniques and methodology on current problems such as the measurement and evaluation of operational risk as required by the Basel II accord.
Subject matter of the course will be announced in due time.

Content
The course is concerned with the quantitative analysis of selected problems arising in economics, engineering, and natural sciences. Subject matter of the course will be announced in due time.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Lecture Notes.
Elective literature:
problem-oriented

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: OR-oriented modeling and analysis of real problems (project) [25688]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	1/0/3	Winter / Summer Term	de

Learning Control / Examinations
Presentation and documentation of the rssults.

Conditions
None.

Learning Outcomes
Students are enabled to apply their knowledge about techniques and methodology on real problems and to develop a practically oriented solution in an OR-lab; e.g. in the public health sector.
Subject matter of the course will be announced in due time.

Content
The course is concerned with the quantitative analysis of selected problems arising in economics, engineering, and natural sciences. Subject matter of the course will be announced in due time.

Media
Blackboard, Slides, OR-Lab

Literature
Problem oriented
Elective literature:
problem-oriented

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Organic Computing [2511104]

Coordinators: H. Schmeck, S. Mostaghim
Part of the modules: Ubiquitous Computing (p. 96)[IW4INAIFB7], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB], Organic Computing (p. 97)[IW4INAIFB8]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO) and of submitting written exercises that recapitulate the content of the course. The exercises include theoretical questions as well as practical programming. For providing a successful solution to all exercises, a bonus will be granted, improving the grade of a passed exam by one grade-step (0.3 or 0.4, respectively, following §4(2), 3 SPO). The course will be offered every second semester (summer term) and exams may be repeated at every ordinary exam date.

Conditions
None.

Learning Outcomes
The student acquires the ability to master methods and concepts of Organic Computing and to demonstrate innovation skills regarding the used methods.
Therefore the course aims at the teaching of fundamentals and methods of Organic Computing within the context of its applicability in practice. On the basis of a fundamental understanding of the taught concepts and methods the students should be able to choose the adequate methods and concepts, if necessary further develop them according to the situation and use them properly when facing related problems in their later job. The students should be capable of finding arguments for the chosen solutions and express them to others.

Content
The mission of Organic Computing is to tame complexity in technical systems by providing appropriate degrees of freedom for self-organized behaviour adapting to changing requirements of the execution environment, in particular with respect to human needs. According to this vision an organic computer system should be aware of its own capabilities, the requirements of the environment, and it should be equipped with a number of “self-x” properties allowing for the anticipated adaptiveness and for a reduction in the complexity of system management. These self-x properties are self-organisation, self-configuration, self-optimization, self-healing, self-protection and self-explanation. In spite of these self-x properties, an organic system should be open to external control actions which might be necessary to prevent undesired behaviour.

Media
powerpoint slides with annotations using a tablet pc access to applets and Internet ressources lecture recording (camtasia).

Literature

- Autonomic Computing: Concepts, Infrastructure and Applications. M. Parashar and S. Hariri (Ed.), CRC Press. December 2006.
- Self-Organization in Biological Systems. S. Camazine, J. Deneubourg, N. R. Franks, J. Sneyd, G. Theraulaz and E. Bonabeau. Princeton University Press, 2003.
- Complex Adaptive Systems: An Introduction. H. G. Schuster, Scator Verlag, 2001.
- Introduction to Evolutionary Computing. A. E. Eiben and J. E. Smith. Natural Computing Series, Springer Verlag, 2003. Swarm Intelligence: From Natural to Artificial Systems.Eric Bonabeau, Marco Dorigo and Guy Theraulaz. Oxford University Press, 1999.
- Control of Complex Systems. K. Astrom, P. Albertos, M. Blanke, A. Isidori and W. Schaufelberger. Springer Verlag, 2001.

Elective literature:

- **Adaptive and Self-organising Systems,** Christian Müller-Schloer, Moez Mnif, Emre Cakar, Hartmut Schmeck, Urban Richter,
  June 2007. Preprint.Submitted to ACM Transactions on Autonomous and Adaptive Systems (TAAS)
- **Organic Computing - Addressing Complexity by Controlled Self-organization,** Jürgen Branke, Moez Mnif, Christian Müller-Schloer, Holger Prothmann, Urban Richter, Fabian Rochner, Hartmut Schmeck, In Tiziana Margaria, Anna Philippou, and Bernhard Steffen, *Proceedings of ISoLA 2006*, pp. 200-206. Paphos, Cyprus, November 2006.
- Evolutionary Optimization in Dynamic Environments. J. Branke. Kluwer Academic Publishers, 2002.
- Self-star Properties in Complex Information Systems: Conceptual and Practical Foundations (Lecture Notes in Computer Science. O. Babaoglu, M. Jelasity, A. Montresor, C. Fetzer, S. Leonardi, A. van Moorsel and M. van Steen. Springer Verlag, 2005.

- Design and Control of Self-organizing Systems. C. Gershenson. PhD thesis, Vrije Universiteit Brussel, Brussels, Belgium, 2007.
- VDE / ITG / GI - Positionspapier: Organic Computing - Computer- und Systemarchitektur im Jahr 2010. Juli 2003. it - Information Technology, Themenheft Organic Computing, Oldenbourg Verlag. Volume: 47, Issue: 4/2005.

further references will be announced in class

Course: Managing Organizations [2577902]

Coordinators: H. Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 35)[IW4BWLUO1]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment will consist of a written exam (60 min) taking place at the beginning of the recess period (according to Section 4 (2), 2 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The course should enable the participants to assess the strengths and weaknesses of existing organisational structures and rules using systematic criteria. Here concepts and models for designing organisation structures, regulating organisational processes and managing organisational changes are presented and discussed using case studies. The course is structured to relate to actions and aims to give students a realistic view of the opportunities and limits of rational design approaches.

Content

- Principles of organisational management
- Managing organisational structures and processes: the selection of design parameters
- Ideal-typical organisational structures: choice and effect of parameter combinations
- Managing organisational changes

Media
Slides.

Literature

- Laux, H.; Liermann, F.: *Grundlagen der Organisation*, Springer. 6. Aufl. Berlin 2005.
- Lindstädt, H.: *Organisation*, in Scholz, C. (Hrsg.): Vahlens Großes Personallexikon, Verlag Franz Vahlen. 1. Aufl. München, 2009.
- Schreyögg, G.: *Organisation. Grundlagen moderner Organisationsgestaltung*, Gabler. 4. Aufl. Wiesbaden 2003.

The relevant excerpts and additional sources are made known during the course.

Course: Organization Theory [2577904]

Coordinators: H. Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 35)[IW4BWLUO1], Strategic Decision Making and Organization Theory (p. 36)[IW4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2	Winter term	de

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

Conditions
None.

Learning Outcomes
The participants are made familiar with mostly classical principles of economic organisational theory and institutional economics. This includes transaction cost theory and agency-theory approaches, models for the function and design of organisational information and decision-making systems, transfer price models to coordinate the exchange of goals and services within companies, models on incentive systems and relative performance tournaments as well as selected OR optimisation approaches to designing organisational structures. The course therefore lays the basis for a deeper understanding of the advanced literature on this key economic area.

Content

- Basic considerations and institution-economic principles of organisational theory
- Transfer prices and internal market-price relationships
- Design and coordination without conflicting objectives
- Economic evaluation of information
- Organisation under asymmetric information and conflicting objectives: agency theory principles

Media
Folien.

Literature

- Laux, H.; Liermann, F.: Grundlagen der Organisation. Springer, 5. Aufl. Berlin 2003.
- Milgrom, P.; Roberts, J.: Economics, Organization and Management. Prentice Hall, Englewoods Cliffs 1992.

The relevant excerpts and additional sources are made known during the course.

Course: Parallel Algorithms [24602]

Coordinators: P. Sanders
Part of the modules: Parallel Processing (p. 88)[IW4INPV], Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Knowlege from lectures as *Algorithms I/II* are recommended.

Learning Outcomes
The Students are to learn basic techniques for the design of parallel algorithms as well as a selection of important parallel algorithms.

Content
Models and their relationship to real machines:

- Shared memory - PRAM
- Message passing, BSP
- Circuits

Analysis: speedup, efficiency, scalability
Basic techniques:

- SPMD
- Parallel divide and conquer
- Collective communication
- Load balancing

Examples of real algorithms:

- Collective Communication (also for large data sets): broadcast, reduce, prefix sums, all-to-all exchange
- Matrix arithmetic
- Sorting
- List ranking
- Minimum spanning trees
- Load balancing: master worker with adaptive problem size, random polling, random distribution

Media
Slides (pdf), scientific articles

Literature
Elective literature:

- Sanders, Worsch. Parallele Programmierung mit MPI – ein Praktikum
- Kumar, Grama, Gupta und Karypis. Introduction to Parallel Computing.
- JáJá. An Introduction to Parallel Algorithms

Course: Patent Law [24656]

Coordinators: P. Bittner
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of patent law and the business of technical intellectual property that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of *Industrial and intellectual property law*. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopoly of a patent and the antitrust law policies in Europe will be reviewed with the students.

Content
The course deals with the subject matter of the law of technical intellectual property, in particular inventions, patents, utility models, design patents, know-how, the rights and obligations of employees as creators of technical IP, licensing, limitations and exceptions to patenting, term of protection, enforcement of the rights and defence against these in invalidation and revocation actions. The course does not merely focus on German patent law, but likewise puts European, US and international patent law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background and the legislative policy in the field of technical intellectual property, particularly in the field of information and communication technologies. Students shall learn about the rules of national, European and international patent law as well as know-how protection law and to apply these legal rules in practical cases, in particular in the area of utilizing technical intellectual property through agreements and lawsuits. The conflict between the monopolyöf a patent and the antitrust law policies in Europe will be reviewed with the students.

Media
transparancies

Literature

- Schulte, Rainer Patentgesetz Carl Heymanns Verlag, 7. Aufl. 2005 ISBN 3-452-25114-4
- Kraßer, Rudolf, Patentrecht Verlag C.H. Beck, 5. Aufl. 2004 ISBN 3-406-384552

Elective literature:
tba in the transparencies

Course: [24186]

Coordinators: K. Melullis, Markus Dammler
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Performance Engineering of Enterprise Software Systems [24636]

Coordinators: R. Reussner, S. Kounev
Part of the modules: Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Modern enterprise software systems (e.g., based on the Java EE or Microsoft .NET technologies) are expected to satisfy increasingly stringent requirements for performance and scalability. There are numerous studies, for example in the areas of e-business, manufacturing, telecommunications, health care and transportation that have shown that a failure to meet performance requirements can lead to serious financial losses, loss of customers and reputation, and in some cases even to loss of human lives. To avoid the pitfalls of inadequate quality of service, it is important to evaluate analyze the expected performance and scalability characteristics of systems during all phases of their life cycle. The methods used to do this are part of the discipline called *Performance Engineering*. Performance Engineering helps to estimate the level of performance a system can achieve and provides recommendations to realize the optimal performance level. At every stage, performance evaluation is carried out with a specific set of goals and constraints.
The aim of the course is to provide an introduction to the major methods and techniques for performance engineering evaluation of enterprise systems. The students will first be introduced to modern performance measurement techniques including platform benchmarking, application profiling and system load testing. The different types of workload models typically used in performance evaluation studies will be discussed. An overview of current benchmarks for enterprise systems will be given. Following this, modern state-of-the-art methods for modeling and performance prediction will be introduced. The students will be acquainted with the major types of performance models used in practice and with their advantages and disadvantages. Finally, an overview of current design-oriented performance meta-models will be given. Throughout the course, case studies of real-life systems will be presented to illustrate the developed concepts.

Content
The lecture covers the following topics:

1. Introduction to performance engineering of enterprise software systems

a. Lifecycle of a system

b. Foundations

c. Approaches to performance engineering

d. Capacity planning

2. Performance measurement techniques

a. Performance metrics

b. Average performance and variability

c. Modeling of measurement errors

d. Comparing alternatives on the basis of measurements

e. Tools and techniques for performance measurements

f. Design of performance experiments

3. Benchmarking of enterprise software systems

a. Benchmarking methodologies

b. Overview over popular benchmarks

c. Applications of benchmarks

4. Model-based performance predictions

a. Operation analysis

b. Characterisation of usage profile

c. Modeling techniques (e.g. Petri nets)

d. Analysis models for performance prediction

e. Design-oriented performance meta-models

5. Case studies

Media
Slides, secondary literature

Literature

1. Daniel A. Menascé, Virgilio A.F. Almeida and Lawrence W. Dowdy, “Performance by Design: Computer Capacity Planning by Example”, Prentice Hall, ISBN 0-13-090673-5, 2004.
2. David J. Lilja, “Measuring Computer Performance - A Practitioner’s Guide”, Cambridge University Press, ISBN 0-521-64105-5, 2000.

Elective literature:
[3] Samuel Kounev, “Performance Engineering of Distributed Component-Based Systems - Benchmarking, Modeling and Performance Prediction”, Shaker Verlag, ISBN: 3832247130, 2005.

[4] Lizy Kurian John, Lieven Eeckhout, “Performance Evaluation and Benchmarking”, CRC Press Inc., ISBN: 0849336228, 2005.

[5] Daniel A. Menascé and Virgilio A.F. Almeida, “Scaling for E-Business: Technologies, Models, Performance, and Capacity Planning”, Prentice Hall, ISBN 0-13-086328-9, 2000.

[6] R. K. Jain , “The Art of Computer Systems Performance Analysis : Techniques for Experimental Design, Measurement, Simulation, and Modeling”, Wiley (April 1991), ISBN: 0471503363, 1991.

[7] Kishor Trivedi, “Probability and Statistics with Reliability, Queuing, and Computer Science Applications”, John Wiley and Sons, ISBN 0-471-33341-7, New York, 2001.

[8] Simonetta Balsamo, Antinisca Di Marco, Paola Inverardi and Marta Simeoni, “Model-Based Performance Prediction in Software Development: A Survey”, *IEEE Transactions on Software Engineering*, Vol. 30, No. 5., May 2004.

[9] Samuel Kounev, “Performance Modeling and Evaluation of Distributed Component-Based Systems using Queueing Petri Nets”, *IEEE Transactions on Software Engineering*, 32(7):486-502, July 2006.

[10] Samuel Kounev and Christofer Dutz, “QPME - A Performance Modeling Tool Based on Queueing Petri Nets”, to appear in ACM SIGMETRICS Performance Evaluation Review (PER), Special Issue on Tools for Computer Performance Modeling and Reliability Analysis, 2008.

[11] Steffen Becker, Heiko Koziolek and Ralf Reussner, “The Palladio Component Model for Model-Driven Performance Prediction”, *Journal of Systems and Software*, In Press, Accepted Manuscript, 2008.

Remarks
The lecture is offered in German and English.

Course: Personalization and Recommender Systems [2540506]

Coordinators: A. Geyer-Schulz
Part of the modules: Advanced CRM (p. 22)[IW4BWLISM1], Business & Service Engineering (p. 26)[IW4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The student

- knows the options and opportunities of personalization especially in the area of Internet based services
- 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

Content
At first, an overview of general aspects and concepts of personalization 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.

Media
Folien, Aufzeichnung der Vorlesung im Internet.

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.
Elective literature:
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.

Course: Simulation Game in Energy Economics [2581025]

Coordinators: W. Fichtner
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

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

Conditions
Visiting the course “Introduction to Energy Economics”

Learning Outcomes
Understanding for market mechanisms, pricing and investment decisions in a liberalised electricity market.

Content

Media
Media will likely be provided on the e-learning platform ILIAS.

Literature
Elective literature:
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

Course: Portfolio and Asset Liability Management [2520357]

Coordinators: Y. Kim
Part of the modules: Mathematical and Empirical Finance (p. 51)[IW4STAT1], Statistical Methods in Risk Management (p. 52)[IW4STAT2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment of this course consists of a written examination (following §4(2), 1 SPO) and of possible additional assignments during the course (following §4(2), 3 SPO).

Conditions
None.

Learning Outcomes
Introduction and deepening 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

Media
transparencies, exercises.

Literature
To be announced in lecture.
Elective literature:
To be announced in lecture.

Remarks
The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term 2012.

Course: Lab Advanced Telematics [PrakATM]

Coordinators: M. Zitterbart
Part of the modules: Networking Labs (p. 68)[IW4INNL]

ECTS Credits	Hours per week	Term	Instruction language
5	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students can

- understand and master a concrete protocol or application in the domain of Telematics in detail
- implement protocols or applications in the domain computer networks in a common programming language
- work goal driven based on a given exercise of a given subject independently, but also in a team.

Content
This lab course examines concrete subjects that were introduced in the corresponding lectures. It is advised but not compulsory to attend the respective lectures before the lab course.

The following subjects are covered:

- Project lab “Sensor Networks”
- Project lab “Future Internet”

Course: Practical Course in Algorithm Design [24079p]

Coordinators: P. Sanders, D. Wagner, M. Krug
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of an oral exam according to sec. 4 subsec. 2 no. 2 study and examination regulations. In addition there will be multiple projects and a final presentation.

Conditions
None.

Recommendations
Knowledge of the lecture Algorithms II is recommended.

Learning Outcomes
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.

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.

Course: Advanced Lab Applied Informatics [25070p]

Coordinators: A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
Part of the modules: Intelligent Systems and Services (p. 94)[IW4INAIFB5], Organic Computing (p. 97)[IW4INAIFB8], Web Data Management (p. 93)[IW4INAIFB4], Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment of this course are practical work, presentations and a written seminar thesis according to §4(2), 3 of the examination regulation. Practical work, presentations and a written thesis are weighted according to the course.

Conditions
None.

Learning Outcomes
Students are able to

- implement a prototype at the computer based on the given topic.
- write the thesis with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the course.
- present results of the research in written form as generally found in scientific publications.

Content
The lab intensifies and extends specific topics which are discussed within corresponding lectures. Knowledge of these lecture topics is an advantage but not a precondition.

Media
Slides, access to internet resources

Literature
Literature will be given individually.

Remarks
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre

Course: Laboratory in Cryptography [PrakKryp]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	4	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student

- understands a given protocol or a given attack on a cryptographic system,
- implements a cryptographic protocol in a standard programming language,
- realizes attacks on cryptographic systems,
- learns to work aim-oriented on a given task in a small group.

Content
The Praktikum covers different areas of computer security and cryptography. The topics are presented theoretically and are implemented afterwards. Covered topics are:

- Historical encryption
- Kerberos protocol
- Hash functions
- Block ciphers
- Efficient long number arithmetic
- ElGamal encryption / signature

Course: Practical Course Automatic Speech Recognition [24298]

Coordinators: A. Waibel, Stüker
Part of the modules: Speech Processing (p. 80)[IW4INSV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
The prior completion or parallel attendance of the lecture *Principles of Automatic Speech Recognition* [24145] is of advantage.

Learning Outcomes

- The students experience the implementation of algorithms from the area of automatic speech recognition in the example of the Janus Recognition Toolkit.
- The students learn to autonomously study an existing software using an existing documentation and under human supervision
- The students improve their teamwork skills and their ability to conduct a project in a team, managing the project flow themselves.
- The student learns to communicate with his co-students taking this class, as well as with the supervisor of the class.
- After completion of this class, the student will be familiar with the use of the speech recognition system Janus Recognition Toolkit.
- This class teaches the necessary steps in designing and training a speech recognition system.
- The students learn the basic skills for participating and conducting competitive evaluations for automatic speech recognition systems.

Content

- Using the „Janus" speech recognition system, which has been developed at our institute, the students shall learn through consecutive exercises the methods for training and evaluating a state-of-the-art speech recognition system.
- The open object structure of Janus makes it possible, to gain insight into every stage of the training and recognition process, and to enhance the understanding of the methods applied.
- During the first half of the class, the students complete a tutorial for learning the use of the Janus Recognition Toolkit and the use of the scripting language Tcl/Tk which is necessary in order to control Janus.
- During the second half of the class the students will train in teamwork a speech recognition system for a surprise language, and will participate in a competitive evaluation.

Media
web-based tutorial

Literature
Elective literature:

- A. Waibel, K.F. Lee: Readings in Speech Recognition
- F. Jelinek: Statistical Methods of Speech Recognition
- Schukat-Talamazzini: Automatische Spracherkennung

Course: Practical Course Data Warehousing and Mining [24874]

Coordinators: K. Böhm
Part of the modules: Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts (projects, experiments, presentations and reports). The course will be assessed with “passed” or “failed” (according to sec. 9 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully. If the course is dropped after the first session, it will be marked with “failed”.

Conditions
None.

Learning Outcomes
In this practical course, the students should transfer the theoretical knowledge from the lecture “Data Warehousing and Mining” into practice. In this process, the students will also learn how to work with common tools and how to deploy them. In the data warehousing block, the students should learn how to set up data warehouses and should become familiar with the data-cube model. In the data mining block, the students should become familiar with the common data-mining techniques. They will be confronted with the typical problems in data mining and will learn how to develop solutions. Furthermore, the students should learn to work in teams in order to work on various projects successfully.

Content
The practical course data warehousing and mining will deepen the theoretical knowledge from the lecture “Data Warehousing and Mining”, with a focus on practical aspects and common tools. The course is divided into two blocks, data warehousing and data mining. The data warehousing block focuses on data preprocessing and building data warehouses. The data-mining block roughly follows the KDD process with practical knowledge-discovery examples in businesses. With such examples, the different data-mining concepts are investigated. The focus is on techniques for clustering, classification and discovering frequent itemsets and association rules. Working in teams is another important aspect in the whole course.

Media

- Slides.
- Practical course notes.

Literature
Elective literature:

- J. Han und M. Kamber: “Data Mining: Concepts and Techniques”, Morgan Kaufmann, 2006.
- I. H. Witten und E. Frank: “Data Mining - Practical Machine Learning Tools and Techniques”, Morgan Kaufmann, 2005.
- D. Hand, H. Mannila und P. Smyth: “Principles of Data Mining”, MIT Press, 2001.
- L. I. Kuncheva: “Combining Pattern Classifiers”, Wiley-Interscience, 2004.
- A. Bauer, H. Günzel: “Data Warehouse Systeme – Architektur, Entwicklung, Anwendung”, dpunkt.verlag, 2004.

Course: Practical course: Geometric Modeling [24884]

Coordinators: H. Prautzsch, Diziol
Part of the modules: (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Programming knowledge in C++

Learning Outcomes
Practical skills to work with free form curves and surfaces. Team work.

Content
Classical techniques of computer aided geometric design, interpolation, periodic curves, approximation, tensor product surfaces, curvature, offsets, ball pivoting algorithm.
AC ++ library is used and it has to be extended.

Media
Practical course material, slides

Literature
Elective literature:
Prautzsch, Boehm, Paluszny: Bézier and B-Spline Techniques, Springer 2002.
Farin: Curves and Surfaces for CAGD, Fifth Edition, 2002.
de Boor: A practical guide to splines, 2001.
Piegl, Tiller: The NURBS book, 1997

Course: Practical Course Modeling and Simulation of Networks and Distributed Systems [24878]

Coordinators: H. Hartenstein
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI], Networking Labs (p. 68)[IW4INNL]

ECTS Credits	Hours per week	Term	Instruction language
5	0/2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Basic knowledge in computer networks, according to the lectures *Database Systems* and *Introduction in Computer Networks* or *Telematics* is required.
The requirements are explained in the module description.

Learning Outcomes
The students learn to understand and apply basic concepts of the simulation of networks and distributed systems. More specifically students will learn to formulate and model problems of networks and distributed systems, e.g., the Internet and ubiquitous networks, to analyze them via simulation and to discuss their findings

Content
The simulation of networks and distributed systems is a means to analyze and evaluate protocols in a quick and cost-efficient way and is therefore a valuable tool in the research of networks and distributed systems. While analytical approaches are often challenged by the complexity of scenarios and field tests are challenged by a high hardware configuration effort and resulting costs, simulations allow for the efficient investigation of the parameter space regarding networktopologies, communication patterns and dependencies to other protocols. However, simulation results are only of relevance if the modeling and evaluation has beendone accurately.

In this practical course the students will acquire practical experiences by using the concepts, tools and simulators introduced in the lecture.

More specifically the following topics are covered:

- Introduction to the simulation of computer networks and distributed systems in general
- Hands-on experience with respect to state-of-the-art simulators, in particular ns-3, OMNeT++ and OPNET
- Simulation of wired and wireless networks
- Distributed simulations
- Agent-based simulations
- How to implement your own simulator: algorithms and their quality

Media
Slides, problems, code fragments

Literature
Averill Law, W. David Kelton, Simulation Modeling and Analysis, 4th ed., McGraw-Hill, 2006.

Remarks
The lecture was known as *Praktikum Simulation von Rechnernetzen* till the winter term 09/10.

Course: Advanced Lab in Ubiquitous Computing [24146p]

Coordinators: H. Schmeck
Part of the modules: Ubiquitous Computing (p. 96)[IW4INAIFB7]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Practical Course Distributed Data Management [praktvd]

Coordinators: K. Böhm
Part of the modules: Theory and Practice of Database Technology (p. 77)[IW4INDBTP]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts (projects, experiments, presentations and reports). The course will be assessed with “passed” or “failed” (according to sec. 9 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully. If the course is dropped after the first session, it will be marked with “failed”.

Conditions
Course *Database Systems* has to passed.
Knowledge about database systems, e.g. from the lectures *Database Systems*, as well as basic knowledge of Java programming.

Learning Outcomes
During this practical course, the students should

1. deepen selected topics from the lecture “Distributed Data Management” in the context of sensor networks,
2. gain experiences in programming sensor nodes,
3. develop self-containedly a solution for a given problem from the research-area of query processing in sensor networks and
4. get experience in developing and programming in teams as well as getting familiar with the according tools.

Content
Characteristics of modern information systems like massively distributed data creation, query processing over the internet and an increased demand regarding the robustness of such systems require distributed storage and query processing. Traditional database systems initially did not meet these new requirements, but met them by offering additional software extensions. These extensions suffer from the fact that the original system was not designed with a distributed system in mind and therefore the extension either only offer limited functionality or their applicability is tailored to a specific scenario. This course offers a broad introduction into distributed database technology, that does not have the drawbacks of afore mentioned extensions. Furthermore the participants get an in-depth look on selected research topics through theoretical course work and hands-on experience with different distributed database systems: The first block of the course will introduce database schemas for distributed storage and based on this, the participants will use SQL to execute queries over distributedly stored data. The second block of the course will focus on query processing in sensor networks, which is an application of distributed databases, where extensions of standard database technology are not sufficient for several reasons. After an introductional phase into sensor databases, the students will develop a solution to a complex research problem over several weeks. For the development and testing of this solution, we will provide Sun SPOT sensor nodes (www.sunspotworld.com).

Media

- Slides.
- Practical course notes.

Literature
Please refer to the literature from the lecture “Distributed Data Management”.
Elective literature:
Please refer to the literature from the lecture “Distributed Data Management”.

Remarks
The course is not offered.

Course: Practical Course Web Engineering [24880]

Coordinators: H. Hartenstein, M. Nußbaumer, M. Keller
Part of the modules: Applied Web Engineering (p. 66)[IW4INPWE]

ECTS Credits	Hours per week	Term	Instruction language
5	4	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
The lecture Web Engineering (24124) has to be taken.

Recommendations
Knowledge of HTML is required, basic programming knowledge (e.g. Java, C++/C or C#, etc.) is expected.

Learning Outcomes
The practical course is based on the lecture Web Engineering. The exercise help develop a fundamental understanding of server- and client-side technologies and their interaction. According to the lecture the aspects data, interaction, navigation, presentation, communication and processes are covered.

A larger project will be realized in the second half of the practical course, to broaden the knowledge about the whole Web application lifecycle and the project management process. The project and most of the exercises will be carried out in form of teamwork.

Content
The practical course consists of two parts. In the first half the basic technologies and methods of the Web Engineering discipline are introduced. This includes declarative languages like (X)HTML/CSS and XML/XSL as well as component-based approaches and frameworks. Another thematic focus of the course is on Web services as a fundamental building block for realizing service-oriented applications. The second half of the practical course emphasizes the structured and disciplined application of the learnt technologies and methods by realizing a software project.

Media
Slides, homepages.

Course: Lab Class Web Services [25820]

Coordinators: S. Tai
Part of the modules: Service Computing 2 (p. 100)[IW4INAIFB13], Service Technology (p. 90)[IW4INAIFB1], Service Computing 1 (p. 99)[IW4INAIFB12], Cloud Computing (p. 91)[IW4INAIFB2], Web Service Engineering (p. 92)[IW4INAIFB3]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 of the examination regulation in form of an examination of the written seminar thesis, a presentation and a project. The final mark is based on the examination of the written seminar thesis and the project but can be upgraded or downgraded according to the quality of the presentation.

Conditions
None.

Recommendations
The lectures *Service Oriented Computing 1* and/or Cloud Computing are recommeded.

Learning Outcomes
Students will acquire the technical expertise to apply service-oriented platforms and tools. Thereby, they will be enabled to develop practical solutions for concrete problems of constructing service-oriented IT infrastructure for provision of electronic services over the Internet.

Content
The “Praktikum (lab class) Web Services” provides a practical introduction to fundamental Web service technologies and their application to support applications on the Internet. Based on concrete application scenarios, the class focuses on the development of software solutions for specific aspects of service-oriented IT-infrastructure. This includes the complete development lifecycle of a large-scale software project and its implementation in small project teams.

Literature
Will be announced in the lecture.

Course: Practical Course Web Technologies [WTprak]

Coordinators: S. Abeck, Gebhart, Hoyer, Link, Pansa
Part of the modules: Web Applications and Web Technologies (p. 62)[IW4INWAWT]

ECTS Credits	Hours per week	Term	Instruction language
5	2/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment of this course consists of the documentation of the exercises and results of the practical course and various presentations as a “Erfolgskontrolle anderer Art” following §4, Abs. 2, 3 of the Prüfungsordnung für Informationswirtschaft.

Conditions
Participation in the lecture *Advanced Web Applications* [24153/24604]

Learning Outcomes
To comprehend the Web technologies used in a real project environment.
To understand and to be able to formulate in one’s own words the task of the practical work.
To apply the Web technologies in order to solve the task.
The results can be documented and presented in a clear and comprehensible way.

Content
The student becomes a member of one of the project teams of the research group and receives a well-defined task, in which he/she develops a part of an advanced Web application using latest Web technologies.
Examples for such tasks are:

- Extension of a Web-based student support system using portal technologies
- Monitoring of an existing Web service implementation using the Java Framework
- Extension of an access control on a service-oriented web application using an existing identity management solution

Media
Templates to efficiently document the results of the practical work (e.g. project documents, presentation material)

Literature

- Team guidelines of the research group
- Lecture notes “Advanced Web Applications”

Elective literature:
Literature basis of the respective project team

Remarks
The course is not offered any longer, examination is possible until winter term 2012/13.

Course: [24310]

Coordinators: K. Böhm, E. Müller
Part of the modules: Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations and consists of multiple parts. The performance is assessed on the basis of projects, experiments, presentations and reports.
The course will be assessed with “passed” or “failed” (according to sec. 9 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully. If the course is dropped after the first session, it will be marked with “failed”.

Conditions
Good knowledge in the field of Data Mining, e.g. from the lecture Data Mining Paradigms and Methods for Complex Databases [24647] is required. Furthermore, knowledge of programming in Java is required.

Recommendations
The practical course is recommended as preparation for evaluating data mining techniques in theses.

Learning Outcomes

Content

Literature

- J. Han und M. Kamber: “Data Mining: Concepts and Techniques”, Morgan Kaufmann, 2006.
- I. H. Witten und E. Frank: “Data Mining - Practical Machine Learning Tools and Techniques”, Morgan Kaufmann, 2005.

Course: [24895]

Coordinators: M. Beigl
Part of the modules: (p. 82)[IN4INKUS]

ECTS Credits	Hours per week	Term	Instruction language
5	4	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Literature
Introduciton: John Krumm, Ubiquitous Computing Fundamentals, 2009, Chapter 7-9.

Course: [24875]

Coordinators: M. Beigl
Part of the modules: (p. 83)[IN4INMMI]

ECTS Credits	Hours per week	Term	Instruction language
5	4	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
120h

Content

Literature
Indtroduction:
David Benyon: Designing Interactive Systems: A Comprehensive Guide to HCI and Interaction Design. Addison-Wesley Educational Publishers Inc; 2nd Revised edition edition; ISBN-13: 978-0321435330
Steven Heim: The Resonant Interface: HCI Foundations for Interaction Design. Addison Wesley; 1 edition (March 15, 2007) ISBN-13: 978-0321375964
John Krumm, Ubiquitous Computing Fundamentals

Course: Multicore Programming in Practice: Tools, Models, Languages [24649]

Coordinators: V. Pankratius
Part of the modules: Software Systems (p. 64)[IW4INSWS], Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
6	4	Winter / Summer Term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations and consists of multiple parts. The performance is assessed on the basis of exercise sheets, results of a programming project, a final presentation and a final report.

Conditions
This course can **not** be taken in the study course Information Engineering and Management.

Recommendations
The course requires basic knowledge of C/C++, Java, operating systems, computer architecture, software engineering.

Learning Outcomes
Understand basics of parallel programming for multicore systems. Use parallel programming languages and tools.

Content
Multicore processors are standard and require parallel programming. This course focuses on developing the practical skills that are necessary for the development of parallel programs for shared-memory parallel computers. It presents selected topics from parallel programming models, parallel design patterns, programming languages, and debugging techniques for parallel programs. This course has a significant amount of practical work: labs, case studies, and a large software project have to be completed throughout the semester. This course can be graded with a mark for Diplom/Master's students in Computer Science, but alternatively can also be graded with a „Praktikumsschein" for Diplom students due to is large amount of practical work. The grading is entirely done throughout the course; there is no exam after the course. The course requires pre-registration.

Media
Slides

Literature
Will be announced in the lecture.
Elective literature:
Will be announced in class.

Course: Consulting in Practice [PUB]

Coordinators: K. Böhm, Dürr
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
1	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include talks, market studies, projects, case studies and reports.
The course will be assessed with “passed” or “failed”. For passing the practical course, all partial exercises must have been passed successfully.

Conditions
None.

Learning Outcomes
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”.

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

Media
Slides, case studies.

Remarks
Seats are limited, so please register with Prof. Böhm’s office.
This course is offered every three semesters, with the next time being in the winter term 2010/2011.

Course: Selling IT-Solutions Professionally [PLV]

Coordinators: K. Böhm, Hellriegel
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
1	2	Summer term	de

Learning Control / Examinations
The assessment will be an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include group work and role playing, written summaries and the presentation thereof and occasionally playing roles such as account manager, sales manager and project manager.
The course will be assessed with “passed” or “failed”. For passing the practical course, all partial exercises must have been passed successfully.

Conditions
None.

Learning Outcomes
At the end of the course, the participants:

1. Have gained knowledge and understanding for the sales process.
2. Have obtained knowledge and understanding for typical roles and tasks.
3. Have gained an insight into practical and application-oriented aspects through an extensive case study and role plays.

Content
One of the key qualifications in IT sales (activities related to the customer) is the understanding of sales mechanisms as well as having the corresponding basic skills. This applies not only to the marketing staff, but also to consultants of customers, project managers and developers. After a short overview of the different types of businesses and the resulting requirements regarding marketing and sales in general, the course focuses in particular on the process of selling IT-solutions professionally.

The topics are structured as follows:

1. Understanding the market: which information regarding the markets of clients and suppliers needs to be obtained and where can such information be found.
2. Knowing the customer: what should a provider know about the customer and its staff? This goes up to the question with which characters one has to deal with.
3. Planning the sales process: sales builds on phases, milestones and formally describable intermediate results.
4. Building a sales team: solutions are developed and sold with a team consisting of “players” having different expertise. How does one play this game?
5. Positioning the solution: obviously, it is necessary to develop a solution which is competitive, both technically and commercially.
6. To contract: what is important at the very last steps: how to convince the customers.

Based on a real-world case study, the students have the opportunity to reflect and practice the learned theory by means of teamwork and role plays. This aims at establishing a first connection to reality. The topics of the course are enriched with many examples from practice.

Media
Presentation, case studies and group work material.

Literature
Elective literature:
Reiner Czichos: Creaktives Account-Management.

Remarks
Seats are limited, so please register with Prof. Böhm’s office.
This course is offered every three semesters, with the next time being in the winter term 2010/2011.

Course: Practical seminar: Health Care Management (with Case Studies) [2550498]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
7	2/1/2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists in a case study, the writing of a corresponding paper, and an oral exam (according to §4(2), 2 of the examination regulation).

Conditions
None.

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

Learning Outcomes
The practical seminar will take place in a hospital in Karlsruhe such that the students are confronted with real problems. The target of this seminar is to develop solutions for these problems using well-known methods of Operations Research. Consequently the students' ability to analyze processes and structures, to collect relevant data as well as to develop and solve models will be promoted.

Content
Processes in a hospital are often grown historically ("We have always done it this way"), so that there has not been the need to analyze processes until reforms of the health system have put increasing pressure on hospitals. Consequently, nowadays hospitals look for possibilities to improve their processes. The students are confronted with case studies and are asked to develop a solution. Therefore they have to collect and analyze relevant data , processes and structures. When developing the solution the students have to bear in mind that besides the economic efficiency also the quality of care and patient satisfaction (e.g. measured in waiting time) may not be neglected in the health care sector.

Literature
Elective literature:

- Fleßa: Grundzüge der Krankenhausbetriebslehre, Oldenbourg, 2007
- Fleßa: Grundzüge der Krankenhaussteuerung, Oldenbourg, 2008
- Hall: Patient flow: reducing delay in healthcare delivery, Springer, 2006

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

Course: Principles of Insurance Management [2550055]

Coordinators: U. Werner
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Summer term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature

- D. Farny. *Versicherungsbetriebslehre.* Karlsruhe 2011.
- P. Koch. *Versicherungswirtschaft - ein einführender Überblick.* 2005.
- M. Rosenbaum, F. Wagner. Versicherungsbetriebslehre. Grundlegende Qualifikationen. Karlsruhe 2002.
- U. Werner. Einführung in die Versicherungsbetriebslehre. Skript zur Vorlesung.

Elective literature:
Will be announced during the lecture.

Remarks
For organizational reasons, please register with the secretariat of the chair: thomas.mueller3@kit.edu.

Course: Private and Social Insurance [2530050]

Coordinators: W. Heilmann, K. Besserer
Part of the modules: Insurance Management II (p. 32)[IW4BWLFBV7], Insurance Management I (p. 31)[IW4BWLFBV6]

ECTS Credits	Hours per week	Term	Instruction language
2,5	2/0	Winter term	de

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

Conditions
None.

Learning Outcomes
Getting to know basic terms and functioning of private and social insurance.

Content
Basic terms of insurance, i.e. characteristics, judicial and political background and functioning of private and social insurance as well as their economic and societal and political meaning.

Literature
Elective literature:

- F. Büchner, G. Winter. Grundriss der Individualversicherung. 1995.
- P. Koch. Versicherungswirtschaft. 2005.
- Jahrbücher des GDV. Die deutsche Versicherungswirtschaft: http://www.gdv.de/2011/11/jahrbuch-der-deutschen-versicherungswirtschaft-2011/

Remarks
Block course. For organizational reasons, please register with the secretariat of the chair: thomas.mueller3@kit.edu

Course: Production and Logistics Management [2581954]

Coordinators: M. Fröhling, F. Schultmann
Part of the modules: Industrial Production III (p. 38)[IW4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
5,5	2/2	Summer term	de

Learning Control / Examinations
The examination will be in form of a written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes

- Students discuss the basic tasks of an operative production and logistics management.
- Students discuss approaches to solve these tasks and shall be able to apply certain ones.
- Students explain the interdependencies between the tasks and methods to solve.
- Students discuss possible IT tools for production and logistics management.
- Students describe emerging trends in production and logistics management.

Content
This course covers central tasks and challenges of operational production and logistics management. Systems analytically, central planning tasks are discussed. Exemplary solution approaches for these tasks are presented. Further practical approaches are explained. Students get to know the set-up and mode of operation of planning systems such as PPS-, ERP- and Advanced Planning Systems to cope with the accompanying planning tasks. Alongside to MRP II, students will be introduced to integrated supply chain management approaches in Supply Chain Management.

Media
Media will be provided on the e-learning platform.

Literature
will be announced in the course

Course: Project Work in Risk Research [2530393]

Coordinators: U. Werner
Part of the modules: Operational Risk Management II (p. 34)[IW4BWLFBV10], Operational Risk Management I (p. 33)[IW4BWLFBV9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of oral presentations and papers on the topics presented (50%) as well as of the participation in group work (50%), according to Section 4 (2), 3 of the examination regulation.

Conditions
None.

Recommendations
Willingness to study literature beforehand in order to prepare for the work project at hand. Depending on the topic at hand, specific knowledge is required for being admitted to the course.

Learning Outcomes
Learn how to integrate knowledge from individual and collective group work for developing ideas and creating solutions for current problems in risk research.

Content
Project work with topic from current risk research.
Topics covered so far:

- Risk perception of extreme natural events
- Terrorism: Prevention, Provention, Perception
- Damage potential of man-made hazards
- Risk communikation
- Cross-cultural comparison of risk perception
- Scenario-based hazard assessment
- Improving citizens' emergency preparedness
- Innovative insurance products for adapting to climate change
- Developing a questionnaire regarding risk perception of climate change
- Evaluation of the PROSA-project of DRV-BW

Literature
Indicated during the course for the selected topic.
Elective literature:
Indicated during the course for the selected topic.

Remarks
This course is normally offered each semester.
For further information, see: http://insurance.fbv.kit.edu
For organizational reasons, please register with the secretary of the chair: thomas.mueller3@kit.edu. Please include a list of courses taken so far.

Course: Project Management in Practice [24147]

Coordinators: K. Böhm, W. Schnober
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
1	2	Summer term	de

Learning Control / Examinations
The assessment is an assessment according to sec. 4 subsec. 2 no 3. study and examination regulations and consists of several parts. These include presentations, project work, papers and seminar theses.
The course will be assessed with “passed” or “failed” (according to sec. 7 subsec. 3 study and examination regulations). For passing the practical course, all partial exercises must have been passed successfully.

Conditions
None.

Learning Outcomes
At the end of the course, the participants:

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

The following key skills are taught:

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

Content

- General project conditions
- Project goals / creative methods for identifying project goals and priorities
- Project planning
- Activity planning
- Cost/time/resource planning
- Phase models
- Risk management
- Project control / success control / monitoring
- Crisis management
- Project termination / lessons learned

Media
Slides, SW-screenshots, misc. presentation techniques

Remarks
The course materials are partly in English.
Places are limited, so please register with Prof. Böhm’s office.
This course is offered every three semesters, with the next time being in the winter term 2010/2011.

Course: Public Key Cryptography [PKK]

Coordinators: J. Müller-Quade
Part of the modules: Public Key Cryptography (p. 58)[IW4INPKK]

ECTS Credits	Hours per week	Term	Instruction language
6	3	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Recommendation: Knowledge of the foundations of Algebra is helpful.

Learning Outcomes

- The student will learn the methods and mechanisms of cryptography in practice as well as the theoretical foundations of cryptography.
- The student should be able to critically assess algorithms and protocols and to identify vulnerabilities / threats.

Content

- This course will show the students the theoretical and practical aspects of Pubic Key Cryptography.
- The most important primitives of cryptography will be covered: one-way function, hash function, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g. Diffie-Hellman) with their strengths and weaknesses.
- In addition to public-key systems, the module provides knowledge about number-theoretic algorithms for solving problems such as primality testing, factoring large numbers and computing discrete logarithms in finite groups. Thus the choice of parameters and the related level of security of a cryptographic system can be estimated.
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
- The combination of cryptographic modules will be treated using the example of currently used protocols such as Secure Shell (SSH), Transport Layer Security (TLS) and anonymous digital money.

Media
lecture notes

Literature
lecture notes , http://iaks-www.ira.uka.de/ (Zugangsdaten werden in der Vorlesung bekanntgegeben)
Elective literature:
- M. Bishop, Introduction to Computer Security, Addison-Wesley, Boston, 2005.
- J. Buchmann, Introduction to Cryptography, Springer, Heidelberg, 2003.
- J.D. Lipson, Elements of Algebra and Algebraic Computing, Addison-Wesley, 1981.
- A.J. Menezes, P.C. van Oorschot, S.A. Vanstone Handbook of Applied Cryptography CRC Press, 1997.
- W. Stallings, Cryptography and Network Security, Prentice Hall, New Jersey, 1999.
- W. Trappe, L. Washington, Introduction to Cryptography with Coding Theory, Prentice Hall, New Jersey, 2002.

Course: Public Management [2561127]

Coordinators: B. Wigger, Assistenten
Part of the modules: Strategic Decision Making and Organization Theory (p. 36)[IW4BWLUO3]

ECTS Credits	Hours per week	Term	Instruction language
6	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following Art. 4, para. 2, clause 1 of the examination regulation. The grade for this course equals the grade of the written exam.

Conditions
Basic knowledge of Public Finance is required.

Learning Outcomes

Content
The lecture „Public Management“ deals with the economic theory of public sector administration. It is divided into four parts. The first section gives an overview of the legal framework of governmental administration in the Federal Republic of Germany and introduces the classical theory of administration as developed by Weber. Part two studies concepts of public decision-making, which have a significant impact on the operation of public sector administrations and where one focus is on consistency problems of collective decision-making. The third chapter deals with efficiency problems arising in conventionally organized public administrations and companies. X-inefficiency, information and control problems, the isolated consideration of income-spending-relations as well as rent-seeking problems will be considered. In section four the concept of New Public Management, which is a new approach to public sector administration that is mainly based in contract theory, is introduced. Its foundations in institutional economics are developed, with a focus on the specific incentive structures in self-administered administrations. Finally, the achievements of New Public Management approaches are discussed.

Literature
Elective literature:

- Damkowski, W. and C. Precht (1995): Public Management; Kohlhammer
- Richter, R. and E.G. Furubotn (2003): Neue Institutionenökonomik; 3rd edition; Mohr
- Schedler, K. and I. Proeller (2003): New Public Management; 2nd edition; UTB
- Mueller, D.C. (2009): Public Choice III; Cambridge University Press
- Wigger, B.U. (2006): Grundzüge der Finanzwissenschaft; 2nd edition; Springer

Course: Quality Control I [2550674]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Winter term	de

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with Quality Control II. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in quality management. Students learn to use the techniques, such as control charts, experimental design, efficiently and targeted.

Content
Topics overview: Introduction to TQM, Statistical Process Control (control charts), Acceptance Sampling (sampling plans), Design and Analysis of Experiments

Media
Blackboard, Slides, Flash Animations.

Literature
Lecture Notes
Elective literature:

- Montgomery, D.C. (2005): Introduction to Statistical Quality Control (5e); Wiley.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Quality Control II [25659]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Summer term	de

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with Quality Control I. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in reliability engineering.

Content
Topics overview: Reliability Theory (structure function, reliability of complex systems, modeling and estimating lifetime distributions, systems with repair), Maintenance

Media
Blackboard, Slides, Flash Animations.

Literature
Lecture Notes
Elective literature:

- ROSS, S.M.: Introduction to Probability Models (5 ed). Academic Press, 1993.
- KOHLAS, J.: Zuverlässigkeit und Verfügbarkeit. B.G. Teubner, Stuttgart, 1987.
- BIROLINI, A: Qualität und Zuverlässigkeit technischer Systeme, Springer, Berlin, 1991.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Randomized Algorithms [24171]

Coordinators: T. Worsch
Part of the modules: Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students know the important approaches and techniques for the use of randomization in algorithms, as well as tools for their analysis.

Students are able to find weak points in deterministic algorithms, to develop randomized approaches to eliminate them, and to assess them using tools from probabilisty theory.

Content
Randomised algorithms are not deterministic. Their behavior depends on the outcome of random experiments. One of the first uses is Rabin's randomized test for primality. Meanwhile for a multitude of problems randomized algorithms have been described which are faster (at least in some sense) than deterministic algorithms. In addition sometimes randomized algorithms are easier to understand and/or implement then deterministic algorithms.

During the course not only different kinds of randomized algorithms (Las Vegas, Monte
Carlo, ...) are presented; the foundations from probability theory needed e.g. for the analysis of the time complexity are presented, too. Also, important concepts like Markov chains are treated. Since stochastic methods are gaining importance in more and more areas in computer science, the course will also be useful outside the area of randomized algorithms.

Topics: probabilistic complexity classes, routing in hypercubes, game theory, random walks, randomized graph algorithms, randomized hashing, randomized online algorithms

Media
lecture notes and slides in pdf format;

Literature

- J. Hromkovic : Randomisierte Algorithmen, Teubner, 2004
- M. Mitzenmacher, E. Upfal: Probability and Computing, Cambridge Univ. Press, 2005
- R. Motwani, P. Raghavan: Randomized Algorithms, Cambridge Univ. Press, 1995

Elective literature:

- E. Behrends: Introduction to Markov Chains, Vieweg, 2000
- A. Borodin, R. El-Yaniv: Online Computation and Competitive Analysis, Cambridge Univ. Press, 1998

Course: Rationale Splines [rsp]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Prior attendance of the lecture “Curves and Surfaces in CAD I” is not mandatory but helpful.

Learning Outcomes
A deep fundamental geometric understanding for the construction of curves and surfaces used in CAD, CAGD, and Computer Vision

Content
Projective spaces, quadrics, rational curves, rational Bèzier and B-Spline representation, offset curves and surfaces, parametrization of quadries, triangular patches on quadries, cyclides.

Media
Blackboard and slides.

Literature
Elective literature:
• Boehm, Prautzsch: Geometric Concepts for Geometric Design, AK Peters 1994.
• Farin: NURBS for Curve and Surface Design, 2nd edition, AK Peters 1999.
• Piegl, Tiller: The NURBS book, Springer 1997.

Course: [RIO]

Coordinators: I. Spiecker genannt Döhmann
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Recommendations
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes

Content

Media
extensive script with cases; content structure, further information in the lectures

Course: Regulation Theory and Practice [2560234]

Coordinators: K. Mitusch
Part of the modules: Energy Economics and Energy Markets (p. 39)[IW4BWLIIP4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
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.

Conditions
May not be examined, when te examination of *Regulation* [26026] was already taken.

Recommendations
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.

Learning Outcomes
The lecture provides insights into the regulation of network or infrastructure industries. Students should learn the basic aims and possibilities as well as the problems and limits of regulation. A central goal is to achieve an understanding of regulation as an incentive system under problems of severe asymmetric information. The lecture is suited for all students who want to work in companies of the network sectors – or who would like to become active on the side of regulators or in the respective political areas. Students should be able to apply general formal methods to the practice of regulation.

Content
In network industries – like transport, utilities or communication – the forces of competition often fail in certain critical areas, so that monopolies will arise. In these cases the usual competition laws often turn out to be insufficient. Then they are complemented by special regulation laws. Accordingly, the regulation authority (in Germany the federal network agency, Bundesnetzagentur) is in charge for network industries side by side with the Federal Cartel Office as another supervisory authority. The lecture begins with a short description of the general competition laws and competition policies. Then it turns to the aims, the possibilities and the practice of regulation which are presented and analyzed critically. This happens from both a theoretical (microeconomic modelling) perspective as well as from a practical perspective with the help of various examples.

Literature
Literature and lecture notes are handed out during the course.

Course: Risk Communication [2530395]

Coordinators: U. Werner
Part of the modules: Operational Risk Management I (p. 33)[IW4BWLFBV9], Operational Risk Management II (p. 34)[IW4BWLFBV10]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter term	de

Learning Control / Examinations
The assessment consists of oral presentations (incl. papers) within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective literature:
R. Löfstedt, L. Frewer (Hrsg.). The Earthscan Reader in Risk & Modern Society. London 1998.
B.-M. Drottz-Sjöberg. Current Trends in Risk Communication - Theory and Practice. Hrsg. v. Directorate for Civil Defence and Emergency Planning. Norway 2003.
Munich Re. Risikokommunikation. Was passiert, wenn was passiert? www.munichre.com
O.-P. Obermeier. Die Kunst der Risikokommunikation - Über Risiko, Kommunikation und Themenmanagement. München 1999.
Fallstudien unter www.krisennavigator.de

Remarks
To attend the course please register with the secretary of the chair: thomas.mueller3@kit.edu

Course: Risk Management in Industrial Supply Chain Networks [2581992]

Coordinators: T. Comes
Part of the modules: Industrial Production III (p. 38)[IW4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0		en

Learning Control / Examinations
The examination will be in form of an oral or written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes
Students shall learn methods and tools to manage risks in complex and dynamically evolving supply chain networks. Students learn the characteristics of modern logistics and supply chain management including trends such as globalization, lean production and e-business and learn to identify and analyze the arising risks. On the basis of this overview on supply chain management, the students gain knowledge about approaches and methods of industrial risk management. These approaches will be adapted to answer the specific questions arising in supply chain management. Key aspects include the identification of major risks, which provide the basis for the development of robust networks, and the design of strategic and tactic risk prevention and mitigation measures. In this manner, students will gain knowledge in designing and steering of robust internal and external value-creating networks.

Content

- supply chain management: introduction, aims and trends
- industrial risk management
- definition und characterization of risks: sourcing and procurement, demand, production and infrastructure
- identification of risks
- risk controlling
- risk assessment and decision support tools
- risk prevention and mitigation strategies
- robust design of supply chain networks
- supplier selection
- capacity management
- business continuity management

Media
Media will be provided on the e-learning plattform.

Literature
will be announced in the course

Course: Risk Management of Microfinance and Private Households [26354]

Coordinators: U. Werner
Part of the modules: Operational Risk Management II (p. 34)[IW4BWLFBV10], Operational Risk Management I (p. 33)[IW4BWLFBV9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of oral presentations and term papers within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations incl. papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes

- Becoming acquainted with starting points for analysing the special risk situation of private households and micro enterprises;
- learning to synchronize various risk coping instruments, identifying risks of microfinance products and learning to design innovative microfinance products.

Content
The course consists of two interlocking parts:
In the first part the socio-economic framework as well as the goals and strategies of private-sector risk management are discussed, with an emphasis on insurance decisions. In the second part the issue of small enterpreneural entities and their specific risk related problems in covering their financial requirements is addressed. Typically their size and other specific characteristics lead to high risks for financial services institutions.
After an introduction to the economic principles of microfinance, the institutions working in this sector are presented as well as innovative credit-, savings-, and insurance products (which are often combined). We'll discuss approaches for performance measurement from the perspectives of customers, suppliers, and investors.

Media
Scriptum.

Literature

- H.-U. Vollenweider. *Risikobewältigung in Familie und Haushalt - eine sicherheitsökonomische Studie.* 1986.
- P. Zweifel, R. Eisen. Versicherungsökonomie. 2003
- J. Ledgerwood, I. Johnson, J.M. Severino. *Microfinance Handbook: An Institutional and Financial Perspective.* 2001.
- B.M. de Aghion, J. Morduch. The Economics of Microfinance. 2005.

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.kit.edu
To attend the course please register with the secretary of the chair: thomas.mueller3@kit.edu

Course: Security Engineering [24142]

Coordinators: A. Pretschner
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM], Security Engineering (p. 55)[IW4INSE]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment is described in the module description.

Conditions
None.

Learning Outcomes

Content

Media
Slides, educational videos

Literature

- M. Stamp: Information Security—Principles and Practice, Wiley, 2006 — good coverage of our level of detail for crypto, access control, and security protocols
- A. Menezes, P. van Oorschot, S. Vanstone:Handbook of Applied Cryptography (available online), CRC Press, Fifth Printing, August 2001
- Ross Anderson: Security Engineering, 2nd ed., Wiley, 2008
- Matt Bishop: Computer Security, Addison Wesley, 2002
- Christopher Alberts, Audrey Dorofee: Managing Information Security Risks-The OCTAVE approach, Addison Wesley, 2003
- Thomas Peltier: Information Security Risk Analysis, Auerbach Publications, 2001
- M. Schumacher, E. Fernandez-Buglioni, D. Hybertson, F. Buschmann, P. Sommerlad: Security Patterns–Integrating Security and Systems Engineering, John Wiley& Sons, 2006
- educational videos bei www.securitytube.net

Remarks
The course is not offered any longer.

Course: Semantic Web Technologies I [2511304]

Coordinators: R. Studer, S. Rudolph, E. Simperl
Part of the modules: Web Data Management (p. 93)[IW4INAIFB4]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation or of an oral exam (20 min) following §4, Abs. 2, 2 of the examination regulation.
The exam takes place every semester and can be repeated at every regular examination date.

Conditions
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent.

Learning Outcomes

- Basic knowledge about the main ideas and the realisation of Semantic Web Technologies

Content
”Semantic Web” denotes an extension of the World Wide Web by meta data and applications in order to make the meaning (semantics) of data on the web usable by intelligent systems, e.g. in e-commerce and internet portals. Central to this is the representation and processing of knowledge in form of ontologies. This lecture provides the foundations for knowledge representation and processing for the corresponding technologies and presents example applications. It covers the following topics:

- Extensible Markup Language (XML)
- Resource Description Framework (RDF) and RDF Schema
- Web Ontology Language (OWL)
- Rule Languages
- Applications

Media
Slides.

Literature

- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.

Elective literature:

1. Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, Foundations of Semantic Web Technologies. Textbooks in Computing, Chapman and Hall/CRC Press, 2009.
2. G. Antoniou, Grigoris Antoniou, Frank Van Harmelen, A Semantic Web Primer, MIT Press, 2004
3. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 5. Auflage 2000
4. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 3. Auflage 2003
5. Dieter Fensel. Spinning the Semantic Web. 2003 (ISBN 0262062321).
6. Handschuh, Staab. Annotation for the Semantic Web. 2003 (ISBN 158603345X).
7. J. Sowa. Knowledge Representation. Brooks/Cole 1999
8. Tim Berners-Lee. Weaving the Web. Harper 1999 geb. 2000 Taschenbuch.
9. Ian Jacobs, Norman Walsh. Architecture of the World Wide Web, Volume One. W3C Recommendation 15 December 2004. http://www.w3.org/TR/webarch/

Course: Semantic Web Technologies II [2511306]

Coordinators: E. Simperl, A. Harth, S. Rudolph, Daniel Oberle
Part of the modules: Semantic Technologies (p. 95)[IW4INAIFB6], Web Data Management (p. 93)[IW4INAIFB4]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

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

Conditions
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent. *Semantic Web Technologies I* [2511304] is recommended.

Learning Outcomes

- Acquisition of basic competencies in Linked Data and data integration on the web
- Acquisition of advanced knowledge in knowledge representation with ontologies
- Acquisition of detailed knowledge of acquisition and evaluation of ontologies
- Analysis of typical usage scenarios and industry applications

Content
Central components of the Semantic Web are explained in detail. Linked Data foundations, crawling, querying and applications; knowledge representation, ontology modelling; ontology development and evaluation; Further, benefits and challenges of semantic technologies are discussed.

Media
Slides.

Literature

- Pascal Hitzler, Sebastian Rudolph, Markus Krötzsch: Foundations of Semantic Web Technologies. Chapman & Hall/CRC 2009.
- Steffen Staab, Rudi Studer (Editors). Handbook on Ontologies. International Handbooks in Information Systems. Springer 2003.
- John Domingue, Dieter Fensel, James A. Hendler (Editors). Handbook of Semantic Web Technologies. Springer 2011.

Elective literature:

1. Grigoris Antoniou, Frank Van Harmelen. A Semantic Web Primer. MIT Press, 2004
2. Uwe Schöning. Logik für Informatiker. Spektrum Akademischer Verlag, 2000
3. Steffen Hölldobler. Logik und Logikprogrammierung. Synchron Verlag, 2003
4. Dieter Fensel. Spinning the Semantic Web. MIT Press, 2003
5. John Sowa. Knowledge Representation. Brooks/Cole, 1999
6. Tim Berners-Lee. Weaving the Web. HarperOne, 1999
7. 7. Dean Allemang. Semantic Web for the Working Ontologist: Effective Modeling in RDFS and OWL. Morgan Kaufmann, 2008
8. Asuncion Gomez-Perez, Oscar Corcho, Mariano Fernando Lopez: Ontological Engineering: with examples from the areas of Knowledge Management, e-Commerce and the Semantic Web. Springer, 2004
9. Nicola Guarino and Chris Welty. Identity, Unity, and Individuation: Towards a Formal Toolkit for Ontological Analysis. Proceedings of ECAI-2000: The European Conference on Artificial Intelligence. IOS Press, 2000
10. Nicola Guarino and Chris Welty. Evaluating Ontological Decisions with OntoClean. Communications of the ACM. 45(2):61-65, 2000
11. 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

Course: Algorithm Design Seminar [24819]

Coordinators: D. Wagner
Part of the modules: Introduction to Algorithmics (p. 59)[IW4INEALGT], Advanced Algorithms: Design and Analysis (p. 86)[IW4INAADA], Introduction to Algorithmics (p. 84)[IW4INEAT], Advanced Algorithms: Design and Analysis (p. 60)[IW4INAALGOA], Advanced Algorithms: Engineering and Applications (p. 61)[IW4INAALGOB]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students shall

- conduct literature research starting from a given topic, identify, locate, evaluate and summarize relevant literature.
- compose their written elaboration (and later their bachelor/masters thesis) with a minimum of introductory effort, and thereby respect given templates similiar to those enforced in standard scientific publication processes.
- devise a presentation in the context of the scientifc topic. To this end, techniques are presented that enable the processing and the presentation of content in a way suitable for the audience.
- present their research results in a written form similar to standard scientific dissemination.

Content
Various current topics that build upon the contents of the associated lectures.

Remarks
This lecture is offered irregularly.

Course: Seminar in Applied Informatics [25070s]

Coordinators: A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai
Part of the modules: Semantic Technologies (p. 95)[IW4INAIFB6]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	

Learning Control / Examinations
The assessment is done according to §4(2), 3 of the examination regulation in form of an evaluation of the seminar presentation and a written seminar report. The weighting of the individual marks (presentation and report) is announced at the beginning of the seminar.

Conditions
None.

Learning Outcomes
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form as generally found in scientific publications.

Content
The seminar intensifies and extends specific topics which are discussed within corresponding lectures. The actual topics are changing each semester. Knowledge of these lecture topics is an advantage but not a precondition.

Media
Slides, Access to internet resources

Literature
Literature will be given individually.

Remarks
The title of this course is a generic one. Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre

Course: Seminar in Cryptography [SemiKryp3]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student

- deals with a restricted problem in the field of cryptography,
- analyzes and discusses the problems associated to a distinct discipline in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content
The seminar deals with current topics in the research field of cryptography. These are e.g.

- provable security
- side channel attacks;
- new Public-Key systems;
- quantum cryptography

Course: Seminar in Cryptography [SemiKryp2]

Coordinators: J. Müller-Quade
Part of the modules: Networking Security - Theory and Praxis (p. 72)[IW4INNTP], Public Key Cryptography (p. 58)[IW4INPKK], Foundations and Application of IT-Security (p. 87)[IW4INGAS]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student

- deals with a restricted problem in the field of cryptography,
- analyzes and discusses the problems associated to a distinct discipline in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content
The seminar deals with current topics in the research field of cryptography. These are e.g.

- provable security
- side channel attacks;
- new Public-Key systems;
- quantum cryptography

Course: Seminar in Law [rechtsem]

Coordinators: T. Dreier, P. Sester, I. Spiecker genannt Döhmann
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
Written paper and oral presentation (§4, Abs. 2, 3 of the SPO).

Conditions
None.

Recommendations
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes
It is the goal of the seminar to enable students to independent scientific research regarding legal issues in the area of information management and engineering. The seminar covers legal issues of information law and commercial law, from internet law, the law of intellectual property, competition law and data protection law to contract law. The subjects to be discussed comprise issues of national, European and international law. Written papers shall also discuss the information technology issues and economic questions related to the legal problem at issue.

Content
The seminar covers legal issues of information law, from internet law, the law of intellectual property, competition law and data protection law to contract law. The subjects to be discussed comprise issues of national, European and international law. Each seminar focuses on a different set of issues. Written papers shall also discuss the information technology issues and economic questions related to the legal problem at issue. The current topics will be announced before start of term.
Students can participate in all seminars offered by the ZAR/IIR (however, students can participate in seminars of the master study cours, seminars in cooperation with the University of Freiburg and other specially marked seminars if special permission has been granted).

Media
extensive script with cases; content structure, further information in the lectures

Literature
Tba in the lecture.

Course: Seminar in Security [SemSich]

Coordinators: J. Müller-Quade, M. Zitterbart
Part of the modules: Computer Security (p. 54)[IW4INSICH]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation).

Conditions
None.

Learning Outcomes
The student

- deals with a restricted problem in the field of computer security,
- analyzes and discusses the problems associated to a distinct discipline in the final seminar paper,
- discusses, presents and defends subject-specific arguments within a given task,
- organizes the preparation of the final papers largely independent.

Content
The seminar deals with current topics in the research field of computer security. These are e.g.

- Side channel attacks;
- Network security;
- Communication protocols;

Course: Seminar in Enterprise Information Systems [SemAIFB1]

Coordinators: R. Studer, A. Oberweis, T. Wolf, R. Kneuper
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis and a presentation.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.
The seminar is for bachelor as well as master students. The differentiation will be made by selection of different topics and different standards of evaluation.

Conditions
See corresponding module information.

Learning Outcomes
Students are able to

- do literature search based on a given topic: identify relevant literature, find, assess and evaluate this literature.
- write the seminar thesis (and later the Bachelor-/Masterthesis) with a minimal learning curve by using format requirements such as those recommended by well-known publishers.
- give presentations in a scientific context in front of an auditorium. These techniques are presented and learned during the seminar.
- present results of the research in written form generally found in scientific publications.

Content
The seminar intensifies and extends specific topis which are discussed within corresponding lectures. Knowledge of these lecture topics is an advantage but not a precondition.
Specific titles and the topics of offered seminars will be announced before the start of a semester in the internet at http://www.aifb.uni-karlsruhe.de/Lehre

Literature
Literature will be given individually in the specific seminar.

Course: Seminar Management accounting for industrial engineers [2577916]

Coordinators: M. Wouters
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	en

Learning Control / Examinations
The final grade of the course is the grade awarded to the paper.

Conditions
The LV “Allgemeine Betriebswirtschaftslehre C” (2600026) must have been completed before starting this seminar.

Learning Outcomes
Students are familiar with topics in management accounting literature and practice that are most relevant to their studies and to their research projects.

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. Meetings are concentrated in three weeks that are spread throughout the semester.
Week 1: Introductory lecture. You need to conduct a first literature search and at the end of the first week you should identify (provisionally) the topic for your paper.
Week 2: The purpose of the second week is to define the topics and research questions in much more detail. Different types of papers may be selected: literature review, research paper, descriptive case study, or teaching case. Students will present their ideas and all participants should ask questions, help each other focus, offer ideas, etc.
Week 3: In the third week we are going to present and discuss the final papers.

Media
The instructor uses a LCD projector and makes the slides available for the students. Students should have their own notebook computer with the usual software for spreadsheets, word processing, internet, etc.

Literature
Will be announced in the course.

Remarks
Maximum of 24 students.

Course: Seminar Efficient Algorithms [SemAIFB2]

Coordinators: H. Schmeck
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a talk (presentation of 45-60 minutes) about the research topic of the seminar together with discussion, a written summary about the major issues of the topic (approx. 15 pages) and attending the discussions of the seminar (according Section 4(2), 3 of the examination regulation).
The grade of this course is achieved by the weighted sum of the grades (talk 50%, written summary 30% and discussion 20%).
This seminar is for bachelor as well as master students. The difference between them is calculated according to different evaluation mechanisms for the written summary work and the talk.

Conditions
See corresponding module information.

Learning Outcomes
The students should learn to work on research papers by searching for new topics in computer science and by presenting the major issues of the papers.
The master students should deepen their ability to develop independent insight into new scientific topics and to communicate them through oral presentation and written summary to others.
The students will learn to deal with critical discussions on scientific presentations and written summaries through active participation in the seminar.

Content
Topics include the new research issues of the research group “applied Informatics”. The new topics are in the area Organic Computing, Nature-inspired optimization and service oriented architectures.
The topics of the seminars are introduced around the end of the former semester on the board A12 of the institute AIFB (building 11.40) and in Internet http://www.aifb.kit.edu/web/SeminarePraktika

Literature
Will be announced at the beginning of the semester.

Remarks
There is a limited number of participants. The students have to register for the seminar.

Course: Seminar Energy Economics [SemEW]

Coordinators: W. Fichtner, P. Jochem, A. Eßer-Frey, M. Genoese
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar eOrganization [SemAIFB5]

Coordinators: S. Tai
Part of the modules: Service Computing 2 (p. 100)[IW4INAIFB13], Cloud Computing (p. 91)[IW4INAIFB2], Service Computing 1 (p. 99)[IW4INAIFB12], Interdisciplinary Seminar Module (p. 19)[IW4IWSEM], Web Service Engineering (p. 92)[IW4INAIFB3]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.

The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Conditions
None.

Learning Outcomes
Research in the field of eOrganization adhering to scientific standards.

Content
The seminar explores current research topics of Cloud Service Engineering (including service computing, service engineering, cloud computing and service networks). Each time, a particular focus theme will be chosen.

Course: [SemTuE1]

Coordinators:
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Finance [2530293]

Coordinators: M. Uhrig-Homburg, M. Ruckes
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
None.

Recommendations
Knowledge of the content of the module *F1 (Finance)* [IW4BWLFBV1] is assumed.

Learning Outcomes
The student gets in touch with scientific work. Through profound working on a specific scientific topic the student is meant to learn the foundations of scientific research and reasoning in particular in finance.
Through the presentations in this seminar the student becomes familiar with the fundamental techniques for presentations and foundations of scientific reasoning. In addition, the student earns rhetorical skills.

Content
Within this seminar different topics of current concern are treated. These topics have their foundations in the contents of certain lectures.
The topics of the seminar are published on the website of the involved finance chairs at the end of the foregoing semester.

Literature
Will be announced at the end of the foregoing semester.

Course: Seminar in Industrial Production [SemIIP2]

Coordinators: F. Schultmann, M. Fröhling, T. Comes
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
Assessment acc. to §4 (2), No.3 ER by assessing the written seminar thesis (approx. 20 pages), the oral presentation and active participation in public discussions. The final grade will be formed by weighing the individual assessment grades.

Conditions
Students should have completed the modules „Industrial Production I“ [WW3BWLIIP], „Industrial Production II“ [IW4BWLIIP2] or “Industrial Production III” [WW3BWLIIP6].

Learning Outcomes
Students shall gain insights into selected research of the Institute of Industrial Production (IIP).

- Students search for, identify, review and evaluate relevant literature.
- Students prepare their seminar thesis (and later on bachelor/master thesis) with a minimum expense in becoming acquainted with their topic and general layout.
- Students produce an oral presentation in a scientific context by using the outlined techniques of scientific presentation.
- Students learn to present their written results in an adequate form for scientific publishing.

Students in M.Sc. studies will have to put special emphasis on a critical discussion and evaluation of their topic, since they will have to look into actual scientific results in the field of industrial production.

Content
This seminar covers actual topics of industrial production, logistics, environmental science, project management and similar fields. We recommend a successful attendance of previous IIP modules (not compulsory!).
Actual topics covered in this seminar will be published before the start of semester.

Course: Seminar Information Engineering and Management [SemIW]

Coordinators: C. Weinhardt
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
See corresponding module information.

Recommendations
Business Engineering/Economics Engineering: At least one module offered by the institute should have been chosen before attending this seminar.

Learning Outcomes
The student should be able to do a literature review based on a predefined topic in the context of information engineering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level. This process gives him the knowledge and practice for further research work like a master thesis or a doctoral thesis

Content
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires a interdisciplinary examination.

Media

- Powerpoint
- eLearning Platform Ilias
- Software Tools, if necessary

Literature
The student will receive the necessary literature for his research topic.

Remarks

- Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.
- All the seminars offered at the chair of Prof. Dr. Weinhardt can be chosen. The current topics of the seminars are available at the following homepage: http://www.iism.kit.edu/im/lehre .

Course: Seminar Complexity Management [SemAIFB3]

Coordinators: D. Seese
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
see German version

Conditions
None.

Learning Outcomes
see German version

Content
see German version

Literature
Will be announced in the seminar.

Remarks
The number of participants is limited. Please take notice about the inscription procedure at the institutes website. Specific titles and the topics of offered seminars will be announced before the start of a semester on the website of AIFB.

Course: Seminar Public Sector Risk Management [2530355]

Coordinators: U. Werner, S. Hochrainer
Part of the modules: Operational Risk Management I (p. 33)[IW4BWLFBV9], Operational Risk Management II (p. 34)[IW4BWLFBV10]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar Service Science, Management & Engineering [2590470]

Coordinators: C. Weinhardt, R. Studer, S. Nickel, H. Fromm
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment of this course is according to §4(2), 3 SPO in form of an examination of the written seminar thesis (15-20 pages), a presentation and active participation in class.
The final mark is based on the examination of the written seminar thesis but can be upgraded or downgraded according to the quality of the presentation.

Conditions
See corresponding module information.

Recommendations
Lecture *eServices* [2540466] is recommended.

Learning Outcomes
Autonomously deal with a special topic in the Service Science, Management and Engineering field adhering to scientific standards.

Content
Each Semester, the seminar will cover topics from a different selected subfield of Service Science, Management & Engineering. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
See the KSRI website for more information about this seminar: http://www.ksri.kit.edu

Literature
The student will receive the necessary literature for his research topic.

Course: [SemSTAT]

Coordinators: N.N.
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2		

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar Stochastic Models [SemWIOR1]

Coordinators: K. Waldmann
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	

Learning Control / Examinations
The assessment of this course is in form of an examination of the written seminar thesis and a presentation. The final mark is the result of both the paper and its presentation.

Conditions
None.

Learning Outcomes
In case studies students comprehend stochastic relationships and gain deep knowledge of modelling, evaluation, and optimization of stochastic systems. In group presentations, students learn basic academic presentation and argument skills.

Content
The actual topic as well as the contemporary issues are available online.

Media
Power Point and related presentation techniques.

Literature
Will be presented with the actual topic.

Course: Seminar Knowledge Management [SemAIFB4]

Coordinators: R. Studer
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The success monitoring is done through a presentation about a research topic from the current topic of the seminar (45-60 minutes) followed by a discussion, a written summary of the main points (approx. 15 pages) and of active participation in discussions (in accordance with §4(2),3 SPO).
The total mark is composed of the graded and weighted success controls (50% lecture, 30% written paper, and 20% participation and discussion.
The seminar can be attended by both bachelor and master students. A differentiation is made by different topic assignment and evaluation standards for seminar paper and presentation.

Conditions
See module description.

Learning Outcomes
The students will learn to perform literature searches on current topics in computer science and holistic knowledge management as well as preparing and presenting the contents of scientific publications.

During the work on the seminar topics the master students will deepen their skills to autonomously comprehend current scientific knowledge and to convey it to others through oral presentations and written summaries.

Through active participation in the seminar, students acquire skills in critical appraisal of research topics and in oral and written presentation of independently developed research content.

Content
Each year, the seminar will cover topics from a different selected subfield of knowledge management, e.g.:

- Ontology-based knowledge management,
- Information Retrieval and Text Mining,
- Data Mining,
- Personal Knowledge Management,
- Case Based Reasoning (CBR),
- Collaboration and Scoial Computing,
- Business-process Oriented Knowledge Management.

Media
Slides.

Literature

- I. Nonaka, H. Takeuchi: The Knowledge Creating Company. Oxford University Press 1995
- G. Probst et al.: Wissen managen - Wie Unternehmen ihre wertvollste Ressource optimal nutzen. Gabler Verlag, Frankfurt am Main/ Wiesbaden, 1999
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolf, York Sure: Semantic Web - Grundlagen, Springer, 2008 (ISBN 978-3-540-33993-9)
- S. Staab, R. Studer: Handbook on Ontologies, ISBN 3-540-40834-7, Springer Verlag, 2004
- Modern Information Retrieval, Ricardo Baeza-Yates & Berthier Ribeiro-Neto. New York, NY: ACM Press; 1999; 513 pp. (ISBN: 0-201-39829-X.)

Remarks
The number of students is limited. Students have to observe the designated registration process.

Course: Seminar in Insurance Management [SemFBV1]

Coordinators: U. Werner
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
See corresponding module information.
The seminar is held within the courses of *Risk and Insurance Management and Insurance Management* ([WW3BWLFBV3], [WW3BWLFBV4] and [WW4BWLFBV6/7], respectively.
A course taken as a seminar cannot be chosen as a part of a course module (and vice versa).

Recommendations
The seminar fits well with the bachelor modules *Risk and Insurance Management* [WW3BWLFBV3] as well as with the master modules *Insurance Management I* [IW4BWLFBV6] and *Insurance Management* II [IW4BWLFBV7]. These modules, though, are not required to be taken.

Learning Outcomes
See German version.

Content
The seminar is offered within the following courses:

- Principles of Insurance Management
- Insurance Accounting ? (s.o.)
- Insurance Marketing
- Insurance Production
- Service Management

For their contents refer to the information given for these courses.

Literature
Will be announced at the beginning of the lecture period.

Remarks
Some of the courses mentioned above are offered on demand. For further information, see:http://insurance.fbv.kit.edu.
To attend the course please register with the secretary of the chair: thomas.mueller3@kit.edu

Course: Seminar in Operational Risk Management [SemFBV2]

Coordinators: U. Werner
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
See corresponding module information.
The seminar is held within the courses of *Risk and Insurance Management* [WW3BWLFBV3] and *Operational Risk Management I/II* [WW4BWLFBV9/10??].
A course taken as a seminar cannot be chosen as a part of a course module (and vice versa).

Recommendations
The seminar fits well with the bachelor module *Risk and Insurance Management* [WW3BWLFBV3] as well as with the master modules *Operational Risk Management I* [WW4BWLFBV8] and *Operational Risk Management* II [IW4BWLFBV9]. These modules, though, are not required to be taken.

Learning Outcomes
See German version.

Content
The seminar is offered within the following courses:

- Enterprise Risk Management
- Multidisciplinary Risk Research
- Risk Communication
- Risk Management of Microfinance and Private Households
- Project Work in Risk Research

For their contents refer to the information given for these courses.

Literature
Will be announced at the beginning of the course period.

Remarks
Some of the courses mentioned above are offered on demand. For further information, see: http://insurance.fbv.kit.edu
To attend the course please register with the secretary of the chair: thomas.mueller3@kit.edu

Course: Seminar in strategic and behavioral marketing [2572197]

Coordinators: B. Neibecker
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The student is evaluated based on the written work, a presentation of the results in front of an audience and his contribution to the discussion

Conditions
None.

Learning Outcomes
At the seminar (with a “Referat” as its goal) the student should be able to do a literature review based on a predefined topic in the context of marketing research. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature. The student learns to present his results in a paper and in front of an audience on a academic level.

Content
In the seminar the student should learn to apply the research methods to a predefined topic area. The topics are based on research questions in marketing. This problem analysis requires a interdisciplinary examination. As a special option, the implementation of methodological solutions for market research can be accomplished and discussed with respect to its application.

Literature
Will be allocated according the individual topics.

Remarks
• Students from Bachelor and Master Course can visit the seminar. The research topic as well as the evaluation of the work and the presentation will have a different focus between Bachelor and Master Course.

Course: Seminar in Discrete Optimization [2550491]

Coordinators: S. Nickel
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a written seminar thesis of 20-25 pages and a presentation of 40-60 minutes (according to §4(2), 3 of the examination regulation).
The final mark for the seminar is the weighted average of the marks for the assessed assignments (seminar thesis 50 %, presentation 50%).
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.

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

Learning Outcomes
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.

Content
The topics of the seminar will be announced at the beginning of the term in a preliminaty meeting. Dates will be announced on the internet.

Literature
Literature and relevant sources will be announced at the beginning of the seminar.

Remarks
The seminar is offered in each term.

Course: Seminar in Experimental Economics [SemWIOR3]

Coordinators: C. Puppe
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
Term paper and presentation

Conditions
See corresponding module information.
A course in the field of Game Theory should be attended beforehand.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in Experimental Economics.
Students learn the technical basics of presentation and to argument scientifically. Also rethoric skills shall be amplified.

Content
The seminar's topic will be announced before the beginning of each semester on the internet (http://www.wior.uni-karlsruhe.de/LS_Berninghaus/Studium/).

Media
Slides.

Literature
Will be announced at the end of the recess period.

Course: Seminar in Continous Optimization [2550131]

Coordinators: O. Stein
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
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 total grade is composed of the equally weighted grades of the written and oral assessments.
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 seminar presentation.

Conditions
See corresponding module information.
Attendance is compulsory.
Preferably at least one module offered by the institute should have been chosen before attending this seminar.

Learning Outcomes
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.
The student is introduced to the style of scientific work. By focussed treatment of a scientific topic the student learns 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.

Content
The current seminar topics are announced under http://kop.ior.kit.edu at the end of the preceding semester.

Literature
References and relevant sources are announced at the beginning of the seminar.

Course: Seminar „Business Planning“ [2545005]

Coordinators: O. Terzidis, A. Presse
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar „Innovation Management“ [2545006]

Coordinators: O. Terzidis, B. Kneisel, A. Presse
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Service-oriented Innovation Systems [2545007]

Coordinators: O. Terzidis, R. Eichin, A. Presse
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar „From Invention to Innovation“ [2545008]

Coordinators: O. Terzidis, Presse, André, Fahrenberg, Jens, Blattner, Rolf
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Seminar: Internet of Things and Services [24786]

Coordinators: M. Beigl, Stefan Tai
Part of the modules: (p. 82)[IN4INKUS], (p. 83)[IN4INMMI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: [24844]

Coordinators: M. Beigl
Part of the modules: (p. 82)[IN4INKUS], (p. 83)[IN4INMMI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter / Summer Term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Literature
Introduction: John Krumm, Ubiquitous Computing Fundamentals.
Further litertaure will be announced.

Course: Seminar: Management and Organization [2577915]

Coordinators: H. Lindstädt
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations
Term paper (50%) and presentation (50%).

Conditions
See corresponding module information.

Learning Outcomes
The aim of the seminar is to describe corporate and organisational management approaches, to assess them critically and clarify them using practical examples. The focus is on assessing the models with a view to their applicability and theoretical limits.

Content
The subjects are redefined each semester on the basis of current issues.

Media
Slides.

Literature
The relevant sources are made known during the course.

Course: Practical Seminar Service Innovation [2595477]

Coordinators: G. Satzger, A. Neus, M. Kohler, H. Fromm
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM], Business & Service Engineering (p. 26)[IW4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
5	3		de

Learning Control / Examinations
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).

Conditions
None.

Recommendations
Knowledge of Service Innovation Methods is assumed. Therefore it is recommended to attend the course Service Innovation [2540468] beforehand.

Learning Outcomes
The student should be able to do a literature review based on a given topic in the context of service innovation. The approach comprises the identification of relevant literature according to the topic and an analysis as well as the evaluation of the methods presented in the literature. The practical work components should enable the student to learn about and independently use scientific methods employed e.g. in case studies or experiments. The student learns to present his results in a paper and in front of an audience on an academic level. This process is helpful for further scientific work like the master or doctoral thesis.

Content
The Practical Seminar Service Innovation conveys both a theoretical foundation and practical methods. Using a case example of real-world challenges in the area of Service Innovation, application and adaptation of innovation methods are taught and the results are presented. This project work applies conceptual, analytical and creative methods.

Literature
The foundational literature will be announced together with the individual topics.

Remarks
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.

Course: Service Analytics [2595501]

Coordinators: T. Setzer, H. Fromm
Part of the modules: Service Management (p. 28)[IW4BWLISM6], Advanced CRM (p. 22)[IW4BWLISM1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written examination (following §4(2), 1 SPO) and by submitting written papers as part of the exercise (following §4,(2), 3 SPO). The total grade for this lecture will consist to 80 % of the grade achieved in the written examination and to 20 % of the assignments during the exercises.

Conditions
None.

Recommendations
The lecture is addresed to students with interests and basic knowledge in the topics of Operations Research, decritptive and inductive statistics.

Learning Outcomes
Participants are able to structure large sets of available data and to use that data for planning, operation, personalization of complex services, in particular for IT services. They learn a step-by-step approach starting with analyzing possibly incomplete data, techniques of multivariate statistics to filter data and to extract data features, forecast techniques, and robust planning and control procedures for enterprise decision support.

Content
Today's service-oriented companies are starting to optimize the way services are planned, operated, and personalized by analyzing vast amounts of data from customers, IT-systems, or sensors. As the statistical learning and business optimization world continues to progress, skills and expertise in advanced data analytics and data and fact-based optimization become vital for companies to be competitive. In this lecture, relevant methods and tools will be considered as a package, with a strong focus on their inter-relations. Students will learn to analyze and structure large amounts of potentially incomplete and unreliable data, to apply multivariate statistics to filter data and to extract key features, to predict future behavior and system dynamics, and finally to formulate data and fact-based service planning and decision models.
More specifically, the lessons of this lecture will include:

- Co-Creation of Value Across Enterprises
- Instrumentation, Measurement, Monitoring of Service Systems
- Descriptive, predictive, and prescriptive Analytics
- Usage Characteristics and Customer Dynamics
- Big Data, Dimensionality Reduction, and Real-Time Analytics
- System Models and What-If-Analysis
- Robust Mechanisms for Service Management
- Industry Applications of Service Analytics

Tutorials:
Students will conduct lecture accompanying, guided exercises throughout the semester.

Media

- Power Point
- eLearning platform Ilias

Literature

- Business Forecasting, Wilson, J. H., Keating, B., McGraw-Hill, 2002
- Multivariate Data Analysis, Hair, J. F., Black, B., Babin, B., Anderson, R. E., 2008
- Analytics at Work, Davenport, T. H., Harris, J. G., Morion, R., Harward Business Press, 2010
- Business Analytics for Managers, Jank, W., Springer, 2011

Online Sources:

- The data deluge, The Economist, Feb. 2010
- Competing on Analytics, T. Davenport in Harward Business Review, Feb. 2007

- Mit Advanced Analytics können Händler Kundendaten optimal nutzen, McKinsey Handelsmarketing, Feb. 2011

Further readings will be provided in the lecture.

Remarks
This is a new lecture first offered in the summer term of 2012.

Course: Service Innovation [2540468]

Coordinators: G. Satzger, A. Neus, M. Kohler
Part of the modules: Service Management (p. 28)[IW4BWLISM6], Business & Service Engineering (p. 26)[IW4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	en

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 3 SPO and of assignments during the course as an "Erfolgskontrolle anderer Art" following §4(2), 3 SPO.

Conditions
None.

Learning Outcomes
Understand the difference between innovation and invention, and how disruptive effects can be fast and wide-reaching.
Know examples for innovation in processes, organization and business models; understand how service and product innovation differ.
Understand the link between risk and innovation; be aware of obstacles to innovation and know how to overcome them.

Content
While innovation in manufacturing or agriculture can leverage a considerable body of research, experience and best practice, innovation in services has not reached the same level of maturity. In practice, while many organizations have a well-understood process for innovating in the product business, innovating in services is often still a fuzzy and complex undertaking. In this lecture we will discuss the state of research, compare product and service innovation, understand how innovation diffusion works, examine case studies on service innovation, compare open vs. closed innovation, learn how to leverage user communities to drive innovation and understand obstacles as well as enablersand how to manage, incentivize and foster service innovation.

Literature

- Barras, Richard (1986) Towards a theory of innovation in services. Research Policy 15, 161-173
- Hauschildt, Jürgen und Salomo, Sören (2007) Innovationsmanagement. 4. Auflage, München: Vahlen.
- von Hippel, Erich (2007) Horizontal innovation networks - by and for users. Industrial and Corporate Change, 16:2
- Sundbo, Jon (1997) Management of Innovation in Services. The Service Industries Journal, Vo. 17, No. 3, pp. 432-455

Elective literature:

- Benkler, Yochai (2006) The Wealth of Networks: How Social Production Transforms Markets and Freedom. Yale University Press. (Online: http://www.benkler.org)
- Christensen, Clayton M. (2003) The Innovator's Dilemma, Harper Collins.
- Kanerva, M.; Hollanders, H. & Arundel, A. (2006) TrendChart Report: Can we Measure and Compare Innovation in Services?
- von Hippel, Erich (2005) Democratizing Innovation. The MIT Press, Cambridge, MA. (Online: http://web.mit.edu/evhippel/www/books/D
- Howells, Jeremy & Tether, Bruce (2004) Innovation in Services: Issues at Stake and Trends. Commission of the European Communities, Brussels/Luxembourg. (Online: http://www.isi.fhg.de/publ/downloads/isi04b25/inno-3.pdf)
- Miles, I. (2008) Patterns of innovation in service industries. IBM Systems Journal, Vol. 47, No 1
- Morison, Eltling E. (1966) Gunfire at Sea: A Case Study of Innovation. In: Men, Machines and Modern Times. The MIT Press, pp. 17-44.

Course: Service Management [26327]

Coordinators: U. Werner
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6], Insurance Management II (p. 32)[IW4BWLFBV7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of oral presentations and term papers within the lecture (according to Section 4 (2), 3 of the examination regulation) and a final oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the assessment of the oral presentations and term papers (50 percent) and the assessment of the oral exam (50 percent).

Conditions
None.

Learning Outcomes
See German version.

Content
See German version.

Literature
Elective literature:
Ch. Belz, T. Bieger. Dienstleistungskompetenz und innovative Geschäftsmodelle, St. Gallen 2002.
M. Bruhn. Qualitätsmanagement für Dienstleistungen. 6. Aufl. Berlin 2008.
H. Corsten, R. Gssinger. Dienstleistungsmanagement, 5. Aufl. München/Wien 2007.
A. Lehmann. Dienstleistungsmanagement: Strategien und Ansatzpunkte zur Schaffung von Service... 1995.
H. Meffert, M. Bruhn. Dienstleistungsmarketing: Grundlagen - Konzepte – Methoden. Wiesbaden 2006

Remarks
This course is offered on demand. For further information, see: http://insurance.fbv.kit.edu.de
To attend the course please register with the secretariat of the chair: thomas.mueller3@kit.edu

Course: Service Oriented Computing 1 [2511500]

Coordinators: S. Tai
Part of the modules: Service Technology (p. 90)[IW4INAIFB1], Service Computing 1 (p. 99)[IW4INAIFB12]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment of this course is a written examination (60min.) in the first week after lecture period (nach §4(2), 1 SPO).

Conditions
None.

Recommendations
Lecture *AI2* [2511032] is recommended.

Learning Outcomes
The course introduces concepts, methods, and techniques of “service-oriented computing”, including languages for (Web) service description, methods and tools for the development of services, and platforms (middleware, runtimes) for the Web-based deployment, delivery, and execution of services. The course provides a solid technical foundation that enables the student to address the increasingly relevant challenges of developing “service-oriented architectures (SOA)” in the industry.

Content
Web services represent the next-generation of Web technology, and are an evolution of conventional distributed middleware. They enable new and improved ways for enterprise computing, including application interoperability and integration, and business process management. Modern software systems are being designed as service-oriented architectures (SOA), introduding increased agility and flexibilty at both the software systems and the business level. Web services and SOA thus have a profound impact on software development and the businesses that they support. The course “Service-oriented Computing” introduces the concepts, methods and technology that provide a solid foundation in this area. Topics include:

- Service description
- Service engineering, including development and implementation
- Service composition (aggregation), including process-based service orchestration
- Interoperability formats and protocols
- Service platforms and runtimes (middleware)

Media
Slides, access to internet resources.

Literature
Will be announced in the lecture.

Course: Service Oriented Computing 2 [2511308]

Coordinators: R. Studer, S. Agarwal, B. Norton
Part of the modules: Intelligent Systems and Services (p. 94)[IW4INAIFB5], Service Computing 2 (p. 100)[IW4INAIFB13], Service Computing 1 (p. 99)[IW4INAIFB12], Service Technology (p. 90)[IW4INAIFB1]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

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

Conditions
It is recommended to attend the course *Service-oriented Computing 1* [2511500] beforehand.

Learning Outcomes
Students will extend their knowledge and proficiency in the area of modern service-oriented technologies. Thereby, they acquire the capability to understand, apply and assess concepts and methods that are of innovative and scientific nature.

Content
Building upon basic Web service technologies the lecture introduces select topics of advanced service computing and service engineering. In particular, focus will be placed on new Web-based architectures and applications leveraging Web 2.0, Cloud Computing, Semantic Web and other emerging technologies.

Literature
Literature will be announced in the lecture.

Course: Security [24941]

Coordinators: J. Müller-Quade
Part of the modules: Foundations and Application of IT-Security (p. 87)[IW4INGAS], Networking Security - Theory and Praxis (p. 72)[IW4INNTP], Computer Security (p. 54)[IW4INSICH]

ECTS Credits	Hours per week	Term	Instruction language
6	3/1	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student

- knows the theoretic background and the basic mechanisms of computer security and cryptography
- understands the mechanisms of computer security and can explain them,
- can read and understand the current scientific papers,
- can evaluate the safety procedures and can recognize hazards,
- can adapt mechanisms of computer security to new environment.

Content

- Theoretical and practical aspects of computer security
- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective protection methods / avoidance strategies
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g., Diffie-Hellman)
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS).

Course: Security in Modern Business Applications [24170]

Coordinators: J. Müller-Quade, Florian Kerschbaum
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Recommendations
Basic knowledge of IT-Security is helpful.

Learning Outcomes

Content

Remarks
This lecture will probably only be offered in the winter term 11/12.

Course: Signals and Codes [24137]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP], Computer Security (p. 54)[IW4INSICH]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None

Recommendations
Basic knowledge of linear algebra and probability theory are helpful.

Learning Outcomes

- The student should get an insight into the contemporary methods of signal- and coding theory.
- He / she should be able to analyze given systems and to perform changes to adapt a system to different conditions.
- Furthermore the student will be capable to understand ongoing research in the topic of the lecture.

Content
The course covers essentially the question of how the exchange of information can be realized reliably and efficiently. The lecture gives an overview of how to secure signals against random errors. In signal theory, source coding and the Theorem of Shannon will be covered. In the coding theory part, classical algebraic codes (as linear, cyclic, RS, BCH codes) will be presented as well as convolution codes.

Literature
Introduction to coding theory, J.H. van Lint, Springer

Course: Simulation I [2550662]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam according to Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (according to Section 4(2), 3 of the examination regulation).

Conditions
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [2550040] and *Introduction to Operations Research II* [2530043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].

Learning Outcomes
The lecture provides insights into the typical process in planning and conducting simulation studies.

Content
As the world is getting more complex it is often not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.
Topics overview: Discrete event simulation, generation of random numbers, generating discrete and continous random variables, statistical analysis of simulated data.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature

- Lecture Notes
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Elective literature:

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Simulation II [2550665]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (§4(2), 3 SPO).

Conditions
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [2550040] and *Introduction to Operations Research II* [2530043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].
- *Simulation I*[2550662]

not any

Learning Outcomes
The lecture provides insights into the typical process in planning and conducting simulation studies.

Content
As the world is getting more complex it is oftern not possible to analytically provide key figures of interest without overly simplifying the problem. Thus efficient simulation techniques become more and more important. In the lecture important basic concepts are presented in terms of selected case studies.
Topics overview: Variance reduction techniques, simulation of stochastic processes, case studies.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature

- Lecture Notes

Elective literature:

- A. M. Law / W. D. Kelton: Simulation Modeling and Analysis (3rd ed); McGraw Hill (2000)
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Software-Evolution [24164]

Coordinators: K. Krogmann, Mircea Trifu
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
The successful completion of the course *Software Engineering I* [24518] is required.

Recommendations
Knowledge on software engineering and software architectures is recommended.

Learning Outcomes
Students which participate in the lecture will learn the special challenges of long-living software systems. Furthermore, they will know the advantages of target-oriented software evolution in order to impact future development of a software system. The students will learn which means and concepts of software evolution are suitable for a certain scenario and which factors impact the software development process. To complement the theoretical foundations, the students will gain insights into practical examples and suitable tools which ease the handling of software-evolution. Participants of the lectures will get to know a cross section of implementation aspect, techniques, management, and concepts. The student will be able to analyse, evaluate, and improve software systems.

Content
The lecture software evolution covers the following topics: software development processes, specifics of long-living software systems, evolution scenarios of software systems, software architecture development, re-engineering, implementation techniques, architecture patterns, traceability, software evaluation approaches, maintainability analysis, and tools supporting software evolution.

Media
Slides.

Literature

- Ian Sommerville, Software Engineering (8th Edition), Addison Wesley (June 4, 2006)
- Roger Pressman, Software Engineering: A Practitioner's Approach (7th Edition), McGraw-Hill Science/Engineering/Math (January 20, 2009)
- Penny Grubb and Armstrong A. Takang, Software Maintenance: Concepts and Practice (2nd Edition), World Scientific Publishing Company (September 2003)
- Michele Lanza and Radu Marinescu, Object-Oriented Metrics in Practice: Using Software, Metrics to Characterize, Evaluate, and Improve the Design of Object-Oriented Systems (1st Edition), Springer, Berlin (30. Oktober 2006)
- Robert C. Martin, Clean Code: A Handbook of Agile Software Craftsmanship (1st Edition), Prentice Hall (August 11, 2008)
- Oscar Nierstrasz, Stephane Ducasse and Serge Demeyer, Object-Oriented Reengineering Patterns, Square Bracket Associates (October 7, 2009)

Course: Software Laboratory: OR Models II [2550497]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4], Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
The assessment is a 120 minutes examination, including a written and a practical part (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the software laboratory and the following term.

Conditions
Successful completion of the course *Software Laboratory: OR-Models I* [2550490].
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

Learning Outcomes
The course is based on the first part of the software laboratory. The students advance to detailed modelling knowledge and use the software for the implementation of more complex solution methods. An important aspect lies on the practical application possibilities of OR software in combinatorial and nonlinear optimization problems.

Content
The task of solving combinatorial and nonlinear optimization problems imposes much higher requirements on suggested solution approaches as in linear programming.
During the course of this software laboratory, students get to know important methods from combinatorial optimization, e.g. Branch & Cut- or Column Generation methods and are enabled to solve problems with the software system IBM Optimization Studio and the corresponding modeling language OPL. In addition, issues of nonlinear optimization, e.g. quadratic optimization, are addressed. As an important part of the software laboratory, students get the possibility to model combinatorial and nonlinear problems and implement solution approaches in the software system.
The software laboratory also introduces some of the most frequently used modelling and programming languages that are used in practice to solve optimization problems.

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

Course: Software Development for Modern, Parallel Platforms [24660]

Coordinators: V. Pankratius
Part of the modules: Software Systems (p. 64)[IW4INSWS], Parallel Processing (p. 88)[IW4INPV]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Basic knowledge in the fields of software engineering and programming languages.
Basic knowledge of the lecture *Multicore Computers and Computer Clusters* [24112] in the winter term is helpful.

Recommendations
The course requires basic knowledge of C/C++, Java, operating systems, computer architecture.
The course is self-contained, but can be taken in conjuction with the winter course „Multicore Computers and Computer Clusters“.

Learning Outcomes
Understand basics of parallel programming for shared-memory parallel systems, programming models and languages, and debugging techniques for parallel programs.

Content
Multicore processors make parallelism available for everyone. This course introduces the students to the basics of software development for parallel shared-memory architectures. In particular, it discusses parallel design patterns, parallelism in modern programming languages, parallel libraries, internals of OpenMP, and debugging techniques for shared memory parallel programs. The course also shows how to use graphics cards (GPGPU) for general-purpose data parallel computations. This course can be taken by Master's students in Computer Science and „Informationswirtschaft“.

Literature
Will be announced in the lecture.
Elective literature:
Will be announced in the lecture.

Course: Social Network Analysis in CRM [2540518]

Coordinators: A. Geyer-Schulz
Part of the modules: Advanced CRM (p. 22)[IW4BWLISM1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
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 25) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	113
1.3	106
1.7	99
2.0	92
2.3	85
2.7	78
3.0	71
3.3	64
3.7	57
4.0	50
4.7	40
5.0	0

Conditions
None.

Learning Outcomes
The objectives of this course are to give students an introduction to and overview of social network analysis as a methodological approach for analysis in different areas of business administration, especially customer relationship management. Theory as well as application of social network analysis will be discussed. Students will learn how to perform and interpret analysis results.

Content
The trend to view economic and social structures as networks allows to anlysze these networks by well established and new methods from mathematics, business administration, sociology and phyiscs. The goal of these analyses are to understand different aspects of these networks: In organizations (internal Marketing): Here networks analysis kann help to detect whether hierarchies and official structures are 'alive' or if so called 'hidden organizations' have evolved. In addition such results can reveal ineffient procedures or structures within an organization. In CRM: Within analytical CRM the concept of customer value can be enriched by enclosing the network value that customer offers to the company (Customer Network Value). In Marketing: To successfully implement a virale marketing strategy the knowledge of the structure of customer networks is essential. The dynamics on these networks are relevant if one wants to use these networks for marketing purposes. Internetstructure: For information services, such as e.g. search engines, ithe identification of relevant nodes and clusters is a the major service profided and thus relevant for business success.
The analysis should identify the relevant (central) nodes in a network, find cliques, describe their connections and, if relevant, describe alos the direction of information flow within the network. To achieve this different methods will be discussed during the course.

Media
Folien

Literature
Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chicester, 2 edition, 2000.
Sabrina Helm. Viral marketing: Establishing customer relationships by word-of-mouse. Electronic Markets, 10(3):158–161, Jul 2000.
Dieter Jungnickel. Graphs, Networks and Algorithms. Number 5 in Algorithms and Computation in Mathematics. Springer Verlag, Berlin, 1999.
Leo Katz. A new status index derived from sociometric analysis. Psychometrika, 18(1):39–43, Mar 1953.

Jon M. Kleinberg. Authoritative sources in a hyperlinked environment. JACM, 46(5):604–632, sep 1999.
Barry Wellman Laura Garton. Social impacts of electronic mail in organizations: A review of research literature. Communication Yearbook, 18:434–453, 1995.
Carl D. Meyer. Matrix Analysis and Applied Linear Algebra. Society for Industrial and Applied Mathematics, Philadelphia, 2000.
Andrew Richards, William ; Seary. Eigen analysis of networks. Journal of Social Structure, 1(2), Feb 2000.
Pacey C. Foster Stepehen P. Borgatti. The network paradigm in organizational research: A review and typology. Journal of Management, 29(6):991–1013, 2003.
Mani R. Subramani and Balaji Rajagopalan. Knowledge-sharing and influence in online social networks via viral marketing. Communications of the ACM, 46(12):300–307, Dec 2003.
Stanley Wasserman and Katherine Faust. Social Network Analysis: Methods and Applications, volume 8 of Structural Analysis in the Social Sciences. Cambridge University Press, Cambridge, 1 edition, 1999.
Barry Wellman. Computer networks as social networks. Science, 293:2031–2034, Sep 2001.

Remarks
The course is currently not offered.

Course: Special Topics in Information Engineering & Management [2540478]

Coordinators: C. Weinhardt
Part of the modules: Communications & Markets (p. 27)[IW4BWLISM5], Business & Service Engineering (p. 26)[IW4BWLISM4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	3	Winter / Summer Term	de

Learning Control / Examinations
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)

Conditions
None.

Learning Outcomes
The student should be able to do a literature review based on a predefined topic in the context of information engneering and management. The approach comprises the identification of relevant literature according to the topic and an analysis as well as an evaluation of the methods presented in the literature.The practical work components should enable the student to learn and independently use scientific methods employed e.g. in case studies or experiments.
The student learns to present his results in a paper and in front of an audience on an academic level. This process is helpful for furhter scientific work like the master or doctoral thesis.

Content
In this course the student should learn to apply the search methods to a predefined topic area. The topics are based on research questions in Information Engineering and Management across different industry sectors. This problem analysis requires a interdisciplinary examination. Experiments, case studies or software development can be part of the practical work that offers the students an opportunity to get a deeper insight into the field of Information Engineering and Management. The course also encompasses a documentation of the implemented work.

Media

- Power Point
- eLearning Plattform Ilias
- Software tools for development , if needed

Literature
The basic literature will be made available to the student according to the respecitive topic.

Remarks
All the practical seminars offered at the chair of Prof. Dr. Weinhardt can be chosen in the Special Topics in Information Engineering & Management course. The current topics of the practical seminars are available at the following homepage: www.iism.kit.edu/im/lehre
The Special Topics Information Engineering and Management is equivalent to the practical seminar, as it was only offered for the major in “Information Management and Engineering” so far. With this course students majoring in “Business Engineering“ and “Economics Engineering” also have the chance of getting practical experience and enhance their scientific capabilities.
The Special Topics Information Engineering and Managementcan be chosen instead of a regular lecture (see module description). Please take into account, that this course can only be accounted once per module.

Course: Special Topics of Enterprise Information Systems [SBI]

Coordinators: A. Oberweis
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
Students are able to handle methods and instruments in a subarea of “Enterprise Information Systems” and to show the capability to be innovative with regard to applied methods.

The course will impart knowledge of basics and methods in the context of their application in practice. Based on the understanding of the imparted concepts and methods students will be able to choose the appropriate methods and apply them in the right way for problems they will face in their professional life.

Students will be enabled to find arguments for solution approaches and to argue for them.

Content
This course is a placeholder for special courses that are offered in an irregular sequence and cover selected topics in the field of enterprise information systems. These topics include in particular the design and the management of database systems, the computer-support of business processes and strategic planning of information systems and their organization.

Literature
Will be announced at the beginning of the course.

Course: Special Topics of Efficient Algorithms [25700sp]

Coordinators: H. Schmeck
Part of the modules: Organic Computing (p. 97)[IW4INAIFB8]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

Learning Control / Examinations
The assessment consists of assignments or of a bonus exam (wrt §4 (2), 3 SPO), and a written exam (60 min.) in the week after the end of the lecturing periodwrt (§4 (2), 1 SPO). The exam will be offered in every semester and can be repeated on regular examination dates.
If the mark obtained in the written exam is in between 1.3 and 4.0, a successful completion of the assignments or the bonus exam will improve the mark by one level (i.e. by 0.3 or 0.4).

Conditions
None.

Learning Outcomes
The student will learn how to use methods and concepts of efficient algorithms and how to demonstrate adequate innovative capabilities with respect to the used methods.
This course emphasizes the teaching of advanced concepts in relation to their applicability in the real world. Based on a fundamental understanding of the covered concepts and methods, students should know how to select appropriate concepts and methods for problem settings in their professional life, and, if necessary, to extend and apply them in an adequate form. The students should be enabled to find adequate arguments for justifying their chosen problem solutions.

Content
This course emphasizes the new topics in the area of algorithms, data structures, and computer infrastructures. The exact topics can vary according to the audiences and the time it is held.

Literature
Elective literature:
Will be announced in the lecture.

Remarks
This course can be particularly used for recognising the external courses with the topics in the area of algorithms, data-structures and computer infrastructures but are not associated in other courses in this subject area.

Course: Special Topics of Knowledge Management [25860sem]

Coordinators: R. Studer
Part of the modules: Intelligent Systems and Services (p. 94)[IW4INAIFB5]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter / Summer Term	

Learning Control / Examinations
Assesment is provided by a written exam of 60 minutes or an oral exam during the first few weeks after the lecturing period (acc. to §4(2), 1 or 2 SPO). The exam is offered each semester and may be repeated at the regular examination day.

Conditions
The lecture *Angewandte Informatik I - Modellierung* [2511030] is a prerequisite.

Learning Outcomes
The students acquire the skills, methods and tools in one specialized topic of “knowledge management” to demonstrate their mastery and innovativeness.
The lecture aims at providing principles and methods in the context of the practical application of KM. On the basis of a fundamental understanding of concepts, methods, and tools, students will be able to work on advanced problems. The students will be able to find and argue for solutions of KM problems.

Content
The lecture deals with special topics in the area of knowledge management (incl. Knowledge Discovery and Semantic Web). The lecture deepens one of the following topics:

- Dynamc and Interoperable Systems in Knowledge Management
- Personal and Process-oriented Knowledge Management
- Formal Concept Analysis
- Semantic Search and Text Mining
- Combination of Social Software and Semantic Web

Literature
Elective literature:
Depends on the actual content.

Course: Special Topics in Optimization I [25128]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Special Topics in Optimization II* [25126]. In this case, the duration of the written examination takes 120 minutes.

In a combined examination of *Special Topics in Optimization I* [25128] and *Special Topics in Optimization II* [25126], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

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

Course: Special Topics in Optimization II [25126]

Coordinators: O. Stein
Part of the modules: Mathematical Programming (p. 49)[IW4OR6]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.

The examination is held in the semester of the lecture and in the following semester.

Prerequisite for admission to the written examination is attaining at least 30% of the exercise points. Therefore the online-registration for the written examination is subject to fulfilling the prerequisite.

The examination can also be combined with the examination of *Special Topics in Optimization I* [25128]. In this case, the duration of the written examination takes 120 minutes.

In a combined examination of *Special Topics in Optimization I* [25128] and *Special Topics in Optimization II* [25126], upon attaining more then 60% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Conditions
None.

Learning Outcomes
The student knows and understands fundamentals of a special topic in continuous optimization.

Content

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

Course: Special Topics in Management: Management and IT [2577907]

Coordinators: H. Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 35)[IW4BWLUO1]

ECTS Credits	Hours per week	Term	Instruction language
2	1/0	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a written exam (30 min) at the beginning of the recess period (according to Section 4(2), 1 of the examination regulation).
The exam takes place in every semester. Re-eaminations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The course discusses management questions and concepts that are clearly motivating from a current and practical perspective. Here the integration of IT and process issues into corporate management from the management's perspective is one of the subjects of particular interest. The event takes place in close cooperation with leading, practical managers.

Content
(Excerpt):

- A summary of current management concepts and questions.

Media
Slides.

Literature
The relevant excerpts and additional sources are made known during the course.

Course: Specification and Verification of Software [SpezVer]

Coordinators: B. Beckert, P. Schmitt
Part of the modules: Software Systems (p. 64)[IW4INSWS]

ECTS Credits	Hours per week	Term	Instruction language
5	3	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

Content

Media
Lecture notes and slides in english are available from the course website

Literature
Lecture Notes: Formal Specification and Verification http://i12www.ira.uka.de/ pschmitt/FormSpez/skript.ps
Elective literature:
Verification of Object-Oriented Software: The KeY Approach
Bernhard Beckert, Reiner Hähnle, Peter H. Schmitt (Eds.)
Springer-Verlag, LNCS 4334.

Course: Game Theory I [2520525]

Coordinators: N.N.
Part of the modules: Applied Strategic Decisions (p. 42)[IW4VWL2], Social Choice Theory (p. 45)[IW4VWL9]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/2	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (80 minutes) according to Section 4(2),1 of the examination regulation.
The exam takes place in the recess period and can be resited at every ordinary examination date.

Conditions
None.

Recommendations
Basic knowledge of mathematics and statistics is assumed.
See corresponding module information.

Learning Outcomes
This course conveys established knowledge in theory of strategic decision making. The students shall be able to analyze strategic problems systematically and to give advice for behavior in concrete economic situations.

Content
Main topic is non-cooperative game theory. Models, solution concepts and applications are discussed for simultaneous as well as sequential games. Different equilibrium concepts are introduced and a short introduction to cooperative game theory is given.

Media
Folien, Übungsblätter.

Literature
Gibbons, A primer in Game Theory, Harvester-Wheatsheaf, 1992
Holler/Illing, Eine Einführung in die Spieltheorie, 5. Auflage, Springer Verlag, 2003
Gardner, Games for Business and Economics, 2. Auflage, Wiley, 2003
Berninghaus/Ehrhart/Güth, Strategische Spiele, 2. Auflage, Springer Verlag 2006
Elective literature:

- Binmore, Fun and Games, DC Heath, Lexington, MA, 1991

Course: Language Technology and Compiler [24661]

Coordinators: G. Snelting
Part of the modules: Language Technology and Compiler (p. 63)[IW4INCOMP1]

ECTS Credits	Hours per week	Term	Instruction language
8	4/2	Summer term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
The student

- knows the importance of language and compiler technologies in other areas of computer science
- learns the theoretical foundations and practical methods which form the foundation for the compiler passes: lexical analysis, syntactic analysis, semantic analysis, code generation and code optimization
- has received an overview over the state of the art in compiler construction
- is able to apply his knowledge in practice when constructing a compiler (e.g. In the compiler lab)
- is able to follow advanced courses (e.g. Compiler 2)

Content

- Structure of a compiler
- Lexical analysis
- Syntactic analysis
- Semantic analysis
- Code generation
- Code optimization
- Specific technologies: LL-Parser, LR/LALR-Parser, attributed grammars, instruction selection, register allocation, runtime mechanisms, memory management, static single assignment form and its usage in optimization

Course: Natural Language Processing and Software Engineering [24187]

Coordinators: W. Tichy
Part of the modules: Software Systems (p. 64)[IW4INSWS], Software Methods (p. 65)[IW4INSWM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students are being introduced to the fundamental concepts of natural language processing. Students should be able to explain and use the covered methods. Students should know use cases of NLP in the field of software engineering and should be able to describe possible fields of application of text analysis systems in this context.

Content
This course covers the basics of natural language processing.
Natural language processing is becoming more and more important. Potential applications include responding to textual commands, answering questions for online help systems, or searching the internet. Furthermore, the automatic analysis and transformation of software requirements documents is a new field of research. Thus, computational linguistics is of importance not only for application development but also for software engineering itself.
This course is for M.S. students of Informatics and Informationswirtschaft. It introduces the basics of natural language processing and application areas in software development. It covers the topics of parsing natural language, the inherent ambiguity of natural language, the concept of thematic roles and semantics, the automatic translation of texts into software models, and the creation and use of ontologies for text analysis, plus recent research advances.

Media
Lecture presentations (pdf), references

Literature

- Jurafsky, D. & Martin, J. H. : Speech and Language Processing: An Introduction to Natural Language Processing, Computational Linguistics and Speech Recognition. Prentice Hall, Pearson Education International, 2009.

Additional literature will be announced in class.

Course: Facility Location and Strategic Supply Chain Management [2550486]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

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

Conditions
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WW1OR] is assumed.

Learning Outcomes
The lecture covers basic quantitative methods in location planning in the context of strategic Supply Chain Planning. Besides the discussion of several criteria for the evaluation of the locations of facilities, the students are acquainted with classical location planning models (planar models, network models and discrete models) and advanced location planning models designed for Supply Chain Management (single-period and multi-period models).The exercises accompanying the lecture offer the possibility to apply the considered models to practical problems.

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

Literature
Elective literature:

- Daskin: Network and Discrete Location: Models, Algorithms, and Applications, Wiley, 1995
- Domschke, Drexl: Logistik: Standorte, 4. Auflage, Oldenbourg, 1996
- Francis, McGinnis, White: Facility Layout and Location: An Analytical Approach, 2nd Edition, Prentice Hall, 1992
- Love, Morris, Wesolowsky: Facilities Location: Models and Methods, North Holland, 1988
- Thonemann: Operations Management - Konzepte, Methoden und Anwendungen, Pearson Studium, 2005

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

Course: Tax Law I [24168]

Coordinators: D. Dietrich
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam (approx. 45 minutes) according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
None.

Learning Outcomes
The target of the lecture is an introduction to national business tax law. The legal norms, spread on several individual tax laws, which are decisive for the taxation of the companies and their owners, will be treated. The focus is on basic fiscal knowledge realizable in practice as a component of modern business economics.

Content
Except for a basic knowledge of the existing German company types and the annual financial statements (balance sheet, statement of earnings), no fiscal previous knowledge is required. The lecture intends to give a current global overview about the most important elements of law. The focus is on trade or business companies in the most common forms such like sole traders, partnerships and corporations.

Media
transparancies

Literature

- Grashoff Steuerrecht, Verlag C. H. Beck, last edition
- Tipke/Lang Steuerrecht, Verlag C. H. Beck, last edition

Course: Tax Law II [24646]

Coordinators: D. Dietrich
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
It is the target of the lecture to provide extended knowledge in business administration related theory of taxation in the field of economics and law, based on the general lecture “introduction to corporate tax law”. The students obtain the basis for an economic examination of the fiscal prescriptions and are able to assess the impact on business decisions. The emphasis is on such tax law regulations which allow possibilities for action and decision to the taxpayer.

Content
The lecture requires basic knowledge of commercial law and company law as well as of earnings tax law. Basic and current questions of German corporate taxation are systematically prepared in topic blocs; foils, leaflets and supplementary references are distributed in the individual sessions. There is room for discussion. A recent text collection of the tax laws will be necessary.

Media
transparancies

Literature

- Grashoff, Steuerrecht, Verlag C.H. Beck, latest edition.
- Spangemacher, Gewerbesteuer, Band 5, Grüne Reihe, Erich Fleischer Verlag
- Falterbaum/Bolk/Reiß/Eberhart, Buchführung und Bilanz, Band 10, Grüne Reihe, Erich Fleischer Verlag
- Tipke, K./Lang, J., Steuerrecht, Köln, in der neuesten Auflage.
- Jäger/Lang Körperschaftsteuer, Band 6, Grüne Reihe, Erich Fleischer Verlag
- Lippross Umsatzsteuer, Band 11, Grüne Reihe, Erich Fleischer Verlag
- Plückebaum/Wendt/ Niemeier/Schlierenkämper Einkommensteuer, Band 3, Grüne Reihe, Erich Fleischer Verlag

Course: Stochastic and Econometric Models in Credit Risk Management [2520337]

Coordinators: Y. Kim
Part of the modules: Statistical Methods in Risk Management (p. 52)[IW4STAT2]

ECTS Credits	Hours per week	Term	Instruction language
5	2/2	Summer term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
The deregulation of European markets and the advent of monetary union has resulted in greater liquidity and more competition, creating a truly homogeneous European credit market. Second, given the low level of nominal interest rates, investors are willing to take on more credit risk to boost returns. Third, the regulatory authorities are set to accept the use of internal models for risk management. This will enable banks to better identify and measure credit risk and therefore manage it more effectively.
The course is intended as a mathematically rigorous introduction to the stochastic and econometric models used in credit risk modeling. We will start with a review on term-structure models, and then continue with pricing credit risk and credit risk derivatives using

- firm's value models,
- intensity models,
- pricing credit derivatives.

Literature
David Lando, Credit Risk Modeling: Theory and Applications, Princeton Series in Finance, 2004
Philipp J. Schönbucher, Credit Derivatives Pricing Models: Model, Pricing and Implementation, Wiley-Finance, 2003
Darrell Duffie, Kenneth J. Singleton, Credit Risk: Pricing, Measurement and Management, Princeton Series in Finance, Princeton University Press, 2003

Remarks
The course Stochastic and Econometric Models in Credit Risk Management [2520337] will not be offered any more from summer term 2013 on. The examination will be offered latest until summer term2012.

Course: Markov Decision Models I [2550679]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7], Stochastic Models in Information Engineering and Management (p. 18)[IW4WWOR]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1/2	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following Section 4(2), 1 of the examination regulation. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3 (according to Section 4(2), 3 of the examination regulation).

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques of stochastic modelling. Students are able to properly describe and analyze basic stochastic systems.

Content
Markov Chains, Poisson Processes, Markov Chains in Continuous Time, Queuing Systems

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer
Elective literature:
Norris, J.R. (1997): Markov Chains; Cambridge University Press
Bremaud, P. (1999): Markov Chains, Gibbs Fields, Monte Carlo Simulation, and Queues; Springer

Course: Markov Decision Models II [2550682]

Coordinators: K. Waldmann
Part of the modules: Stochastic Modelling and Optimization (p. 50)[IW4OR7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1/2	Summer term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4(2), 1 SPO. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge on Markov decision processes for analysis to control and optimize stochastic dynamic systems. They are able to apply the theory aquired and to adjust the models to actual problems. They develop the optimality criterion and can solve the resulting optimal value function efficiently to gain optimal policies and the optimal value.

Content
Markov decision models: Foundations, optimality criteria, solution of the optimality equation, optimality of simply structured decision rules, applications.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Literature
Lecture Notes
Elective literature:
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer
Puterman, M.L. (1994): Markov Decision Processes: Discrete Stochastic Dynamic Programming; John Wiley

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Material Flow Analysis and Life Cycle Assessment [2581995]

Coordinators: L. Schebek
Part of the modules: Industrial Production II (p. 37)[IW4BWLIIP2]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Winter term	de

Learning Control / Examinations
The examination will be in form of an oral or written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
None.

Learning Outcomes

- Students shall be aware of the important role of material flow systems for the economy and ecology.
- Students shall be proficient in understanding the basics and methodology of analytical tools for material flow analysis and Life Cycle Assessment.
- Students shall be able to apply Life Cycle Assessment in case studies.

Content
Materials – in the sense of raw materials taken from nature – represent the physical basis of the economy and the human society in general. At the same time, global environmental problems, e. g., the greenhouse effect, as well as economic problems, e.g., the availability and the price development of raw materials, are directly linked to the increasing use of specific materials like fossil carbon resources or metals. Hence, for the development of solution strategies, the understanding of material flow systems of the techno-sphere, i. e. the environment made by humans, is essential. The lecture is an introduction into basic system theory and modelling techniques of material flow analysis. On this basis, the methodology of the Life Cycle Assessment (LCA) is then presented, which comprises material flows and their environmental effects throughout the entire life cycle of production, use and disposal of products. For decision-makers in economy and policy, LCA serves as an instrument of analysis in order to compare the different possibilities of the design of products, technologies and services. In this lecture, the structure and particular modules of the Life Cycle Assessment are presented in detail. Furthermore, the applications of the Life Cycle Assessment in the context of decision support are explained, in particular within the context of development of innovative technologies. Recent developments of the Life Cycle Costing and the Social LCA will also be considered.

Media
Media will be provided on learning platform.

Literature
will be annouced in the course

Course: Strategical Aspects of Energy Economy [2581958]

Coordinators: A. Ardone
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3,5	2/0	Winter term	

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

Conditions
None.

Learning Outcomes

Content

Literature
Will be anounced in the lecture.

Course: Strategic Management of Information Technology [2511602]

Coordinators: T. Wolf
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment of this course is a written or (if necessary) oral examination according to §4(2) of the examination regulation.

Conditions
None.

Learning Outcomes
Students know the outer frame of IT in an enterprise and know which functions IT has within an enterprise. They unterstand the organization and the content of these functions.

Content
The following topics will be covered: strategic planing of ICT, architecture of ICT, overall planning of ICT, outsourcing, operation and controlling of ICT.

Media
Slides, internet resources

Literature

- Nolan, R., Croson, D.: Creative Destruction: A Six-Stage Process for Transforming the Organization. Harvard Business School Press, Boston Mass. 1995
- Heinrich, L. J., Burgholzer, P.: Informationsmanagement, Planung, Überwachung, Steuerung d. Inform.-Infrastruktur. Oldenbourg, München 1990
- Nolan, R.: Managing the crises in data processing. Harvard Business Review, Vol. 57, Nr. 2 1979
- Österle, H. et al.: Unternehmensführung und Informationssystem. Teubner, Stuttgart 1992
- Thome, R.: Wirtschaftliche Informationsverarbeitung. Verlag Franz Vahlen, München 1990

Course: Supply Chain Management with Advanced Planning Systems [2581961]

Coordinators: M. Göbelt, C. Sürie
Part of the modules: Industrial Production III (p. 38)[IW4BWLIIP6]

ECTS Credits	Hours per week	Term	Instruction language
2	2	Summer term	en

Learning Control / Examinations
The examination will be in form of an oral or written exam acc. to §4(2), 1 ER. Exams are offered in every semester and can be re-examined at every ordinary examination date.

Conditions
see module description

Learning Outcomes
This lecture deals with supply chain management from a practitioner's perspective with a special emphasis on the software solution SAP SCM and the planning domain. 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, production planning / detailed scheduling, transportation planning / vehicle scheduling, global available-to-promise) are presented by discussing the relevant business processes, providing academic background, describing planning processes for a fictive company and showing the user interface and user-related processes in the software solution.
The lecture is supported by a self-explanatory tutorial, in which students can explore the software solution for the fictive company offline on their own.

Content
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
3.4. Production Planning and Detailed Scheduling
3.5. Deployment
3.6. Transportation Planning and Vehicle Scheduling
3.7. [Optional] Global Available to Promise
4. SAP SCM in Practice
4.1. Success Stories
4.2. SAP Implementation Methodology

Course: Symmetric Encryption [24629]

Coordinators: J. Müller-Quade
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP], Computer Security (p. 54)[IW4INSICH], Networking Security - Theory and Praxis (p. 72)[IW4INNTP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Learning Outcomes
The student

- knows the most important algorithms and primitives of symmetric encryption,
- read and understand the latest scientific articles,
- can evaluate the security of given algorithms and recognizes problems

Content
This lecture provides the theoretical and practical aspects of symmetric cryptography.

- Historical ciphers will be covered if they are useful for assessing the security of current ciphers.
- Furthermore, block ciphers are covered. The two most important types of attacks (differential and linear cryptanalysis) will be presented.
- Furthermore, hash functions are covered. Here, attacks are in the focus and techniques to forge meaningful messages through the use of “meaningless collisions”.

Course: Tactical and Operational Supply Chain Management [2550488]

Coordinators: S. Nickel
Part of the modules: Operations Research in Supply Chain Management and Health Care Management (p. 47)[IW4OR4]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

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

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

Learning Outcomes
The main goal of the lecture is the presentation of fundamental techniques from procurement and distribution logistics. A further aspect is set on methods from inventory management and lot sizing. Students acquire the ability to efficiently utilize quantitative models from transportation planning (long-distance and distribution planning), inventory management and lot sizing in production. The introduced methods will be discussed in more detail and illustrated with case-studies in the accompanying exercises

Content
The planning of material transport is an essential element of Supply Chain Management. By linking transport connections across different facilities, the material source (production plant) is connected with the material sink (customer).
The general supply task can be formulated as follows (cf. Gudehus): For given material flows or shipments, choose the optimal (in terms of minimal costs) distribution and transportation chain from the set of possible logistics chains, which asserts the compliance of delivery times and further constraints. The main goal of the inventory management is the optimal determination of order quantities in terms of minimization of fixed and variable costs subject to resource constraints, supply availability and service level requirements. Similarly, the problem of lot sizing in production considers the determination of the optimal amount of products to be produced in a time slot.
The course includes an introduction to basic terms and definitions of Supply Chain Management and a presentation of fundamental quantitative planning models for distribution, vehicle routing, inventory management and lot sizing. Furthermore, case studies from practice will be discussed in detail.

Literature
Elective literature:

- Domschke: Logistik: Transporte, 5. Auflage, Oldenbourg, 2005
- Domschke: Logistik: Rundreisen und Touren, 4. Auflage, Oldenbourg, 1997
- Ghiani, Laporte, Musmanno: Introduction to Logistics Systems Planning and Control, Wiley, 2004
- Gudehus: Logistik, 3. Auflage, Springer, 2005
- Simchi-Levi, Kaminsky, Simchi-Levi: Designing and Managing the Supply Chain, 3rd edition, McGraw-Hill, 2008
- Silver, Pyke, Peterson: Inventory management and production planning and scheduling, 3rd edition, Wiley, 1998

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

Course: Technological Change in Energy Economics [2581000]

Coordinators: M. Wietschel
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam.

Conditions
None.

Learning Outcomes

Content

Course: Telecommunication and Internet Economics [2561232]

Coordinators: K. Mitusch
Part of the modules: Telecommunications Markets (p. 46)[IW4VWL10], Electronic Markets (p. 24)[IW4BWLISM2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	de

Learning Control / Examinations
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.

Conditions
None.

Recommendations
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.

Learning Outcomes
The students should get an idea of the complex competition processes in the telecommunication and internet sector. Besides, they should get to know the analytic instruments with which these competitive processes can be analyzed. The basic patterns of the current debates on economic and regulation policies should become clear to them. The lecture is suited for all students who will deal in their professional life with these sectors. As the software industry shows similar problems, the lecture is also suited for students interested in this sector.

Content
Among the network sectors the telecommunication and internet sector is the most dynamic one and the one with and highest variety of phenomena. Problems of natural monopoly still exist in some parts. But there is also competition, not only at the service level but also at the infrastructural level. Both levels are characterized by (vertical) quality differentiations and by high technology dynamics. What should the regulation of this sector look like? How should the mutual network access prices of two telecommunication providers be regulated and how can regulators set incentives for infrastructure investments?
The internet is a free market par excellence, because everybody can open internet businesses without high entry costs. Why then can a company like ebay dominate the market for internet-auction platforms so strongly? The causes of market concentration on the internet will be analyzed. So will be the economic implications of the Next Generations Networks.

Literature
J.-J. Laffont, J. Tirole (2000): Competition in Telecommunications, MIT Press.
Further literature will be provided during the lecture

Course: Telecommunications Law [24632]

Coordinators: I. Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 103)[IW4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of an written exam (following §4(2), 1 SPO).

Conditions
None.

Recommendations
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes
Telecommunications is the technical basis of the Information Engineering and Management. In which way for example UMTS is regulated, is of relevant importance for the supply of services in the world of the mobile contents services. The central defaults of the telecommunications regulation are in the telecommunications law (TKG). This was completely amended due to community-legal defaults 2004. The lecture procures for apprehending the basics of legal framework of the information society the essential knowledge in telecommunication law.

Content
The lecture offers an overview of the new TKG. The whole range of the regulation is treated: Of the material-legal instruments of the competition-creative economic regulation (market -, entrance -, payment regulation as well as special supervision of abuse) and the non-economic regulation (customer protection; Broadcasting; Assignment of frequencies, numbers and rights of way; secrecy of telecommunications; Data security and public security) up to the institutional arrangement of the regulation. To assist in the understanding the technical and economic bases are clarified as well as community and constitutional default sat at the beginning of the lecture.

Media
extensive script with cases; content structure, further information in the lectures

Literature
Since the law material is to be partly compiled in the discourse with the studying, a current version of the TKG is to be bring along to the lecture.
Further literature will be announced in the lecture.
Elective literature:
tba

Course: Telematics [24128]

Coordinators: M. Zitterbart
Part of the modules: Future Networking (p. 70)[IW4INFN], Networking (p. 71)[IW4INNW], Wireless Networking (p. 67)[IW4INWN]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Knowledge of the lecture *Introduction in Computer Networks* [24519] or similar lectures is required.

Learning Outcomes
This course details selected protocols, architectures, techniques, and algorithms, which were already presented in the course *Introduction in Computer Networks*. Thus, overall knowledge and knowledge about problems that occur within a world-wide and dynamic network as well as solutions that are applied in order to avoid these problems is imparted in this course.

Content
This course addresses protocols, architectures, techniques, and algorithms that are used, e.g., for Internet routing and establishing of reliable end-to-end communication associations. In addition to different media access control mechanisms in local area networks further communication systems, e.g. line-switched ISDN, are detailed. It is intended that students additionally understand which possibilities for network management and administration currently exist.

Media
Slides.

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
Elective literature:

- 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
- Selected journal arcticles

Course: Ubiquitous Computing [24146]

Coordinators: M. Beigl
Part of the modules: Wireless Networking (p. 67)[IW4INWN], Dynamic IT-Infrastructures (p. 78)[IW4INDITI], (p. 83)[IN4INMMI], (p. 82)[IN4INKUS], Ubiquitous Computing (p. 96)[IW4INAIFB7]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Learning Outcomes
The goal of this course is to introduce the foundations, the methods and the techniques of ubiquitous computing. After this course, students have gained knowledge and insights of existing ubiquitous computing systems and are enabled to design and evaluate such systems for the usage in everday life and industrial environments.

Content
The course starts with an survey on ubiquitous computing in general and introduces a selection of representative work in this field. Basic paradigms and concepts are introduced, which provide the methodological background for the analysis and evaluation of ubiquitous computing systems. The course continues with an in-depth examination of the requirements and the device technology for embedded ubiquitous systems, communication networks and standards (e.g. Zigbee, RFID). Further, ubiquitous computing middleware is considered. A major aspect is context-aware computing. The emphasis is on the investigation of architectures and algorithms for context recognition in respect to formal and practical aspects. Finally, new human-computer interfaces and possibilities of the human-computer interaction are presented and discussed.

Media
Slides

Literature
Mark Weiser The Computer of the 21st Century Scientific American, 1991
Weiser and Brown The Coming Age of Calm Technology Xerox PARC, 1996
Vannevar Bush As we may think The Atlantic Monthly, July 1945
J. Raskin Computers by the Millions An Apple Document from 1979
Elective literature:

- Cooperstock, J., Fels, S., Buxton, W. & Smith, K.C. Reactive environments: Throwing away your keyboard and mouse Communications of the Association of Computing Machinery (CACM), 40(9), 65-73.
- Want, R., Schilit,B. ,Adams, N., Gold, R., Petersen, K., Goldberg, D., Ellis, J., Weiser, M. The ParcTab Ubiquitous Computing Experiment Technical Report CSL-95-1, Xerox Palo Alto Research Center, March 1995.
- L. Hallanäs, J. Redström Abstract Information Appliances Symposium on Designing Interactive Systems 2004
- Gemperle, F., Kasabach, C., Stivoric, J., Bauer, M., Martin, R. Design for wearability Wearable Computers Second International Symposium on , 1998 Page(s): 116 -122
- Sinem Coleri Ergen ZigBee/IEEE 802.15.4 Summary September 10, 2004
- Frank Siegemund, Michael Rohs Rendezvous Layer Protocols for Bluetooth-Enabled Smart Devices Extended version. Personal and Ubiquitous Computing Journal, pp. 91-101, October 2003, Springer-Verlag

Course: Environmental Law [24140]

Coordinators: I. Spiecker genannt Döhmann
Part of the modules: Public Business Law (p. 103)[IW4JURA6]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the SPO.
The assessment will be offered in every winter term and can be repeated at every regular examination date.

Conditions
None.

Recommendations
Knowledge of Law, esp. Public Law I or II are recommended.
Parallel to the lectures tutoria are offered in which legal thinking and argumentation is practised. Their attendance is strongly recommended.
During the semester, test exams to each lecture are offered with extensive coaching. During the lecture-free time, a Q-and-A-lecture is offered.Details on the homepage of the ZAR (www.kit.edu/zar)

Learning Outcomes
Environmental law is a field of law that influences management in many regards. Students shall develop a feeling for the many different aspects of environmental law and its instruments. Aside from so-called “classical” approaches such as law-and-order students will learn about other, economic influenced, instruments such as the gathering and the transfer of information or the market for certifiates. On this basis, the course will center around immissions and waste management law. Additionally, water law, protection of soil law and nature protection law will be covered. Students shall be enabled to deal with easy cases in regard to environmental law.

Content
The lecture begins with an introduction into the special problems faced by environmental law. Different instruments, according to common goods theory, will be presented. In the main part of the lecture, immissions law, waste management law, water law, protection of soil law and nature protection law will be analyzed.

Media
extensive script with cases; content structure, further information in the lectures

Literature
Will be announced in the course.
Elective literature:
Will be announced in the course.

Course: Management and Strategy [2577900]

Coordinators: H. Lindstädt
Part of the modules: Strategic Corporate Management and Organization (p. 35)[IW4BWLUO1]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam (60 min) taking place at the beginn of the recess period (according to §4 (2), 1 of the examination regulation). The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Learning Outcomes
The participants learn about central concepts of strategic management along the ideal-typical strategy process: internal and external strategic analysis, concept and sources of competitive advantages, their importance when establishing competitive and corporate strategies as well as strategy assessment and implementation. This aims in particular to provide a summary of the basic concepts and models of strategic management, i.e. to provide in particular an action-oriented integration.

Content

- Corporate management principles
- Strategic management principles
- Strategic analysis
- Competitive strategy: modelling and selection on a divisional level
- Strategies for oligopolies and networks: anticipation of dependencies
- Corporate strategy: modelling and evaluation on a corporate level
- Strategy implementation

Media
Slides.

Literature

- Grant, R.M.: *Contemporary Strategy Analysis.* Blackwell, 5. Aufl. Massachusetts 2005.
- Lindstädt, H.; Hauser, R.: *Strategische Wirkungsbereiche von Unternehmen.* Gabler, Wiesbaden 2004.

The relevant excerpts and additional sources are made known during the course.

Course: Insurance Management Game [INSGAME]

Coordinators: U. Werner
Part of the modules: Insurance Management I (p. 31)[IW4BWLFBV6]

ECTS Credits	Hours per week	Term	Instruction language
3	0/2	Winter term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Course: Subdivision algorithms [24626]

Coordinators: H. Prautzsch
Part of the modules: Curves and Surfaces (p. 81)[IW4INKUF], (p. 85)[IW4INACG]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes
Students should gain sound knowledge about subdivision techniques.

Content
Subdivision algorithms and methods to analyze them.

Media
Blackboard and slides

Literature
Elective literature:

- Peters, Reif. Subdivision surfaces. Springer 2008
- Prautzsch, Boehm, Paluszny: Bézier and B-spline techniques, Springer 2002.
- Warren, Weimer: Subdivision, Morgan Kaufmann 2001.

Remarks
The lecture is offered in the winter term alternating with other lectures in the field of computer graphics. See http://i33www.ira.uka.de/pages/Lehre/VertiefungsgebietComputergraphik.html.

Course: Copyright [24121]

Coordinators: T. Dreier
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

Conditions
None.

Learning Outcomes
It is the aim of this course to provide students with knowledge in the area of copyright that builds upon, and goes beyond the knowledge the students have already acquired in the general lecture of “Industrial and intellectual property law”. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Content
The course deals with the subject matter of copyright, the rights of authors, licensing, limitations and exceptions to copyright, term of protection, neighbouring rights, enforcement and collective administration of rights. The course does not merely focus on German copyright law, but likewise puts European and international copyright law into perspective. Students shall understand how the legal rules depend upon, and interact with, the economic background, legislative policy and information and communication technologies. Students shall learn about the rules of national, European and international copyright law and to apply these legal rules in practical cases.

Media
slides

Literature
Schulze, Gernot Meine Rechte als Urheber Verlag C.H.Beck, current edition
Elective literature:
Additional literature tba in class.

Remarks
It is possible that this course will be taught in the summer instead of the winter semester.

Course: Valuation [2530212]

Coordinators: M. Ruckes
Part of the modules: Finance 1 (p. 29)[IW4BWLFBV1], Finance 2 (p. 30)[IW4BWLFBV2]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter term	en

Learning Control / Examinations

Conditions
None.

Learning Outcomes
Students learn to assess and compare corporate investment projects from a financial point of view.

Content
Firms prosper when they create value for their shareholders and stakeholders. This is achieved by investing in projects that yield higher returns than their according cost of capital. Students are told the basic tools for firm and project valuation as well as ways to implement these tools in order to enhance a firm's value and improve its investment decisions. Among other things, the course will deal with the valuation of firms and individual projects using discounted cash flow and relative valuation approaches and the valuation of flexibility deploying real options.

Literature
Elective literature:
Titman/Martin (2007): Valuation – The Art and Science of Corporate Investment Decisions, Addison Wesley.

Course: Networked IT-Infrastructures [VITI]

Coordinators: B. Neumair
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
Dependencies according to the module.

Learning Outcomes
The goal of this lecture is to introduce the fundamental models, approaches and technologies used in today's digital telecommunication networks. The topics covered in this lecture are strongly aligned with the OSI Reference Model, a broadly accepted layer model for describing communication systems.

Content
The lecture introduces formal methods to describe communication in general. After a brief discussion covering the basics of signal processing as well as physical constraints of telecommunication technologies, the lecture follows the architectural pattern of the OSI Reference Model to point out its given systematics. Based on elementary network technologies like Ethernet and Token Ring the lecture outlines essential problems concerned with frame alignment, shared or controled medium access or error processing. Further topics deal with the realization of worldwide networks regarding protocols, technologies and alogrithms used to construct them. Particularly, technical solutions and algorithms from the TCP/IP stack of the Internet Reference Model are discussed. Furthermore, the functionality and application scope of modern components to interconnect heterogenous networks are presented. Finally dedicated communication technologies like ISDN and higher level application protocols like HTTP or SMTP are introduced to indicate the pervasion of network communication technologies towards people.

Media
Slides.

Literature

- A.S. Tanenbaum, Computer Networks Prentice Hall, 4. Auflage, ISBN 0130661023, 2002.
- Larry L. Peterson, Bruce S. Davie, Computer Networks - A Systems Approach, 3rd ed., Morgan Kaufmann Publishers, 2003.

Elective literature:

- F. Halsall, Data Communications, Computer Networks and OSI, Addison-Wesley, 4. Auflage, ISBN 0-201-18244-0, 1997.
- J.F. Kurose, K.W. Ross, Computer Networking - A Top-Down Approach featuring the Internet. Addison-Wesley, 2005.

Remarks
The course was lectured ultimately in the winer term 2010/11. Examination is possible until summer term 2012.

Course: Distributed Data Management [24109]

Coordinators: K. Böhm
Part of the modules: Theory and Practice of Data Warehousing and Mining (p. 76)[IW4INDWMTP], Theory and Practice of Database Technology (p. 77)[IW4INDBTP], Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Winter term	de

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam according to section 4 subsection 2 no. 1 study and examination regulations or of a 20 minute oral exam according to section 4 subsection 2 no. 2 study and examination regulations.

Conditions
Knowledge about database systems, e.g. from the lectures *Introduction in Computer Networks* and *Database Systems*.

Learning Outcomes
At the end of the course, the participants should be able to explain the pros and cons of distributed data management. They should have understood that subtle differences in the problem formulation can lead to very different solutions. In particular, the participants should be able to explain and differentiate the fundamental approaches to guarantee consistency in a distributed environment and to explain and classify approaches for data management in highly distributed environments (e.g., Peer-to-Peer systems or sensor networks) and for query processing.

Content
In modern information systems, distribution is a fundamental issue. Centralised, monolithic database architectures will probably not play an important role any more in many scenarios. However, there are various unsolved principal problems in in the field of distributed data management, or issues where existing solutions are not satisfactory. Truly, there are many products available, promising to facilitate distributed data management. However, these solutions art not always appropriate, application programmers has to develop large parts of the functionality on their own, or elegant, theoretically solid solutions lead to unsatisfactory runtime behaviour. (Therefore, you should not just choose this course if you are interested in the fundamental problems of distributed data management. If you have a special interest in practical aspects and applications, these topics are important as well.) The course introduces you to the theory of distributed data management and makes you familiar with the corresponding algorithms and methods. Topics of this course include correct and fault-tolerant concurrent executions of transactions in distributed environments (classical solutions as well as very recent developments) and data management in highly distributed environments.

Media
Slides.

Literature

- Philip A. Bernstein, Vassos Hadzilacos, Nathan Goodman. Concurrency Control and Recovery In Database Systems. http://research.microsoft.com/pubs/ccontrol/
- Weikum, G., Vossen, G. Transactional Information Systems: Theory, Algorithms, and the Practice of Concurrency Control and Recovery, Morgan Kaufmann, 2001.

Remarks
The lecture is not offered in the winter term 2010/11.

Course: Distributed Systems - Grid and Cloud [24119]

Coordinators: A. Streit, Jie Tao
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI]

ECTS Credits	Hours per week	Term	Instruction language
4	2	Winter term	de

Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Conditions
None.

Recommendations
Basic knowledge of the lecture Telematics is helpful.

Learning Outcomes

Content

Media
slides, example programs

Literature

1. Ian Foster, Carl Kesselmann: "**The Grid. Blueprint for a New Computing Infrastructure (2nd Edition)**", Morgan Kaufmann, 2004, ISBN 1-55860-933-4
2. Fran Berman, Geoffrey Fox, Anthony J.G. Hey: "**Grid Computing: Making the Global Infrastructure a Reality**", Wiley, 2003, ISBN 0-470-85319-0
3. Anirban Chakrabrti: "**Grid Computing Security**", Springer, 2007, ISBN 3-540-44492-0
4. Tony Hey: "**The Fourth Paradigm: Data-intensive Scientific Discovery**", Microsoft Research, 2009, ISBN 978-0-9825442-0-4
5. Rajkumar Buyya, James Broberg und Andrzej M. Goscinski: "**Cloud Computing: Principles and Paradigms**", Wiley, 2011, ISBN 978-0-470-88799-8

Course: Civil Law for Advanced [24650]

Coordinators: P. Sester
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The course intents to build up extensive knowledge in german corporate law, trade law and civil law especially in contract law. It is designed for students who have already passed the courses *Civil Law for Beginners* [24012], *Advanced Civil Law* [24504], and *Commercial and Corporate Law* [24011/24509]. At the end students should be able to think through complex legal and economic questions.

Content
The course will focus on corporate law, trade law and civil law, especially contract law. We will discuss legal problems on the basis of selected examples in a application orientated way.

Literature
Klunzinger, Eugen: Übungen im Privatrecht, Verlag Vahlen, ISBN 3-8006-3291-8, in der neuesten Auflage

Course: Law of Contracts [24671]

Coordinators: P. Sester
Part of the modules: Private Business Law (p. 102)[IW4JURA5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The course will provide an overview of the forming of an contract. The purpose is to translate legal and economic aspects in a contract to secure the volitional position. The course will also consider international questions.

Content
The purpose of the course is to provide students with an understanding of the legal basics of forming a business contract. By means of special examples an overview of typical corporate contracts will be given. The course discusses the Limited (GmbH), ordinary partnership (OHG), limited partnership (KG), European Economic Interest Grouping (EWIV), club (Verein) and the pubilc limited company (Aktiengesellschaft). In addition it will also focus on international relations.

Literature
Tba at the beginning of the course.

Course: Computer Contract Law [VGE]

Coordinators: M. Bartsch
Part of the modules: Intellectual Property Law (p. 101)[IW4JURA4]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Winter term	de

Learning Control / Examinations
The assessment consists of a written exam following §4, Abs. 2, 1 of the SPO.

Conditions
None.

Learning Outcomes
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.

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.

Media
transparancies

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

Elective literature:
tba in the transparencies

Remarks
The course is lectured in the winterterm 2011/12.
Until winter term 2010/11 the course was entitled ”Vertragsgestaltung im EDV-Bereich”.

Course: Lecture „Entrepreneurship“ [2545001]

Coordinators: O. Terzidis, A. Presse
Part of the modules: EnTechnon (p. 41)[IW4BWLENT1]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Winter / Summer Term	de

Learning Control / Examinations
The assessment consists of a written exam (60 minutes) (following §4(2), 1 of the examination regulation).

Conditions
None.

Learning Outcomes

Content

Course: Theory of Economic Growth [2520543]

Coordinators: M. Hillebrand
Part of the modules: Macroeconomic Theory (p. 44)[IW4VWL8]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	en

Learning Control / Examinations
According to the attendance the assessment consists of a written or an oral exam at the beginning of the recess period (according to Section 4 (2), 1 or 2 of the examination regulation.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Conditions
None.

Recommendations
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [2600012] and *Economics II: Macroeconomics* [2600014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Learning Outcomes

Content

Course: Heat Economy [2581001]

Coordinators: W. Fichtner
Part of the modules: Energy Economics and Technology (p. 40)[IW4BWLIIP5]

ECTS Credits	Hours per week	Term	Instruction language
3	2/0	Summer term	de

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

Conditions
None.

Learning Outcomes

Content

Media
Media will be provided on the e-learning platform ILIAS.

Course: Web Engineering [24124]

Coordinators: H. Hartenstein, M. Nußbaumer
Part of the modules: Dynamic IT-Infrastructures (p. 78)[IW4INDITI], Applied Web Engineering (p. 66)[IW4INPWE], Web Engineering (p. 89)[IW4INWEBE]

ECTS Credits	Hours per week	Term	Instruction language
4	2/0	Winter term	de

Learning Control / Examinations
The assessment is explained in the module description.

Conditions
None.

Learning Outcomes

- Students know fundamentals as well as current methodologies and techniques in the field of Web Engineering
- Students have gained insight into existing Web-oriented application platforms and development frameworks, and have the basic knowledge for system design close to current practices.
- Students can apply methods for analyzing current standards and technologies of the Web. Students are able to understand and interpret scientific papers and standard specifications and are confident in using the domain-specific terminology.
- Students are able to analyze, structure and describe problems in the field of Web Engineering as well as to design Web-based system architectures.

Content
This lecture will discuss the systematic construction of Web-based applications and systems by focusing on the different phases and aspects of the Web application lifecycle. It helps students to look at the Web phenomenon from different perspectives - e.g. as a Web designer, analyst, architect, component engineer, program manager, product manager or CIO. Students learn how to engineer Web applications and agile systems from requirements engineering, planning, design, development, testing, deployment and up to operation, maintenance and evolution. Many examples are shown and discussed, demonstrating the need for expecting change and staying agile. As this is not a programming course, students will be introduced to the core technology aspects and are encouraged to consolidate the details.

Media
Slides

Literature
Will be announced in the lecture.

Course: Web Service Engineering [2511502]

Coordinators: C. Zirpins
Part of the modules: Development of Distributet Business Information Systems (p. 98)[IW4INAIFB11], Web Service Engineering (p. 92)[IW4INAIFB3], Service Computing 1 (p. 99)[IW4INAIFB12], Service Computing 2 (p. 100)[IW4INAIFB13]

ECTS Credits	Hours per week	Term	Instruction language
5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of an oral exam (20 min) (following §4(2), 2 SPO).

Conditions
None.

Recommendations
The course might be combined with the lecture “Service Oriented Computing 1”.

Learning Outcomes
Students will acquire a deep and systematic understanding of service-oriented software systems and their embedding in organizations. Equipped with practical and research-based knowledge, they will be enabled to engineer state-of-art service-oriented applications with Web technologies and gain a broad understanding of tools and methodologies for their own work.

Content
The lecture “Web Service Engineering” covers technical and organizational aspects with respect to the development of modern service-oriented software as socio-technical systems in enterprises and Web environments. It introduces background, state-of-technology and emerging trends of methods, tools and processes for application development with Web services. The topics of the lecture include e.g.:

- Web service foundations and base technologies
- Service-oriented software and enterprise architectures (SOA)
- SOA life cycle and development processes
- Analysis and requirements engineering for SOA
- Service-oriented design and modeling
- Construction and testing of Web service applications
- Web service development tools
- Trends: e.g. development with service mashups / cloud services

Media
Slides in PDF-format will be provided via the course webpages.

Literature
Compulsory literature will be announced in the course.

Remarks
The course “Web Servicee Engineering” will not be offered any more from summer term 2012 on. The examination will be offered latest until summer term 2013 (repeaters only).

Course: [24522]

Coordinators: K. Böhm
Part of the modules: Innovative Concepts of Data and Information Management (p. 74)[IW4INIKDI]

ECTS Credits	Hours per week	Term	Instruction language
1	0/1	Summer term	de

Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content

Remarks
The course is currently not lectured.

Course: How Statistics Begins to Understand the Difference Between Cause and Effect [WSUW]

Coordinators: D. Janzing
Part of the modules: Advanced Topics in Cryptography (p. 56)[IW4INFKRYP]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter term	de

Learning Control / Examinations

Conditions

- Basic knowledge in stochastic is helpful.
- The participants should be open for learning new mathematical terminology.

Learning Outcomes

- The students should understand why inferring causal structure from statistical data is a hard problem.
- They should understand current approaches and be able to judge them.

Content

- Formalization of causal structure via directed acyclic graphs (DAGs)
- Inferring causal relations using conditional statistical dependences
- Selection of potential causal hypotheses via the causal Markov condition
- Further restriction of potential hypotheses via the causal faithfulness condition
- Novel approaches to distinguishing between causal DAGs that induce the same conditional dependences
- Probability-free versions of statistical methods: learning causality from single observations.

Media
lecture notes

Literature
Elective literature:
J. Pearl: Causality, 2000.
Spirtes, Glymour and Scheines: Prediction, Causation and Search, 1993

Course: Seminar Economic Theory [SemWIOR2]

Coordinators: C. Puppe
Part of the modules: Interdisciplinary Seminar Module (p. 19)[IW4IWSEM]

ECTS Credits	Hours per week	Term	Instruction language
3	2	Winter / Summer Term	de

Learning Control / Examinations

Conditions
See corresponding module information.
At least one of the courses *Game Theory I* [2520525] and *Welfare Economics* [2520517] should have been attended beforehand.

Learning Outcomes

Content

Literature
Will be announced at the end of the recess period.

Course: Welfare Economics [2520517]

Coordinators: C. Puppe
Part of the modules: Social Choice Theory (p. 45)[IW4VWL9], Allocation and Equilibrium (p. 43)[IW4VWL7]

ECTS Credits	Hours per week	Term	Instruction language
4,5	2/1	Summer term	de

Learning Control / Examinations
The assessment consists of a written exam at the end of the semester (according to Section 4 (2), 1 or 2 of the examination regulation.

Conditions
None.

Learning Outcomes

Content

Literature
Elective literature:

- J. Rawls: *A Theory of Justice*. Harvard University Press (1971)
- J. Roemer: *Theories of Distributive Justice*. Harvard University Press (1996)

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Studien- und Prüfungsordnung der Universität Karlsruhe (TH) für den Masterstudiengang Informationswirtschaft

vom 15. April 2009

Aufgrund von § 34 Abs. 1 Satz 1 des Landeshochschulgesetzes (LHG) vom 1. Januar 2005 hat die beschließende Senatskommission für Prüfungsordnungen der Universität Karlsruhe (TH) am 13. Februar 2009 die folgende Studien- und Prüfungsordnung für den Masterstudiengang Informationswirtschaft beschlossen.

Der Rektor hat seine Zustimmung am 15. April 2009 erteilt.

Inhaltsverzeichnis

Die Universität Karlsruhe (TH) hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss der Studierendenausbildung an der Universität Karlsruhe (TH) der Mastergrad stehen soll. Die Universität Karlsruhe (TH) sieht daher die an der Universität Karlsruhe (TH) angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

Aus Gründen der Lesbarkeit ist in dieser Satzung nur die männliche Sprachform gewählt worden. Alle personenbezogenen Aussagen gelten jedoch stets für Frauen und Männer gleichermaßen.

I. Allgemeine Bestimmungen

§ 1 Geltungsbereich, Zweck der Prüfung

(1) Diese Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Informationswirtschaft an der Universität Karlsruhe (TH).

(2) Die Masterprüfung (§ 16 – 18) bildet den Abschluss dieses Studiengangs, der gemeinsam von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften an der Universität Karlsruhe (TH) angeboten wird. Durch die Masterprüfung soll festgestellt werden, ob der Studierende die für den Übergang in die Berufspraxis grundlegenden wissenschaftlichen Fachkenntnisse besitzt, die Zusammenhänge des Faches Informationswirtschaft überblickt und die Fähigkeit besitzt, nach wissenschaftlichen Methoden und Grundsätzen selbstständig zu arbeiten.

§ 2 Akademischer Grad

Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science“ (abgekürzt: „M.Sc.“) für den Studiengang Informationswirtschaft (englischsprachig: Information Engineering and Management) verliehen.

§ 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) Die Regelstudienzeit beträgt vier Semester. Sie umfasst neben den Lehrveranstaltungen Prüfungen und die Masterarbeit.

(2) Die im Studium zu absolvierenden Lehrinhalte sind in Module gegliedert, die jeweils aus einer Lehrveranstaltung oder mehreren, thematisch und zeitlich aufeinander bezogenen Lehrveranstaltungen bestehen. Der Studienplan beschreibt Art, Umfang und Zuordnung der Module zu einem Fach sowie die Möglichkeiten, Module untereinander zu kombinieren. Die Fächer und ihr Umfang werden in § 16 definiert.

(3) Der für das Absolvieren von Lehrveranstaltungen und Modulen vorgesehene Arbeitsaufwand wird in Leistungspunkten (Credits) ausgewiesen. Die Maßstäbe für die Zuordnung von Leistungspunkten entsprechen dem ECTS (European Credit Transfer System). Ein Leistungspunkt entspricht einem Arbeitsaufwand von etwa 30 Stunden.

(4) Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studienleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 120 Leistungspunkte.

(5) Die Verteilung der Leistungspunkte im Studienplan auf die Semester hat in der Regel gleichmäßig zu erfolgen.

(6) Lehrveranstaltungen können in englischer Sprache angeboten werden.

(7) Profilmodule dienen der Profilbildung im Studiengang und der transparenten Darstellung der Lehrziele des Studiengangs durch eine Lehrzielhierarchie. Profilmodule werden durch die Module nach § 16 Abs. 2 Satz 2 gebildet. Jeweils beim Abschluss eines Moduls des Profilmoduls werden die Leistungspunkte dem Profilmodul angerechnet. Die Zuordnung der Module und Seminare zu Profilmodulen beschreibt der Studienplan.

§ 4 Aufbau der Prüfungen

(1) Die Masterprüfung besteht aus einer Masterarbeit und Fachprüfungen, jede Fachprüfung aus einer oder mehreren Modulprüfungen, jede Modulprüfung aus einer oder mehreren Modulteilprüfungen. Eine Modulteilprüfung besteht aus mindestens einer Erfolgskontrolle.

(2) Erfolgskontrollen sind:

1. schriftliche Prüfungen,
2. mündliche Prüfungen oder
3. Erfolgskontrollen anderer Art.

Erfolgskontrollen anderer Art sind z.B. Vorträge, Marktstudien, Projekte, Fallstudien, Experimente, schriftliche Arbeiten, Berichte, Seminararbeiten und Klausuren, sofern sie nicht als schriftliche oder mündliche Prüfung in der Modul- oder Lehrveranstaltungsbeschreibung im Studienplan ausgewiesen sind.

(3) Mindestens 50 % einer Modulprüfung sind in Form von schriftlichen oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) abzulegen, die restlichen Prüfungen erfolgen durch Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3). Ausgenommen hiervon ist die Prüfung nach § 16 Abs. 3.

§ 5 Anmeldung und Zulassung zu den Prüfungen

(1) Um an schriftlichen und/oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) teilnehmen zu können, muss sich der Studierende schriftlich oder per Online-Anmeldung beim Studienbüro anmelden. Hierbei sind die gemäß dem Studienplan für die jeweilige Modulprüfung notwendigen Studienleistungen nachzuweisen. Dies gilt auch für die Anmeldung zur Masterarbeit.

(2) Um zu schriftlichen und/oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) in einem bestimmten Modul zugelassen zu werden, muss der Studierende vor der ersten schriftlichen oder mündlichen Prüfung in diesem Modul beim Studienbüro eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach, wenn diese Wahlmöglichkeit besteht, abgeben.

(3) Die Zulassung darf nur abgelehnt werden, wenn der Studierende in einem mit der Informationswirtschaft vergleichbaren oder einem verwandten Studiengang bereits eine Diplomvorprüfung, Diplomprüfung, Bachelor- oder Masterprüfung endgültig nicht bestanden hat, sich in einem Prüfungsverfahren befindet oder den Prüfungsanspruch in einem solchen Studiengang verloren hat.

In Zweifelsfällen entscheidet der Prüfungsausschuss.

§ 6 Durchführung von Prüfungen und Erfolgskontrollen

(1) Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach durchgeführt.

(2) Die Art der Erfolgskontrolle (§ 4 Abs. 2, Nr. 1 - 3) der einzelnen Lehrveranstaltungen wird vom Prüfer der betreffenden Lehrveranstaltung in Bezug auf die Lehrinhalte der Lehrveranstaltung und die Lehrziele des Moduls festgelegt. Die Art der Erfolgskontrollen, ihre Häufigkeit, Reihenfolge und Gewichtung, die Bildung der Lehrveranstaltungsnote und der Modulnote sowie Prüfer müssen mindestens sechs Wochen vor Semesterbeginn bekannt gegeben werden. Im Einvernehmen von Prüfer und Studierendem kann in begründeten Ausnahmefällen die Art der

Erfolgskontrolle auch nachträglich geändert werden. Dabei ist jedoch § 4 Abs. 3 zu berücksichtigen. Hierüber entscheidet der Prüfungsausschuss auf Antrag.

(3) Bei unvertretbar hohem Prüfungsaufwand kann eine schriftlich durchzuführende Prüfung auch mündlich oder eine mündlich durchzuführende Prüfung auch schriftlich abgenommen werden. Diese Änderung muss mindestens sechs Wochen vor der Prüfung bekannt gegeben werden.

(4) Weist ein Studierender nach, dass er wegen länger andauernder oder ständiger körperlicher Behinderung nicht in der Lage ist, die Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Form abzulegen, kann der zuständige Prüfungsausschuss – in dringenden Angelegenheiten, deren Erledigung nicht bis zu einer Sitzung des Ausschusses aufgeschoben werden kann, dessen Vorsitzender – gestatten, Erfolgskontrollen in einer anderen Form zu erbringen.

(5) Bei Lehrveranstaltungen in englischer Sprache können mit Zustimmung des Studierenden die entsprechenden Erfolgskontrollen in englischer Sprache abgenommen werden.

(6) Schriftliche Prüfungen (§ 4 Abs. 2, Nr. 1) sind in der Regel von zwei Prüfern nach § 14 Abs. 2 oder 3 zu bewerten. Die Note ergibt sich aus dem arithmetischen Mittel der Einzelbewertungen. Entspricht das arithmetische Mittel keiner der in § 7 Abs. 2 Satz 2 definierten Notenstufen, so ist auf die nächstliegende Notenstufe zu runden. Bei gleichem Abstand ist auf die nächstbessere Notenstufe zu runden. Das Bewertungsverfahren soll sechs Wochen nicht überschreiten. Schriftliche Einzelprüfungen dauern mindestens 60 und höchstens 240 Minuten.

(7) Mündliche Prüfungen (§ 4 Abs. 2, Nr. 2) sind von mehreren Prüfern (Kollegialprüfung) oder von einem Prüfer in Gegenwart eines Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. Vor der Festsetzung der Note hört der Prüfer die anderen an der Kollegialprüfung mitwirkenden Prüfer an. Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 45 Minuten pro Studierenden. Dies gilt auch für die mündliche Nachprüfung gemäß § 8 Abs. 3.

(8) Die wesentlichen Gegenstände und Ergebnisse der mündlichen Prüfung in den einzelnen Fächern sind in einem Protokoll festzuhalten. Das Ergebnis der Prüfung ist dem Studierenden im Anschluss an die mündliche Prüfung bekannt zu geben.

(9) Studierende, die sich in einem späteren Prüfungszeitraum der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen als Zuhörer bei mündlichen Prüfungen zugelassen. Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse. Aus wichtigen Gründen oder auf Antrag des zu prüfenden Studierenden ist die Zulassung zu versagen.

(10) Für Erfolgskontrollen anderer Art sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Studienleistung dem Studierenden zurechenbar ist. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

(11) Schriftliche Arbeiten im Rahmen einer Erfolgskontrolle anderer Art haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.“ Trägt die Arbeit diese Erklärung nicht, wird diese Arbeit nicht angenommen. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

(12) Bei mündlich durchgeführten Erfolgskontrollen anderer Art muss neben dem Prüfer ein Beisitzer anwesend sein, der zusätzlich zum Prüfer die Protokolle zeichnet.

§ 7 Bewertung von Prüfungen und Erfolgskontrollen

(1) Das Ergebnis einer Erfolgskontrolle wird von den jeweiligen Prüfern in Form einer Note festgesetzt.

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(2) Im Masterzeugnis dürfen nur folgende Noten verwendet werden:

1	:	sehr gut (very good)	:	hervorragende Leistung,
2	:	gut (good)	:	eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
3	:	befriedigend (satisfactory)	:	eine Leistung, die durchschnittlichen Anforderungen entspricht,
4	:	ausreichend (sufficient)	:	eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
5	:	nicht ausreichend (failed)	:	eine Leistung, die wegen erheblicher Mängel nicht den Anforderungen genügt.

Für die Masterarbeit, Modulprüfungen, Modulteilprüfungen und Profilmodule sind zur differenzierten Bewertung nur folgende Noten zugelassen:

1.0, 1.3	:	sehr gut
1.7, 2.0, 2.3	:	gut
2.7, 3.0, 3.3	:	befriedigend
3.7, 4.0	:	ausreichend
4.7, 5.0	:	nicht ausreichend

Diese Noten müssen in den Protokollen und in den Anlagen (Transcript of Records und Diploma Supplement) verwendet werden.

(3) Für Erfolgskontrollen anderer Art kann im Studienplan die Benotung mit „bestanden“ (passed) oder „nicht bestanden“ (failed) vorgesehen werden.

(4) Bei der Bildung der gewichteten Durchschnitte der Fachnoten, Modulnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

(5) Jedes Modul, jede Lehrveranstaltung und jede Erfolgskontrolle darf jeweils nur einmal angerechnet werden. Die Anrechnung eines Moduls, einer Lehrveranstaltung oder einer Erfolgskontrolle ist darüber hinaus ausgeschlossen, wenn das betreffende Modul, die Lehrveranstaltung oder die Erfolgskontrolle bereits in einem grundständigen Bachelorstudiengang angerechnet wurde, auf dem dieser Masterstudiengang konsekutiv aufbaut.

(6) Erfolgskontrollen anderer Art dürfen in Modulprüfungen oder Modulteilprüfungen nur eingerechnet werden, wenn die Benotung nicht nach Absatz 3 erfolgt ist. Die zu dokumentierenden Erfolgskontrollen und die daran geknüpften Bedingungen werden im Studienplan festgelegt.

(7) Eine Modulteilprüfung ist bestanden, wenn die Note mindestens „ausreichend“ (4.0) ist.

(8) Eine Modulprüfung ist dann bestanden, wenn die Modulnote mindestens „ausreichend“ (4.0) ist. Die Modulprüfung und die Bildung der Modulnote werden im Studienplan geregelt. Die differenzierten Lehrveranstaltungsnoten (Absatz 2) sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden. Enthält der Studienplan keine Regelung darüber, wann eine Modulprüfung bestanden ist, so ist diese Modulprüfung dann endgültig nicht bestanden, wenn eine dem Modul zugeordnete Modulteilprüfung endgültig nicht bestanden wurde.

(9) Die Ergebnisse der Masterarbeit, der Modulprüfungen bzw. der Modulteilprüfungen, der Erfolgskontrollen anderer Art sowie die erworbenen Leistungspunkte werden durch das Studienbüro der Universität erfasst.

(10) Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein. Eine Fachprüfung ist bestanden, wenn

die für das Fach erforderliche Anzahl von Leistungspunkten über die im Studienplan definierten Modulprüfungen nachgewiesen wird.

(11) Die Gesamtnote der Masterprüfung, die Fachnoten und die Modulnoten lauten:

		bis	1.5	:	sehr gut (very good)
von	1.6	bis	2.5	:	gut (good)
von	2.6	bis	3.5	:	befriedigend (satisfactory)
von	3.6	bis	4.0	:	ausreichend (sufficient)

(12) Zusätzlich zu den Noten nach Absatz 2 werden ECTS-Noten für Fachprüfungen, Modulprüfungen und für die Masterprüfung nach folgender Skala vergeben:

ECTS-Note	Quote	Definition
A	10	gehört zu den besten 10% der Studierenden, die die Erfolgskontrolle bestanden haben,
B	25	gehört zu den nächsten 25% der Studierenden, die die Erfolgskontrolle bestanden haben,
C	30	gehört zu den nächsten 30% der Studierenden, die die Erfolgskontrolle bestanden haben,
D	25	gehört zu den nächsten 25% der Studierenden, die die Erfolgskontrolle bestanden haben,
E	10	gehört zu den letzten 10% der Studierenden, die die Erfolgskontrolle bestanden haben,
FX		*nicht bestanden* (failed) - es sind Verbesserungen erforderlich, bevor die Leistungen anerkannt werden,
F		*nicht bestanden* (failed) - es sind erhebliche Verbesserungen erforderlich.

Die Quote ist als der Prozentsatz der erfolgreichen Studierenden definiert, die diese Note in der Regel erhalten. Dabei ist von einer mindestens fünfjährigen Datenbasis über mindestens 30 Studierende auszugehen. Für die Ermittlung der Notenverteilungen, die für die ECTS-Noten erforderlich sind, ist das Studienbüro der Universität zuständig.

(13) Bis zum Aufbau einer entsprechenden Datenbasis wird als Übergangsregel die Verteilung der Hauptdiplomsnoten des Diplomstudiengangs Informationswirtschaft per 31. Juli 2005 zur Bildung dieser Skala für alle Module des Masterstudiengangs Informationswirtschaft herangezogen. Diese Verteilung wird jährlich gleitend über mindestens fünf Jahre mit mindestens 30 Studierenden jeweils zu Beginn des Studienjahres für jedes Modul, die Fachnoten und die Gesamtnote angepasst und in diesem Studienjahr für die Festsetzung der ECTS-Note verwendet.

§ 8 Wiederholung von Prüfungen und Erfolgskontrollen, Erlöschen des Prüfungsanspruchs

(1) Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Abs. 2, Nr. 1) einmal wiederholen. Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend“ bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend“ sein.

(2) Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Abs. 2, Nr. 2) einmal wiederholen.

(3) Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen. Fehlversuche an anderen Hochschulen sind anzurechnen.

(4) Die Wiederholung einer Erfolgskontrolle anderer Art (§ 4 Abs. 2, Nr. 3) wird im Studienplan geregelt.

(5) Eine zweite Wiederholung derselben schriftlichen oder mündlichen Prüfung ist nur in Ausnahmefällen zulässig. Einen Antrag auf Zweitwiederholung hat der Studierende schriftlich beim Prüfungsausschuss zu stellen. Über den ersten Antrag eines Studierenden auf Zweitwiederholung entscheidet der Prüfungsausschuss, wenn er den Antrag genehmigt. Wenn der Prüfungsausschuss diesen Antrag ablehnt, entscheidet der Rektor. Über weitere Anträge auf Zweitwiederholung entscheidet nach Stellungnahme des Prüfungsausschusses der Rektor. Absatz 1 Satz 2 und 3 gelten entsprechend.

(6) Die Wiederholung einer bestandenen Erfolgskontrolle ist nicht zulässig.

(7) Eine Fachprüfung ist endgültig nicht bestanden, wenn mindestens ein Modul des Faches endgültig nicht bestanden ist.

(8) Die Masterarbeit kann bei einer Bewertung mit „nicht ausreichend“ einmal wiederholt werden. Eine zweite Wiederholung der Masterarbeit ist ausgeschlossen.

(9) Ist gemäß § 34 Abs. 2 Satz 3 LHG die Masterprüfung bis zum Ende des siebten Fachsemesters dieses Studiengangs einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Studiengang, es sei denn, dass der Studierende die Fristüberschreitung nicht zu vertreten hat. Die Entscheidung darüber trifft der Prüfungsausschuss. Die Entscheidung über eine Fristverlängerung und über Ausnahmen von der Fristregelung trifft der Prüfungsausschuss.

§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß

(1) Der Studierende kann bei schriftlichen Prüfungen ohne Angabe von Gründen bis einen Tag (24 Uhr) vor dem Prüfungstermin zurücktreten (Abmeldung). Bei mündlichen Prüfungen muss der Rücktritt spätestens drei Werktage vor dem betreffenden Prüfungstermin erklärt werden (Abmeldung). Ein Rücktritt von einer mündlichen Prüfung weniger als drei Werktage vor dem betreffenden Prüfungstermin ist nur unter Voraussetzung des Absatzes 3 möglich. Die Abmeldung kann schriftlich beim Prüfer oder per Online-Abmeldung beim Studienbüro erfolgen. Eine durch Widerruf abgemeldete Prüfung gilt als nicht angemeldet. Der Rücktritt von mündlichen Nachprüfungen im Sinne von § 8 Abs. 2 ist grundsätzlich nur unter den Voraussetzungen von Absatz 3 möglich.

(2) Eine Prüfung gilt als mit „nicht ausreichend“ (5.0) bewertet, wenn der Studierende einen Prüfungstermin ohne triftigen Grund versäumt oder wenn er nach Beginn der Prüfung ohne triftigen Grund von der Prüfung zurücktritt. Dasselbe gilt, wenn die Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der Studierende hat die Fristüberschreitung nicht zu vertreten.

(3) Der für den Rücktritt nach Beginn der Prüfung oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. Bei Krankheit des Studierenden oder eines von ihm allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes und in Zweifelsfällen ein amtsärztliches Attest verlangt werden. Die Anerkennung des Rücktritts ist ausgeschlossen, wenn bis zum Eintritt des Hinderungsgrundes bereits Prüfungsleistungen erbracht worden sind und nach deren Ergebnis die Prüfung nicht bestanden werden kann. Werden die Gründe anerkannt, wird ein neuer Termin anberaumt. Die bereits vorliegenden Prüfungsergebnisse sind in diesem Fall anzurechnen. Bei Modulprüfungen, die aus mehreren Prüfungen bestehen, werden die Prüfungsleistungen dieses Moduls, die bis zu einem anerkannten Rücktritt bzw. einem anerkannten Versäumnis einer Prüfungsleistung dieses Moduls erbracht worden sind, angerechnet.

(4) Versucht der Studierende, das Ergebnis einer mündlichen oder schriftlichen Prüfung (§ 4 Abs. 2, Nr. 1 und 2) durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Prüfung als mit „nicht ausreichend“ (5.0) bewertet.

(5) Ein Studierender, der den ordnungsgemäßen Ablauf der Prüfung stört, kann von dem jeweiligen Prüfer oder der Aufsicht führenden Person von der Fortsetzung der Prüfung ausgeschlossen werden; in diesem Fall gilt die betreffende Prüfung als mit „nicht ausreichend“ (5.0) bewertet. In schwerwiegenden Fällen kann der Prüfungsausschuss den Studierenden von der Erbringung weiterer Prüfungen ausschließen.

(6) Der Studierende kann innerhalb von einem Monat verlangen, dass die Entscheidung gemäß Absatz 4 und 5 vom Prüfungsausschuss überprüft wird. Belastende Entscheidungen des Prüfungsausschusses sind dem Studierenden unverzüglich schriftlich mitzuteilen, zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Vor einer Entscheidung ist dem Studierenden Gelegenheit zur Äußerung zu geben.

(7) Absatz 1 - 6 gelten für Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3) entsprechend.

(8) Näheres regelt die Allgemeine Satzung der Universität Karlsruhe (TH) zur Redlichkeit bei Prüfungen und Praktika.

§ 10 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten

(1) Auf Antrag sind die Mutterschutzfristen, wie sie im jeweils gültigen Gesetz zum Schutz der erwerbstätigen Mutter (MuSchG) festgelegt sind, entsprechend zu berücksichtigen. Dem Antrag sind die erforderlichen Nachweise beizufügen. Die Mutterschutzfristen unterbrechen jede Frist nach dieser Studien- und Prüfungsordnung. Die Dauer des Mutterschutzes wird nicht in die Frist eingerechnet.

(2) Gleichfalls sind die Fristen der Elternzeit nach Maßgabe des jeweiligen gültigen Gesetzes (BErzGG) auf Antrag zu berücksichtigen. Der Studierende muss bis spätestens vier Wochen vor dem Zeitpunkt, von dem an er die Elternzeit antreten will, dem Prüfungsausschuss unter Beifügung der erforderlichen Nachweise schriftlich mitteilen, in welchem Zeitraum er Elternzeit in Anspruch nehmen will. Der Prüfungsausschuss hat zu prüfen, ob die gesetzlichen Voraussetzungen vorliegen, die bei einem Arbeitnehmer den Anspruch auf Elternzeit auslösen würden, und teilt dem Studierenden das Ergebnis sowie die neu festgesetzten Prüfungszeiten unverzüglich mit. Die Bearbeitungszeit der Masterarbeit kann nicht durch Elternzeit unterbrochen werden. Die gestellte Arbeit gilt als nicht vergeben. Nach Ablauf der Elternzeit erhält der Studierende ein neues Thema.

(3) Der Prüfungsausschuss entscheidet auf Antrag über die flexible Handhabung von Prüfungsfristen entsprechend den Bestimmungen des Landeshochschulgesetzes, wenn Studierende Familienpflichten wahrzunehmen haben. Die Bearbeitungszeit der Masterarbeit kann nicht durch die Wahrnehmung von Familienpflichten unterbrochen oder verlängert werden. Die gestellte Arbeit gilt als nicht vergeben. Der Studierende erhält ein neues Thema, das innerhalb der in § 11 festgelegten Bearbeitungszeit zu bearbeiten ist.

§ 11 Masterarbeit

(1) Vor Zulassung der Masterarbeit sind Betreuer, Thema und Anmeldedatum dem Prüfungsausschuss bekannt zu geben. Auf Antrag des Studierenden sorgt ausnahmsweise der Vorsitzende des Prüfungsausschusses dafür, dass der Studierende innerhalb von vier Wochen nach Antragstellung von einem Betreuer ein Thema für die Masterarbeit erhält. Die Ausgabe des Themas erfolgt in diesem Fall über den Vorsitzenden des Prüfungsausschusses.

(2) Thema, Aufgabenstellung und Umfang der Masterarbeit sind vom Betreuer so zu begrenzen, dass sie mit dem in Absatz 3 festgelegten Arbeitsaufwand bearbeitet werden kann.

(3) Die Masterarbeit soll zeigen, dass der Studierende in der Lage ist, ein Problem aus seinem Fach selbstständig und in der vorgegebenen Zeit nach wissenschaftlichen Methoden, die dem

Stand der Forschung entsprechen, zu bearbeiten. Der Masterarbeit werden 30 Leistungspunkte zugeordnet. Die Bearbeitungsdauer beträgt sechs Monate. Die Masterarbeit kann auch in englischer Sprache geschrieben werden.

(4) Die Masterarbeit kann von jedem Prüfer nach § 14 Abs. 2 vergeben werden. Soll die Masterarbeit außerhalb der beiden nach § 1 Abs. 2 Satz 1 beteiligten Fakultäten angefertigt werden, so bedarf dies der Genehmigung des Prüfungsausschusses. Dem Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. Die Masterarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 1 erfüllt.

(5) Bei der Abgabe der Masterarbeit hat der Studierende schriftlich zu versichern, dass er die Arbeit selbstständig verfasst hat und keine anderen als die von ihm angegebenen Quellen und Hilfsmittel benutzt hat, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung der Universität Karlsruhe (TH) zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet hat. Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. Bei Abgabe einer unwahren Versicherung wird die Masterarbeit mit „nicht ausreichend“ (5.0) bewertet.

(6) Der Zeitpunkt der Ausgabe des Themas der Masterarbeit und der Zeitpunkt der Abgabe der Masterarbeit sind beim Prüfungsausschuss aktenkundig zu machen. Der Studierende kann das Thema der Masterarbeit nur einmal und nur innerhalb der ersten zwei Monate der Bearbeitungszeit zurückgeben. Auf begründeten Antrag des Studierenden kann der Prüfungsausschuss die in Absatz 1 festgelegte Bearbeitungszeit um höchstens drei Monate verlängern. Wird die Masterarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ bewertet, es sei denn, dass der Studierende dieses Versäumnis nicht zu vertreten hat. § 8 gilt entsprechend.

(7) Die Masterarbeit wird von einem Betreuer sowie in der Regel von einem weiteren Prüfer aus der jeweils anderen Fakultät der beiden nach § 1 Abs. 2 Satz 1 beteiligten Fakultäten begutachtet und bewertet. Einer der beiden muss Juniorprofessor oder Professor sein. Bei nicht übereinstimmender Beurteilung der beiden Prüfer setzt der Prüfungsausschuss im Rahmen der Bewertung der beiden Prüfer die Note der Masterarbeit fest. Der Bewertungszeitraum soll acht Wochen nicht überschreiten.

§ 12 Zusatzleistungen und Zusatzmodule

(1) Innerhalb der Regelstudienzeit, einschließlich der Urlaubssemester für das Studium an einer ausländischen Hochschule (Regelprüfungszeit), können in einem Modul bzw. Fach auch weitere Leistungspunkte (Zusatzleistungen) im Umfang von höchstens 20 Leistungspunkten erworben werden, als für das Bestehen der Modul- bzw. Fachprüfung erforderlich sind. § 3, § 4 und § 8 Abs. 9 der Studien- und Prüfungsordnung bleiben davon unberührt. Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt-, Fach- und Modulnoten ein. Soweit Zusatzleistungen erbracht wurden, werden auf Antrag des Studierenden bei der Festlegung der Modul- bzw. Fachnote nur die Noten berücksichtigt, die unter Abdeckung der erforderlichen Leistungspunkte die beste Modul- bzw. Fachnote ergeben. Die bei der Festlegung der Modul bzw. Fachnote nicht berücksichtigten Leistungspunkte werden als Zusatzleistungen automatisch im Transcript of Records aufgeführt und als Zusatzleistungen gekennzeichnet. Zusatzleistungen werden mit den nach § 7 vorgesehenen Noten gelistet.

(2) Der Studierende hat bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

(3) Die Ergebnisse maximal zweier Module, die jeweils mindestens 9 Leistungspunkte umfassen müssen, werden auf Antrag des Studierenden in das Masterzeugnis als Zusatzmodule aufgenommen und als solche gekennzeichnet. Zusatzmodule werden bei der Festsetzung der Gesamt-, Fach- und Modulnoten nicht mit einbezogen. Nicht in das Zeugnis aufgenommene Zusatzmodule werden im Transcript of Records automatisch aufgenommen und als Zusatzmodule gekennzeichnet. Zusatzmodule werden mit den nach § 7 vorgesehenen Noten gelistet.

(4) Neben den im Studienplan definierten fachwissenschaftlichen Modulen und Leistungen können die Zusatzleistungen nach Absatz 1 - 3 auch aus dem Lehrangebot anderer Fakultäten und Einrichtungen gewählt werden.

§ 13 Prüfungsausschuss

(1) Für den Masterstudiengang Informationswirtschaft wird ein Prüfungsausschuss gebildet. Er besteht aus sechs stimmberechtigten Mitgliedern, die jeweils zur Hälfte von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften bestellt werden: vier Professoren, Juniorprofessoren, Hochschul- oder Privatdozenten, zwei Vertretern der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und einem Vertreter der Studierenden mit beratender Stimme. Im Falle der Einrichtung eines gemeinsamen Prüfungsausschusses für den Bachelor- und den Masterstudiengang Informationswirtschaft erhöht sich die Anzahl der Vertreter der Studierenden auf zwei Mitglieder mit beratender Stimme, wobei je ein Vertreter aus dem Bachelor- und aus dem Masterstudiengang stammt. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.

(2) Der Vorsitzende, sein Stellvertreter, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter werden von den jeweiligen Fakultätsräten bestellt, die Mitglieder der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und der Vertreter der Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. Der Vorsitzende und dessen Stellvertreter müssen Professor oder Juniorprofessor aus einer der beteiligten Fakultäten sein. Der Vorsitz wechselt zwischen den Fakultäten alle zwei Jahre. Der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch die Prüfungssekretariate unterstützt.

(3) Der Prüfungsausschuss regelt die Auslegung und die Umsetzung der Studien- und Prüfungsordnung in die Prüfungspraxis der Fakultäten. Er achtet darauf, dass die Bestimmungen der Prüfungsordnung eingehalten werden. Er entscheidet über die Anrechnung von Studienzeiten, Studien- und Prüfungsleistungen und übernimmt die Gleichwertigkeitsfeststellung. Er berichtet regelmäßig den Fakultätsräten über die Entwicklung der Prüfungen und Studienzeiten sowie über die Verteilung der Fach- und Gesamtnoten und gibt Anregungen zur Reform des Studienplans und der Studien- und Prüfungsordnung.

(4) Der Prüfungsausschuss kann die Erledigung seiner Aufgaben in dringenden Angelegenheiten und für alle Regelfälle auf den Vorsitzenden des Prüfungsausschusses übertragen.

(5) Die Mitglieder des Prüfungsausschusses haben das Recht, der Abnahme von Prüfungen beizuwohnen. Die Mitglieder des Prüfungsausschusses, die Prüfer und die Beisitzenden unterliegen der Amtsverschwiegenheit. Sofern sie nicht im öffentlichen Dienst stehen, sind sie durch den Vorsitzenden zur Verschwiegenheit zu verpflichten.

(6) In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses ein fachlich zuständiger und von der betroffenen Fakultät zu nennender Professor, Juniorprofessor, Hochschul- oder Privatdozent hinzuziehen. Er hat in diesem Punkt Stimmrecht.

(7) Belastende Entscheidungen des Prüfungsausschusses sind schriftlich mitzuteilen. Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung schriftlich oder zur Niederschrift beim Rektorat der Universität Karlsruhe (TH) einzulegen.

§ 14 Prüfer und Beisitzer

(1) Der Prüfungsausschuss bestellt die Prüfer und die Beisitzenden. Er kann die Bestellung dem Vorsitzenden übertragen.

(2) Prüfer sind Hochschullehrer und habilitierte Mitglieder sowie akademische Mitarbeiter der jeweiligen Fakultät, denen die Prüfungsbefugnis übertragen wurde. Bestellt werden darf nur, wer mindestens

die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat. Bei der Bewertung der Masterarbeit muss ein Prüfer Hochschullehrer sein.

(3) Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zum Prüfer bestellt werden, wenn die jeweilige Fakultät ihnen eine diesbezügliche Prüfungsbefugnis erteilt hat.

(4) Zum Beisitzenden darf nur bestellt werden, wer einen akademischen Abschluss in einem Studiengang der Informationswirtschaft, Informatik, Rechtswissenschaften, Wirtschaftswissenschaften oder einen gleichwertigen akademischen Abschluss erworben hat.

§ 15 Anrechnung von Studienzeiten, Anerkennung von Studien- und Prüfungsleistungen

(1) Studienzeiten im gleichen Studiengang werden angerechnet. Studien- und Prüfungsleistungen, die in gleichen oder anderen Studiengängen an der Universität Karlsruhe (TH) oder an anderen Hochschulen erbracht wurden, werden angerechnet, soweit Gleichwertigkeit besteht. Gleichwertigkeit ist festzustellen, wenn Leistungen in Inhalt, Umfang und in den Anforderungen denjenigen des Studiengangs im Wesentlichen entsprechen. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studien- und Prüfungsleistung werden die Grundsätze des ECTS herangezogen; die inhaltliche Gleichwertigkeitsprüfung orientiert sich an den Qualifikationszielen des Moduls.

(2) Werden Leistungen angerechnet, können die Noten – soweit die Notensysteme vergleichbar sind – übernommen werden und in die Berechnung der Modulnoten und der Gesamtnote einbezogen werden. Liegen keine Noten vor, muss die Leistung nicht anerkannt werden. Der Studierende hat die für die Anrechnung erforderlichen Unterlagen vorzulegen.

(3) Bei der Anrechnung von Studienzeiten und der Anerkennung von Studien- und Prüfungsleistungen, die außerhalb der Bundesrepublik erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

(4) Absatz 1 gilt auch für Studienzeiten, Studien- und Prüfungsleistungen, die in staatlich anerkannten Fernstudien- und an anderen Bildungseinrichtungen, insbesondere an staatlichen oder staatlich anerkannten Berufsakademien sowie an Fach- und Ingenieurschulen erworben wurden.

(5) Die Anerkennung von Teilen der Masterprüfung kann versagt werden, wenn in einem Studiengang mehr als 45 Leistungspunkte und/oder die Masterarbeit anerkannt werden soll/en. Dies gilt insbesondere bei einem Studiengangwechsel sowie bei einem Studienortwechsel.

(6) Zuständig für die Anrechnungen ist der Prüfungsausschuss. Vor Feststellungen über die Gleichwertigkeit sind die zuständigen Fachvertreter zu hören. Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

(7) Erbringt ein Studierender Studienleistungen an einer ausländischen Universität, soll die Gleichwertigkeit vorab durch einen Studienvertrag nach den ECTS-Richtlinien festgestellt und nach diesem verfahren werden.

(8) Zusatzleistungen, die ein Studierender für den Bachelorstudiengang Informationswirtschaft erbracht hat und die im Studienplan des Masterstudiengangs Informationswirtschaft vorgesehen sind, werden auf Antrag des Studierenden an den Prüfungsausschuss anerkannt.

II. Masterprüfung

§ 16 Umfang und Art der Masterprüfung

(1) Die Masterprüfung besteht aus den Fachprüfungen nach Absatz 2, dem interdisziplinären Seminarmodul nach Absatz 3 sowie der Masterarbeit nach § 11.

(2) In den ersten beiden Studienjahren sind Fachprüfungen aus folgenden Fächern durch den Nachweis von Leistungspunkten in einem oder mehreren Modulen abzulegen:

1. aus dem Fach Betriebswirtschaftslehre im Umfang von 10 Leistungspunkten,
2. aus dem Fach Operations Research im Umfang von 5 Leistungspunkten.

Des Weiteren sind Fachprüfungen

1. aus wirtschaftswissenschaftlichen Fächern durch Module im Umfang von 18 Leistungspunkten,
2. aus dem Fach Informatik durch Module im Umfang von 33 Leistungspunkten,
3. aus dem Fach Recht durch Module im Umfang von 18 Leistungspunkten

abzulegen. Wirtschaftswissenschaftliche Fächer sind Betriebswirtschaftslehre, Operations Research, Statistik und Volkswirtschaftslehre. Dabei sind im Fach Betriebswirtschaftslehre mindestens 9 Leistungspunkte abzulegen. Die Module, die ihnen zugeordneten Leistungspunkte und die Zuordnung der Module zu den Fächern sind im Studienplan festgelegt. Zur entsprechenden Modulprüfung kann nur zugelassen werden, wer die Anforderungen nach § 5 erfüllt.

(3) Ferner muss ein interdisziplinäres Seminarmodul im Umfang von 6 Leistungspunkten absolviert werden, das von je einem Prüfer nach § 14 Abs. 2 aus der Informatik, dem Recht und den Wirtschaftswissenschaften betreut wird.

(4) Als eine weitere Prüfungsleistung ist eine Masterarbeit gemäß § 11 anzufertigen.

§ 17 Bestehen der Masterprüfung, Bildung der Gesamtnote

(1) Die Masterprüfung ist bestanden, wenn alle in § 16 genannten Prüfungsleistungen mindestens mit „ausreichend“ bewertet wurden.

(2) Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden alle Prüfungsleistungen nach § 16 mit ihren Leistungspunkten gewichtet.

(3) Hat der Studierende die Masterarbeit mit der Note 1.0 und die Masterprüfung mit einer Gesamtnote von 1.0 abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen. Mit einer Masterarbeit mit der Note 1.0 und bis zu einer Gesamtnote von 1.3 kann auf Antrag an den Prüfungsausschuss das Prädikat „mit Auszeichnung“ (with distinction) verliehen werden.

§ 18 Masterzeugnis, Masterurkunde, Transcript of Records und Diploma Supplement

(1) Über die Masterprüfung werden nach Bewertung der letzten Prüfungsleistung eine Masterurkunde und ein Zeugnis erstellt. Die Ausfertigung von Masterurkunde und Zeugnis soll nicht später als sechs Wochen nach der Bewertung der letzten Prüfungsleistung erfolgen. Masterurkunde und Zeugnis werden in deutscher und englischer Sprache ausgestellt. Masterurkunde und Zeugnis tragen das Datum der letzten erfolgreich nachgewiesenen Prüfungsleistung. Sie werden dem Studierenden gleichzeitig ausgehändigt. In der Masterurkunde wird die Verleihung des akademischen Mastergrades beurkundet. Die Masterurkunde wird vom Rektor und den Dekanen der beteiligten Fakultäten unterzeichnet und mit dem Siegel der Universität versehen.

(2) Das Zeugnis enthält die in den Fachprüfungen, den zugeordneten Modulprüfungen, im interdisziplinären Seminarmodul und der Masterarbeit erzielten Noten, deren zugeordnete Leistungspunkte und ECTS-Noten und die Gesamtnote und die ihr entsprechende ECTS-Note. Das Zeugnis ist von den Dekanen der beteiligten Fakultäten und vom Vorsitzenden des Prüfungsausschusses zu unterzeichnen.

(3) Weiterhin erhält der Studierende als Anhang ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS User's Guide entspricht. Das Diploma Supplement enthält eine Abschrift der Studiendaten des Studierenden (Transcript of Records).

(4) Die Abschrift der Studiendaten (Transcript of Records) enthält in strukturierter Form alle vom Studierenden erbrachten Prüfungsleistungen. Dies beinhaltet alle Fächer, Fachnoten und ihre entsprechende ECTS-Note samt den zugeordneten Leistungspunkten, die dem jeweiligen Fach zugeordneten Module mit den Modulnoten, entsprechender ECTS-Note und zugeordneten Leistungspunkten sowie die den Modulen zugeordneten Lehrveranstaltungen samt Noten und zugeordneten Leistungspunkten. Aus der Abschrift der Studiendaten sollen die Zugehörigkeit von Lehrverantaltungen zu den einzelnen Modulen und die Zugehörigkeit der Module zu den einzelnen Fächern deutlich erkennbar sein. Angerechnete Studienleistungen sind im Transcript of Records aufzunehmen.

(5) Die Masterurkunde, das Masterzeugnis und das Diploma Supplement einschließlich des Transcript of Records werden vom Studienbüro der Universität ausgestellt.

III. Schlussbestimmungen

§ 19 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen

(1) Der Bescheid über die endgültig nicht bestandene Masterprüfung wird dem Studierenden durch den Prüfungsausschuss in schriftlicher Form erteilt. Der Bescheid ist mit einer Rechtsbehelfsbelehrung zu versehen.

(2) Hat der Studierende die Masterprüfung endgültig nicht bestanden, wird ihm auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Prüfungsleistungen und deren Noten enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

§ 20 Ungültigkeit der Masterprüfung, Aberkennung des Mastergrades

(1) Hat der Studierende bei einer Prüfung getäuscht und wird diese Tatsache erst nach der Aushändigung des Zeugnisses bekannt, so kann der Prüfungsausschuss nachträglich die Noten für diejenigen Prüfungsleistungen, bei deren Erbringung der Studierende getäuscht hat, entsprechend berichtigen und die Prüfung ganz oder teilweise für „nicht bestanden" erklären.

(2) Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass der Studierende darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat der Kandidat die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend" (5.0) und die Masterprüfung für „nicht bestanden" erklärt werden.

(3) Dem Studierenden ist vor einer Entscheidung nach Absatz 1 und Absatz 2 Satz 2 Gelegenheit zur Äußerung zu geben.

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Dies bezieht sich auch auf alle davon betroffenen Anlagen (Transcript of Records und Diploma Supplement). Mit dem unrichtigen Zeugnis sind auch die Masterurkunde, das Masterzeugnis und alle

Anlagen (Transcript of Records und Diploma Supplement) einzuziehen, wenn die Prüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.

(5) Eine Entscheidung nach Absatz 1 oder Absatz 2 Satz 2 ist nach einer Frist von fünf Jahren ab dem Datum des Prüfungszeugnisses ausgeschlossen.

(6) Die Aberkennung des akademischen Mastergrades richtet sich nach den gesetzlichen Bestimmungen.

§ 21 Einsicht in die Prüfungsakten

(1) Nach Abschluss der Masterprüfung wird dem Studierenden auf Antrag innerhalb eines Jahres Einsicht in seine Masterarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.

(2) Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) Der Prüfer bestimmt Ort und Zeit der Einsichtnahme.

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

§ 22 In-Kraft-Treten

(1) Diese Satzung tritt am 1. Oktober 2009 in Kraft.

(2) Studierende, die auf Grundlage der Prüfungsordnung für den Masterstudiengang Informationswirtschaft vom 30. April 2006 (Amtliche Bekanntmachung der Universität Karlsruhe (TH) Nr. 9 vom 07. Oktober 2006) ihr Studium an der Universität Karlsruhe (TH) aufgenommen haben, können einen Antrag auf Zulassung zur Prüfung letztmalig am 30. März 2013 stellen.

(3) Auf Antrag können Studierende, die ihr Studium an der Universität Karlsruhe (TH) auf Grundlage der Prüfungsordnung für den Masterstudiengang Informationswirtschaft vom 30. April 2006 (Amtliche Bekanntmachung der Universität Karlsruhe (TH) Nr. 9 vom 07. Oktober 2006) begonnen haben, ihr Studium nach der vorliegenden Prüfungsordnung fortsetzen. Der Prüfungsausschuss stellt dabei fest, ob und wie die bisher erbrachten Prüfungsleistungen in den neuen Studienplan integriert werden können und nach welchen Bedingungen das Studium nach einem Wechsel fortgeführt werden kann.

Karlsruhe, den 15. April 2009

Professor Dr. sc. tech. Horst Hippler
(Rektor)

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