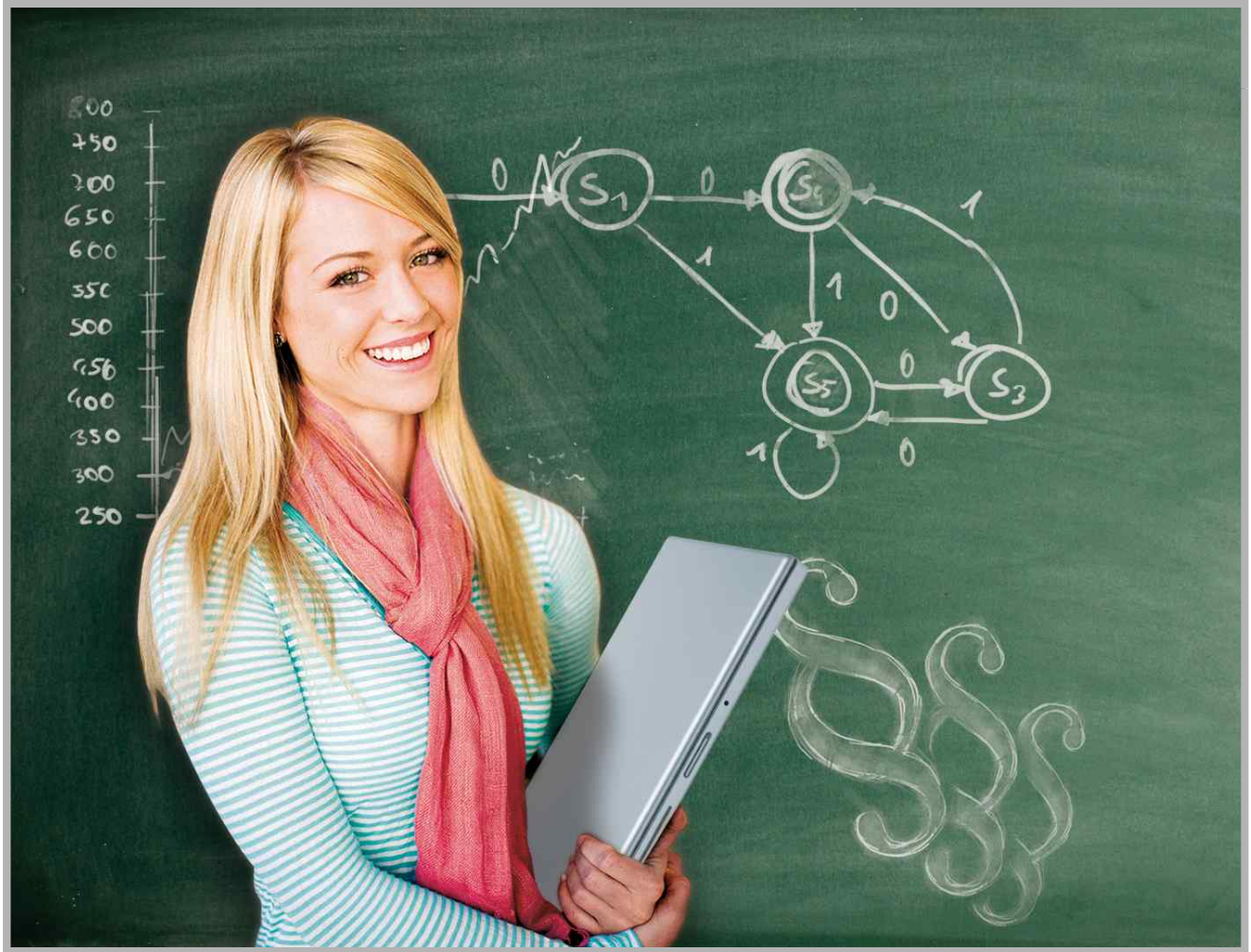
Karlsruhe Institute of Technology

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

Winter term 2009/2010
Long version
26.08.2009

Faculty of Economics and Business Engineering
Fakultät für Informatik



KIT - the cooperation of the Forschungszentrum Karlsruhe GmbH and the Univeristät Karlsruhe (TH)

Forschungszentrum Karlsruhe
in der Helmholtz-Gemeinschaft

Universität Karlsruhe (TH)
Research University · founded 1825

Publishers:

Universität Karlsruhe (TH)
Fakultät für Wirtschaftswissenschaften

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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.

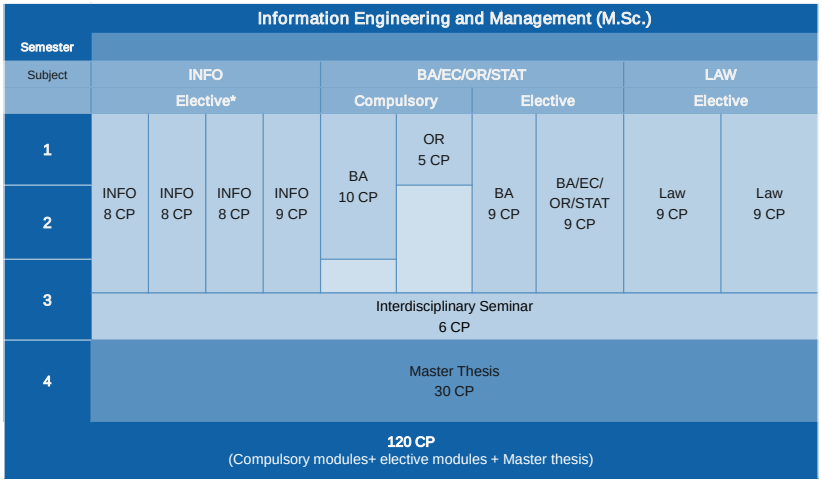

Abbildung 1: Structure of the Master Programme in Information Engineering and Management (Recommendation)

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.uni-karlsruhe.de/studium/hinweise/.

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 Mandatory Modules

3.1 All Subjects

Module: Information Engineering and Management — Module key: [IW4WWIW]

Subject: Business Administration (obligatory)
Module coordination: Christof Weinhardt, Andreas Geyer-Schulz
Credit points (CP): 10

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.

Prerequisites
None.

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* [26450] and *Business Administration in Information Engineering and Management* [26500].
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 existence/generation through allocation and evaluation until the distribution 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.

Courses in module *Information Engineering and Management* [IW4WWIW]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26450	Principles of Information Engineering and Management (S. 97)	2/1	W	5	Weinhardt, Kraemer, van Dinther
26500	Business Administration in Information Engineering and Management (S. 95)	2/1	S	5	Geyer-Schulz

Remarks
None.

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

Subject: Operations Research (obligatory)
Module coordination: Karl-Heinz Waldmann
Credit points (CP): 5

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student

- knows modern concepts of stochastic modeling,
- describes and to analyzes simple stochastic systems.

Content

Courses in module *Stochastic Models in Information Engineering and Management* [IW4WWOR]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25679	Markov Decision Models I (S. 98)	2/1/2	W	5	Waldmann

Module: Interdisciplinary Seminar Module — Module key: [IW4IWSEM]

Module coordination: Studiendekan (Fak. f. Wirtschaftswissenschaften), Martina Zitterbart
Credit points (CP): 6

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.

Prerequisites
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.

Conditions
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.

Courses in module *Interdisciplinary Seminar Module* [IW4IWSEM]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26530	Interdisciplinary Seminar in Information Engineering and Management (S. 339)	2	W/S	6	Geyer-Schulz, Dreier
26510	Master Seminar in Information Engineering and Management (S. 336)	2	W	3	Geyer-Schulz
SemIW	Seminar Information Engineering and Management (S. 372)	2	W/S	3	Weinhardt
SemIIP2	Seminar in Industrial Production (S. 371)	2	W/S	3	Schultmann, Fröhling, Hiete
25195	Master-Seminar Marketing Plannning (S. 208)	2	W/S	3	Gaul
25192	Master Seminar in Marketing (S. 205)	2	W/S	3	Gaul
25197	Master-Seminar zum strategischen u. verhaltenswissenschaftlichen Marketing (S. 210)	2	W	3	Neibecker
25193	Master Seminar zu Marktforschung (S. 206)	2	W/S	3	Gaul
25196	Master Seminar in Entrepreneurship, Innovation and International Marketing (S. 209)	2	W/S	3	Gaul
25194	Master Seminar in Quantitative Marketing and OR (S. 207)	2	W/S	3	Gaul
25915	Seminar: Management and Organization (S. 279)	2	S	3	Lindstädt
25916	Seminar: Management and Organization (S. 280)	2	W	3	Lindstädt
25293	Seminar in Finance (S. 216)	2	W/S	3	Uhrig-Homburg, Ruckes
SemFBV1	Seminar in Insurance Management (S. 368)	2	W/S	3	Werner
SemFBV2	Seminar in Operational Risk Management (S. 369)	2	W/S	3	Werner
SemFBV3	Seminar in Risk Theory and Actuarial Science (S. 370)	2	W/S	3	Hipp
SemWIOR3	Seminar in Experimental Economics (S. 376)	2	W/S	3	Berninghaus
SemWIOR4	Seminar in Game and Decision Theory (S. 377)	2	W/S	3	Berninghaus
SemWIOR2	Seminar Economic Theory (S. 375)	2	W/S	3	Puppe
25131	Seminar in Continous Optimization (S. 189)	2	W/S	3	Stein
SemWIOR1	Seminar Stochastic Models (S. 374)	2	W/S	3	Waldmann
25491	Seminar in Discrete Optimization (S. 235)	2	W/S	3	Nickel
SemAIFB1	Seminar in Enterprise Information Systems (S. 363)	2	W/S	3	Studer, Oberweis, Stucky, Wolf, Kneuper
SemAIFB2	Seminar Efficient Algorithms (S. 364)	2	W/S	3	Schmeck
SemAIFB3	Seminar Complexity Management (S. 365)	2	W/S	3	Seese
SemAIFB4	Seminar Knowledge Management (S. 366)	2	W	3	Studer
26470	Seminar Service Science, Management & Engineering (S. 325)	2	W/S	4	Tai, Weinhardt, Satzger, Studer
rechtsem	Seminar in Law (S. 395)	2	W/S	3	Dreier, Sester, Spiecker genannt Döhmann

Module: Master Thesis — Module key: [IW4IWMATHESIS]

Module coordination: Martina Zitterbart, Studiendekan (Fak. f. Wirtschaftswissenschaften), Vorsitzende des Prüfungsausschusses
Credit points (CP): 30

Learning Control / Examinations
Examination by two examiners from the two faculties. For details refer to examination regulation.

Prerequisites
None.

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.

4 Elective Modules

4.1 Business Administration

Module: Advanced CRM — Module key: [IW4BWLISM1]

Subject: Business Administration
Module coordination: Andreas Geyer-Schulz
Credit points (CP): 9

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.

Prerequisites
None.

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,
- 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.
On one hand, 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.
On the other hand, 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.

Courses in module *Advanced CRM* [IW4BWLISM1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26508	Customer Relationship Management (S. 335)	2/1	W	4,5	Geyer-Schulz
26506	Personalization and Recommender Systems (S. 333)	2/1	S	4,5	Geyer-Schulz
26518	Social Network Analysis in CRM (S. 337)	2/1	W/S	4,5	Hoser

Module: Electronic Markets — Module key: [IW4BWLISM2]

Subject: Business Administration
Module coordination: Andreas Geyer-Schulz
Credit points (CP): 9

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.

Prerequisites
None.

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.

Content
What are the conditions that make electronic markets develop?
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.

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

Further topics of the module include the analysis of existing markets, the design for new markets and the implementation of simple auction forms.

Courses in module *Electronic Markets* [IW4BWLISM2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26502	Electronic Markets (Principles) (S. 328)	2/1	W	4,5	Geyer-Schulz
26504	Electronic Markets: Institutions and Market Mechanisms (S. 330)	2/1	S	4,5	Geyer-Schulz
26460	Market Engineering: Information in Institutions (S. 321)	2/1	S	4,5	Weinhardt, Kraemer

Module: Market Engineering — Module key: [IW4BWLISM3]

Subject: Business Administration
Module coordination: Christof Weinhardt
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module, 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.

Prerequisites
None.

Conditions
The course *Market Engineering: Information in Institutions* [26460] has to be attended.

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* [26460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.

Courses in module *Market Engineering* [IW4BWLISM3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26460	Market Engineering: Information in Institutions (S. 321)	2/1	S	4,5	Weinhardt, Kraemer
25408	Auction Theory (S. 232)	2/1	W	4.5	Ehrhart, Seifert
26454	eFinance: Information Engineering and Management for Securities Trading (S. 318)	2/1	W	4.5	Weinhardt, Riordan
26458	Computational Economics (S. 320)	2/1	W	5	Branke, van Dinther
25373	Experimental Economics (S. 229)	2/1	S	4,5	Berninghaus, Bleich

Module: Business & Service Engineering — Module key: [IW4BWLISM4]

Subject: Business Administration
Module coordination: Christof Weinhardt, Gerhard Satzger
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module, 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.

Prerequisites
None.

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
- 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.

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.

Courses in module *Business & Service Engineering* [IW4BWLISM4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26456	Business Models in the Internet: Planning and Implementation (S. 319)	2/1	S	4,5	Weinhardt, Holtmann
26478	Special Topics in Information Engineering & Management (S. 326)	3	W/S	4.5	Weinhardt
26506	Personalization and Recommender Systems (S. 333)	2/1	S	4,5	Geyer-Schulz
26468	Service Innovation (S. 324)	2/1	S	5	Satzger, Neus

Remarks
The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Module: Communications & Markets — Module key: [IW4BWLISM5]

Subject: Business Administration
Module coordination: Christof Weinhardt
Credit points (CP): 9

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

Prerequisites
None.

Conditions
The course *Communications Economics* [26462] has to be attended.

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.

Courses in module *Communications & Markets* [IW4BWLISM5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26462	Communications Economics (S. 322)	2/1	S	4,5	Seifert, Kraemer
26460	Market Engineering: Information in Institutions (S. 321)	2/1	S	4,5	Weinhardt, Kraemer
25408	Auction Theory (S. 232)	2/1	W	4.5	Ehrhart, Seifert
26478	Special Topics in Information Engineering & Management (S. 326)	3	W/S	4.5	Weinhardt

Remarks
The lecture *Special Topics in Information Engineering & Management* [26478] is first offered in the winter term 2009/10.

Module: Service Management — Module key: [IW4BWLISM6]

Subject: Business Administration
Module coordination: Gerhard Satzger, Christof Weinhardt
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 and 3 of the examination regulation) of the single courses of this module, 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.

Prerequisites
None.

Conditions
The course *Business and IT Service Management* [26484] is obligatory.
The course *eServices* [26466] can only be choosen, if it was not attended in the Bachelor programme.

Learning Outcomes
The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- analyze and develop supply chain and business networks,
- 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 analyze and develop supply chain networks as well as to understand and analyze innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Courses in module *Service Management* [IW4BWLISM6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26484	Business and IT Service Management (S. 327)	2/1	W	5	Satzger
26452	Management of Business Networks (S. 317)	2/1	W	4.5	Weinhardt, Kraemer
26468	Service Innovation (S. 324)	2/1	S	5	Satzger, Neus
26466	eServices (S. 323)	2/1	S	5	Weinhardt, Satzger

Module: F1 (Finance) Module key: [IW4BWLFBV1]

Subject: Business Administration
Module coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 9

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.

Prerequisites
None.

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.

Courses in module *F1 (Finance)* [IW4BWLFBV1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26550	Derivatives (S. 340)	2/1	S	4.5	Uhrig-Homburg
25212	Valuation (S. 212)	2/1	W	4.5	Ruckes
26555	Asset Pricing (S. 341)	2/1	S	4.5	Uhrig-Homburg, Ruckes

Module: F2 (Finance) Module key: [IW4BWLFBV2]

Subject: Business Administration
Module coordination: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
It is obligatory to attend the module *F1 (Finance)* [EE4BWLFBV1].
The courses *Asset Pricing* [VLAP], *Valuation* [25212] and *Derivatives* [26550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [IW4BWLFBV1] already.

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

Content
The module F2 (Finance) is based on the module F1 (Finance). 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.

Courses in module *F2 (Finance)* [IW4BWLFBV2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26560	Fixed Income Securities (S. 342)	2/1	W	4.5	Uhrig-Homburg
25214	Corporate Financial Policy (S. 213)	2/1	S	4.5	Ruckes
25240	Market Microstructure (S. 215)	2/0	W	3	Lüdecke
26565	Credit Risk (S. 343)	2/1	W	4.5	Uhrig-Homburg
25210	Management Accounting (S. 211)	2/1	S	4.5	Lüdecke
26555	Asset Pricing (S. 341)	2/1	S	4.5	Uhrig-Homburg, Ruckes
25212	Valuation (S. 212)	2/1	W	4.5	Ruckes
26550	Derivatives (S. 340)	2/1	S	4.5	Uhrig-Homburg
26570	International Finance (S. 344)	2	S	3	Uhrig-Homburg, Walter
25299	Business Strategies of Banks (S. 218)	2	W	3	Müller
25296	Exchanges (S. 217)	1	S	1.5	Franke
25232	Financial Intermediation (S. 214)	3	W	4.5	Ruckes

Remarks

Module: Applications of Actuarial Sciences I (BWL) Module key: [IW4BWLFBV4]

Subject: Business Administration
Module coordination: Christian Hipp
Credit points (CP): 9

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

Prerequisites
Knowledge in statistics and the module *Insurance: Calculation and Control* [WW3BWLFBV2] is an advantage, but not a requirement.

Conditions
Two courses out of *Life and Pensions* [26310], *Reinsurance* [26312], *Insurance Optimisation* [26316] and *Saving Societies* [26340] have to be chosen.

Learning Outcomes

Content

Courses in module *Applications of Actuarial Sciences I (BWL)* [IW4BWLFBV4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26340	Saving Societies (S. 309)	3/0	S	4,5	Hipp, N.N.
26316	Insurance Optimisation (S. 300)	3	W	4.5	Hipp
26312	Reinsurance (S. 299)	4	S	4.5	Hipp, Stöckbauer
26310	Life and Pensions (S. 298)	3	W	4.5	Hipp, Vogt, Besserer

Remarks

Module: Insurance Management I — Module key: [IW4BWLFBV6]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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.

Prerequisites
Knowledge of the content of the course *Principles of Insurance Management* [25055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Management* [WW3BWLFBV4] or lecture notes available at http://insurance.fbv.uni-karlsruhe.de/345.php) is assumed.
If the contents were not part of the Bachelor programme and there is no professional experience in the insurance industry so far, the student has to pass a test to proof sufficient prior knowledge in the first third of the term.

Conditions
None.

Learning Outcomes

Content

Courses in module *Insurance Management I* [IW4BWLFBV6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26323	Insurance Marketing (S. 302)	3/0	W/S	4.5	Werner
26320	Insurance Accounting (S. 301)	3/0	W	4.5	Werner, Ludwig
26324	Insurance Production (S. 303)	3/0	W/S	4.5	Werner
26327	Service Management (S. 305)	3/0	W/S	4.5	Werner
26360	Insurance Contract Law (S. 314)	3/0	S	4.5	Werner, Schwebler

Remarks
The courses *Insurance Marketing* [26323], *Insurance Production* [26324], and *Service Management* [26327] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Insurance Management II — Module key: [IW4BWLFBV7]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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.

Prerequisites
Knowledge of the content of the course *Principles of Insurance Management* [25055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Management* [WW3BWLFBV4] or lecture notes available at http://insurance.fbv.uni-karlsruhe.de/345.php) is assumed.
If the contents were not part of the Bachelor programme and there is no professional experience in the insurance industry so far, the student has to pass a test to proof sufficient prior knowledge in the first third of the term.

Conditions
None.

Learning Outcomes

Content

Courses in module *Insurance Management II* [IW4BWLFBV7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25050	Private and Social Insurance (S. 182)	2/0	W	2.5	Werner, Heilmann, Besserer
26360	Insurance Contract Law (S. 314)	3/0	S	4.5	Werner, Schwebler
26350	Current Issues in the Insurance Industry (S. 310)	2/0	S	2.5	Werner, Heilmann
26335	Insurance Risk Management (S. 307)	2/0	S	2.5	Werner, Maser
26336	Risk Controlling in Insurance Groups (S. 308)	1/0	S	2	Werner, Müller

Module: Operational Risk Management I — Module key: [IW4BWLFBV9]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

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.

Prerequisites
Knowledge in risk management (for example gained in the Bachelor programme) are an advantage.

Conditions
It is only possible to choose the course *Enterprise Risk Management* [26326] if it was not attended in the Bachelor programme.

Learning Outcomes

Content

Courses in module *Operational Risk Management I* [IW4BWLFBV9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26326	Enterprise Risk Management (S. 304)	3/0	W/S	4.5	Werner
26395	Risk Communication (S. 316)	3/0	W/S	4.5	Werner
26353	International Risk Transfer (S. 311)	2/0	S	2,5	Schwehr
26355	Public Sector Risk Management (S. 313)	2/0	W	2,5	Mechler

Remarks
The courses *Enterprise Risk Management* [26326] and *Risk Communication* [26395] are offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Operational Risk Management II — Module key: [IW4BWLFBV10]

Subject: Business Administration
Module coordination: Ute Werner
Credit points (CP): 9

Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 2 or 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 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.

Prerequisites
Interest in interdisciplinary research is assumed.

Knowledge in social science disciplines, GIS or Finance is an advantage.

Conditions
None.

Learning Outcomes

Content

Courses in module *Operational Risk Management II* [IW4BWLFBV10]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26355	Public Sector Risk Management (S. 313)	2/0	W	2,5	Mechler
26354	Risk Management of Microfinance and Private Households (S. 312)	3/0	W/S	4.5	Werner
26328	Multidisciplinary Risk Research (S. 306)	3/0	W/S	4.5	Werner
26393	Project Work in Risk Research (S. 315)	3	W/S	4.5	Werner

Remarks
The course *Risk Management of Microfinance and Private Households* [26354] is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de

Module: Marketing Planning — Module key: [IW4BWLMAR1]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least one of the main lectures [25156] und [25158] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
The courses *Marketing and Operations Research* [25156] and *Corporate Planning and Operations Research* [25158] have to be chosen.

Learning Outcomes

Content

Courses in module *Marketing Planning* [IW4BWLMAR1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25156	Marketing and Operations Research (S. 195)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 196)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 197)	1	S	2.5	Gaul
25164	International Marketing (S. 199)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 200)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 203)	1/1	W	2.5	Gaul

Module: Market Research — Module key: [IW4BWLMAR2]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least one of the main lectures [25154] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
The courses *Modern Market Research* [25154] oder *Data Analysis and Operations Research* [25171] have to be chosen.

Learning Outcomes

Content

Courses in module *Market Research* [IW4BWLMAR2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25171	Data Analysis and Operations Research (S. 204)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 197)	1	S	2.5	Gaul
25164	International Marketing (S. 199)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 200)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 203)	1/1	W	2.5	Gaul

Module: Strategy, Innovation and Data Analysis Module key: [IW4BWLMAR3]

Subject: Business Administration
Module coordination: Bruno Neibecker
Credit points (CP): 9

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [25166] as well as from one of the chosen lectures [25154] and [25162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
None.

Conditions
- The lecture *Strategic and Innovative Decision Making in Marketing* [25166] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 9 CP must be achieved.

Learning Outcomes
Students have learned the following outcomes and competences:
- To specify the key terms in strategic management and innovation research, based on methodological and behavioral approaches
- To apply statistical tools to analyze and interpret case specific problems in marketing
- To indentify the main research trends
- To analyze and interpret high level academic articles
- To learn interactive skills to work in teams and to follow a goal-oriented approach
- To gain understanding of methodological research to develop concrete plans for marketing decision-making

Content
The core product is everything a customer or business consumer receives. Marketers must understand what it takes to develop a new product successfully. It is important to understand that innovations differ in their degree of newness (up to radical innovations). This helps to determine how quickly the products will be adopted by a target market. Market orientation is on the front side of the medal, the reverse side includes meeting the needs of diverse stakeholders. To find out the critical success factors a deep understanding of analytical and statistical methods is essential. As a result, the developing of an effective marketing strategy is discussed as an empirical, scientific process.

Courses in module *Strategy, Innovation and Data Analysis* [IW4BWLMAR3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25166	Strategic and Innovative Decision Making in Marketing (S. 201)	2/1	S	4.5	Neibecker
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25162	Information Technology and Business Information (S. 198)	2/1	S	4.5	Neibecker

Module: Behavioral Approaches in Marketing and Data Analysis [IW4BWLMAR4] Module key:

Subject: Business Administration
Module coordination: Bruno Neibecker
Credit points (CP): 9

Learning Control / Examinations
Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [25167] as well as from one of the chosen lectures [25154] and [25162].
The final mark for the module is the average of the marks for each course weighted by the credits of the course.

Prerequisites
None.

Conditions
- The lecture *Behavioral Approaches in Marketing* [25167] has to be attended.
- From the lectures *Modern Market Research* [25154] and *Information Technology and Business Information* [25162], one must be attended.
- At least 9 CP must be achieved.

Learning Outcomes
Students have learned the following outcomes and competences:
- To specify the key terms in marketing and communication management
- To identify and define theoretical constructs in marketing communication, based on behavioral theory
- To indentify the main research trends
- To analyze and interpret high level academic articles
- To learn interactive skills to work in teams and to follow a goal-oriented approach
- To gain understanding of methodological research to develop concrete plans for marketing decision-making

Content
Consumer behavior approaches in Marketing are seen as an important research area with a consumer-based perspective including a strong interdisciplinary and empirical orientation. My goal was to create a marketing module that presents a balanced coverage of both qualitative and quantitative material. That is, a practical, managerial perspective is discussed in relation to psychological, sociological and physiological (neuromarketing) approaches. It is examined how the individual receives information from his or her environment and how this material is learned, stored in memory, and used to form attitudes and to make decisions. A conprehensive understanding of marketing research and marketing data analysis is provided throughout the module, as for example in market segmentation or the definition of a target market a company decides to pursue.

Courses in module *Behavioral Approaches in Marketing and Data Analysis* [IW4BWLMAR4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25167	Behavioral Approaches in Marketing (S. 202)	2/1	W	4.5	Neibecker
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25162	Information Technology and Business Information (S. 198)	2/1	S	4.5	Neibecker

Module: Successful Market Orientation — Module key: [IW4BWLMAR5]

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 18

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 240 min. and contains topics from at least two of four main lectures [25154], [25156], [25158] and [25171] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 18 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
At least two courses out of *Modern Market Research* [25154], *Marketing and Operations Reseach* [25156] and *Corporate Planning and Operations Research* [25171] have to be chosen.

Learning Outcomes

Content

Courses in module *Successful Market Orientation* [IW4BWLMAR5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 195)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 196)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 204)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 197)	1	S	2.5	Gaul
25164	International Marketing (S. 199)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 200)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 203)	1/1	W	2.5	Gaul
25166	Strategic and Innovative Decision Making in Marketing (S. 201)	2/1	S	4.5	Neibecker
25167	Behavioral Approaches in Marketing (S. 202)	2/1	W	4.5	Neibecker
25162	Information Technology and Business Information (S. 198)	2/1	S	4.5	Neibecker

Module: Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6]

Module key:

Subject: Business Administration
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from at least two of the main lectures [25164], [25165] and [25170] as well as from the chosen lectures. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.
It is recommended, to attend more lectures than required to fulfill 9 Credit Points as it is possible to examine in these additional lecutres and influence the final grade positively.

Prerequisites
None.

Conditions
At least two courses out of International Marketing [25164], Marketing and Innovation [25165] and Entrepreneurship and Marketing [25170] have to be chosen.

Learning Outcomes

Content

Courses in module *Entrepreneurship, Innovation and International Marketing* [IW4BWLMAR6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 195)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 196)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 204)	2/1	W	4.5	Gaul
25160	e-Business & electronic Marketing (S. 197)	1	S	2.5	Gaul
25164	International Marketing (S. 199)	1	S	2.5	Gaul
25165	Marketing and Innovation (S. 200)	1/1	W	2.5	Gaul
25170	Entrepreneurship and Marketing (S. 203)	1/1	W	2.5	Gaul

Module: Strategic Corporate Management and Organization Module key: [IW4BWLUO1]

Subject: Business Administration
Module coordination: Hagen Lindstädt
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
One of the following courses have to be attended: *Managing Organizations* [25902], *Management and Strategy* [25900]

Learning Outcomes

Content

Courses in module *Strategic Corporate Management and Organization* [IW4BWLUO1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25904	Organization Theory (S. 276)	2/1	W	6	Lindstädt
25902	Managing Organizations (S. 275)	2/0	W	4	Lindstädt
25908	Modeling Strategic Decision Making (S. 277)	2/1	S	6	Lindstädt
25912	Value-Based Instruments of Corporate Strategy (S. 278)	2	W	4	Pidun, Wolff
25900	Management and Strategy (S. 274)	2/0	S	4	Lindstädt

Module: Strategic Decision Making and Organization Theory Module key: [IW4BWLUO3]

Subject: Business Administration
Module coordination: Hagen Lindstädt
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Strategic Decision Making and Organization Theory* [IW4BWLUO3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25904	Organization Theory (S. 276)	2/1	W	6	Lindstädt
25908	Modeling Strategic Decision Making (S. 277)	2/1	S	6	Lindstädt
25912	Value-Based Instruments of Corporate Strategy (S. 278)	2	W	4	Pidun, Wolff

Module: Industrial Production II

Module key: [IW4BWLIIP2]

Subject: Business Administration
Module coordination: Frank Schultmann
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The course *Planning and Management of Industrial Plants* [25952] is obligatory. In addition to that one more course has to be chosen.

Learning Outcomes

Content

Courses in module *Industrial Production II* [IW4BWLIIP2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25952	Planning and Management of Industrial Plants (S. 281)	2/2	W	5.5	Schultmann
25962	Exhaust Emissions (VWL), Emissions into the Environment (ING) (S. 285)	2/0	W	3.5	Karl
25995	Material Flow Analysis and Life Cycle Assessment (S. 288)	2/0	W	3.5	Schebek

Module: Industrial Production III

Module key: [IW4BWLIIP6]

Subject: Business Administration
Module coordination: Frank Schultmann
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Industrial Production III* [IW4BWLIIP6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25954	Production and Logistics Management (S. 282)	2/2	S	5.5	Fröhling, Schultmann
25975	Computer-based Planning and Control of Production and Simulation of Processes (S. 287)	2/0	S	3.5	Fröhling, Möst, Schultmann
25963	The Management of R&D Projects with Case Studies (S. 286)	2/2	W/S	3.5	Schmied

Module: Basics of Liberalised Energy Markets — Module key: [IW4BWLIIP4]

Subject: Business Administration
Module coordination: Wolf Fichtner
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Basics of Liberalised Energy Markets* [IW4BWLIIP4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25998	Basics of Liberalised Energy Markets (S. 289)	2/1	W	3.5	Fichtner
26020	Energy Trade and Risk Management (S. 294)	2/1	S	3.5	Hufendiek
25959	Energy Policy (S. 284)	2/0	S	3.5	Wietschel
26022	Gas-Markets (S. 295)	2/0	W	3	Fichtner
26025	Simulation Game in Energy Economics (S. 296)	2/0	W	3	Fichtner
26234	Regulation Theory and Practice (S. 297)	2/1	S	4	Mitusch

Module: Energy Industry and Technology — Module key: [IW4BWLIIP5]

Subject: Business Administration
Module coordination: Wolf Fichtner
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Energy Industry and Technology* [IW4BWLIIP5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
26003	Energy and Environment (S. 293)	2/1	S	5	Karl, n.n.
25958	Strategical Aspects of Energy Economy (S. 283)	2/0	W	3.5	Ardone
26000	Technological Change in Energy Industry (S. 290)	2/0	W	3	Wietschel
26001	Heat Economy (S. 291)	2/0	S	3	Fichtner
26002	Energy Systems Analysis (S. 292)	2/0	S	3	Möst

4.2 Economics

Module: Applied Strategic Decisions — Module key: [IW4VWL2]

Subject: Economics
Module coordination: Siegfried Berninghaus, Clemens Puppe
Credit points (CP): 9

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.

Prerequisites
The student should have basic knowledge of game theory.

Conditions
The course *Game Theory II* [25369] is obligatory. Exception: This lecture was completed in the Bachelor study programme.

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.

Courses in module *Applied Strategic Decisions* [IW4VWL2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25369	Game Theory II (S. 228)	2/2	W	4.5	Berninghaus
25525	Game Theory I (S. 237)	2/2	S	4.5	Berninghaus
25408	Auction Theory (S. 232)	2/1	W	4.5	Ehrhart, Seifert
26460	Market Engineering: Information in Institutions (S. 321)	2/1	S	4,5	Weinhardt, Kraemer
25373	Experimental Economics (S. 229)	2/1	S	4,5	Berninghaus, Bleich

Module: Allocation and Equilibrium — Module key: [IW4VWL7]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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.
To improve the overall grade of the module there might be taken optional term paper in the field of economics (ie, on the chairs Puppel, or at Berninghaus resp. at the IWW) within the module (according to Section 4(2), 3 of the examination regulation). The grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. The submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Allocation and Equilibrium* [IW4VWL7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25527	Advanced Microeconomic Theory (S. 238)	2/1	S	4.5	Puppe
25517	Welfare Economics (S. 236)	2/1	S	4.5	Puppe
25549	Theory of Business Cycles (S. 242)	2/1	W	4.5	Hillebrand

Module: Macroeconomic Theory — Module key: [IW4VWL8]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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.
To improve the overall grade of the module there might be taken optional term paper in the field of economics (ie, on the chairs Puppel, or at Berninghaus resp. at the IWW) within the module (according to Section 4(2), 3 of the examination regulation). The grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. The submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

Prerequisites
Grundlegende mikro- und makroökonomische Kenntnisse, wie sie beispielsweise in den Veranstaltungen *Volkswirtschaftslehre I (Mikroökonomie)* [25012] und *Volkswirtschaftslehre II (Makroökonomie)* [25014] vermittelt werden, werden vorausgesetzt.
Aufgrund der inhaltlichen Ausrichtung der Veranstaltung wird ein Interesse an quantitativ-mathematischer Modellierung vorausgesetzt.

Conditions
None.

Learning Outcomes

Content

Courses in module *Macroeconomic Theory* [IW4VWL8]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25543	Theory of Economic Growth (S. 241)	2/1	S	4.5	Hillebrand
25549	Theory of Business Cycles (S. 242)	2/1	W	4.5	Hillebrand

Module: Social Choice Theory — Module key: [IW4VWL9]

Subject: Economics
Module coordination: Clemens Puppe
Credit points (CP): 9

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.
To improve the overall grade of the module there might be taken optional term paper in the field of economics (ie, on the chairs Puppel, or at Berninghaus resp. at the IWW) within the module (according to Section 4(2), 3 of the examination regulation). The grade of the term paper can improve the overall grade of the module up to third but at least up to an improvement of one grading scale. The submission of the term paper is only admitted until the end of the following semester in which the last exam of the Economics-Module was absolved. It does not apply for term papers which are already taken in the Seminar Module. For more information, please visit the homepage of the Chair (http://vwl1.ets.kit.edu/).

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Social Choice Theory* [IW4VWL9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25517	Welfare Economics (S. 236)	2/1	S	4.5	Puppe
25525	Game Theory I (S. 237)	2/2	S	4.5	Berninghaus
25537	Decision Theory and Objectives in Applied Politics (S. 239)	2/1	W	4.5	Tangian
25539	Mathematical Theory of Democracy (S. 240)	2/1	S	4.5	Tangian

4.3 Operations Research

Module: Quantitative Marketing and OR — Module key: [IW4OR1]

Subject: Operations Research
Module coordination: Wolfgang Gaul
Credit points (CP): 9

Learning Control / Examinations
The assessment consists of a general written exam according to §4 Abs. 2, Nr. 1 of examination regulation. The written exam has a duration of 120 min. and contains topics from the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examination is offered every semester. Re-examinations are offered at every ordinary examination date and has to be absolved within one year.
The overall grade for the module is the average of the grades for each course weighted by the credits of the course.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Quantitative Marketing and OR* [IW4OR1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25154	Modern Market Research (S. 194)	2/1	S	4.5	Gaul
25156	Marketing and Operations Research (S. 195)	2/1	S	4.5	Gaul
25158	Corporate Planning and Operations Research (S. 196)	2/1	W	4.5	Gaul
25171	Data Analysis and Operations Research (S. 204)	2/1	W	4.5	Gaul

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

Subject: Operations Research
Module coordination: Stefan Nickel
Credit points (CP): 9

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.

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

Conditions
In agreement with the module coordinator, a course from the modules *Mathematical optimization* [WW4OR6] or *Stochastic Modelling and Optimization* [WW4OR7] or one of the courses *Game Theory I* [25525] and *Game Theory II* [25369] can be acknowledged.

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.

Courses in module [IW4OR4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25486	Facility Location and Strategic Supply Chain Management (S. 233)	2/1	S	4.5	Nickel
25488	Tactical and Operational Supply Chain Management (S. 234)	2/1	W	4.5	Nickel
n.n.	Operations Research in Supply Chain Management (S. 386)	2/1	S	4.5	Nickel
n.n.	Operations Research in Health Care Management (S. 385)	2/1	S	4.5	Nickel
090428	Enterprise Hospital (S. 345)	2/0	W/S	2	Nickel, Hansis
n.n.	Practical Course: Health Care Management (with Case Studies) (S. 389)	2/1	W/S	7	Nickel
n.n.	Software Laboratory: OR Models II (S. 387)	2/1	S	4.5	Nickel
n.n.	Software Laboratory: Simulation (S. 393)	2/1	S	4.5	Nickel
n.n.	Software Laboratory: SAP APO (S. 392)	2/1	S	4.5	Nickel

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

Module: Mathematical Programming — Module key: [IW4OR6]

Subject: Operations Research
Module coordination: Oliver Stein
Credit points (CP): 9

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.

Prerequisites
None.

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 one of the lectures *Game Theory I* [25525] and *Game Theory II* [25369] 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.

Courses in module *Mathematical Programming* [IW4OR6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25138	Mixed Integer Programming I (S. 192)	2/1	S	4.5	Stein
25140	Mixed Integer Programming II (S. 193)	2/1	W	4.5	Stein
25128	Special Topics in Optimization I (S. 188)	2/1	W/S	4.5	Stein
25126	Special Topics in Optimization II (S. 187)	2/1	W/S	4.5	Stein
n.n.	Location Theory (S. 390)	2/1	W	4.5	Nickel
n.n.	Graph Theory (S. 388)	2/1	W	4.5	Nickel
n.n.	Software Laboratory: OR Models II (S. 387)	2/1	S	4.5	Nickel
25111	Nonlinear Optimization I (S. 185)	2/1	S	4.5	Stein
25113	Nonlinear Optimization II (S. 186)	2/1	S	4.5	Stein
25134	Global Optimization I (S. 190)	2/1	W	4.5	Stein
25136	Global Optimization II (S. 191)	2/1	W	4.5	Stein

Remarks
The module is offered in winter 2009/10 for the first time.
The lectures are partly offered irregularly. The curriculum of the next two years is available online (www.ior.kit.edu).

Module: Special Topics in Optimization — Module key: [IW4OR7]

Subject: Operations Research
Module coordination: Karl-Heinz Waldmann
Credit points (CP): 9

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.

Prerequisites
None.

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

Courses in module *Special Topics in Optimization* [IW4OR7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25679	Markov Decision Models I (S. 98)	2/1/2	W	5	Waldmann
25682	Markov Decision Models II (S. 247)	2/1/2	S	4.5	Waldmann
25674	Quality Control I (S. 246)	2/1/2	W	4.5	Waldmann
25659	Quality Control II (S. 243)	2/1/2	S	4.5	Waldmann
25687	Optimization in a Random Environment (S. 248)	2/1/2	W/S	4.5	Waldmann
25662	Simulation I (S. 244)	2/1/2	W	4.5	Waldmann
25665	Simulation II (S. 245)	2/1/2	S	4.5	Waldmann
n.n.	OR-nahe Modellierung und Analyse realer Probleme (Projekt) (S. 391)	2/1	W/S	4.5	Waldmann

Remarks
The module is offered in winter 2009/10 for the first time.

4.4 Statistics

Module: Mathematical and Empirical Finance — Module key: [IW4STAT1]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The lecture *Stochastic Calculus and Finance* [25331] is mandatory.

Learning Outcomes

Content

Courses in module *Mathematical and Empirical Finance* [IW4STAT1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25331	Stochastic Calculus and Finance (S. 220)	2/1	W	4,5	Rachev
25359	Financial Time Series and Econometrics (S. 227)	2/1	W	5	Rachev
25381	Advanced Econometrics of Financial Markets (S. 231)	2/1	S	5	Rachev
25357	Portfolio and Asset Liability Management (S. 226)	2/1	S	5	Rachev
25350/1	Finance and Banking (S. 223)	2/2	W	5	Vollmer
25355	Bank Management and Financial Markets, Applied Econometrics (S. 225)	2/2	S	5	Vollmer

Module: Statistical Methods in Risk Management — Module key: [IW4STAT2]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The lecture *Statistical Methods in Financial Risk Management* [25353] is mandatory.

Learning Outcomes

Content

Courses in module *Statistical Methods in Risk Management* [IW4STAT2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25353	Statistical Methods in Financial Risk Management (S. 224)	2/1	W	4,5	Rachev
25337	Stochastic and Econometric Models in Credit Risk Management (S. 221)	2/2	S	5	Rachev
25357	Portfolio and Asset Liability Management (S. 226)	2/1	S	5	Rachev
25342	Operational Risk and Extreme Value Theory (S. 222)	2/2	W/S	5	Rachev
25375	Data Mining (S. 230)	2	W	5	Nakhaeizadeh
25317	Multivariate Methods (S. 219)	2/2	S	5	Heller

Module: Risk Management and Econometrics in Finance Module key: [IW4STAT3]

Subject: Statistics
Module coordination: Svetlozar Rachev
Credit points (CP): 9

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.

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

Conditions
None.

Learning Outcomes

Content

Courses in module *Risk Management and Econometrics in Finance* [IW4STAT3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25353	Statistical Methods in Financial Risk Management (S. 224)	2/1	W	4,5	Rachev
25359	Financial Time Series and Econometrics (S. 227)	2/1	W	5	Rachev
25381	Advanced Econometrics of Financial Markets (S. 231)	2/1	S	5	Rachev

4.5 Informatics

Module: Computersicherheit — Module key: [IW4INSICH]

Subject: Informatics
Module coordination: Jörn Müller-Quade
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Computersicherheit* [IW4INSICH]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
sich	Sicherheit (S. 397)	3/1	S	6	Müller-Quade
SemSich	Seminar aus Sicherheit (S. 373)	2	W/S	3	Müller-Quade, Zitterbart
SigCo	Signale und Codes (S. 380)	2	W	3	Müller-Quade
SymChif	Symmetrische Verschlüsselungsverfahren (S. 381)	2	S	3	Müller-Quade

Module: Fortgeschrittene Themen der Kryptographie Module key: [IW4INFKRYP]

Subject: Informatics
Module coordination: Jörn Müller-Quade
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Fortgeschrittene Themen der Kryptographie* [IW4INFKRYP]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24115	Public Key Kryptographie (S. 111)	3	W	6	Müller-Quade
PrakKryp	Praktikum aus der Kryptographie (S. 357)	4	W/S	3	Müller-Quade
24623	Ausgewählte Kapitel der Kryptographie (S. 157)	2	S	3	Müller-Quade
SemiKryp3	Seminar aus der Kryptographie (S. 379)	2	W/S	3	Müller-Quade
24157	Wie die Statistik allmählich Ursachen von Wirkung unterscheiden lernt (S. 132)	2	W	3	Janzing
SigCo	Signale und Codes (S. 380)	2	W	3	Müller-Quade
SymChif	Symmetrische Verschlüsselungsverfahren (S. 381)	2	S	3	Müller-Quade

Module: Public Key Kryptographie

Module key: [IW4INPKK]

Subject: Informatics
Module coordination: Jörn Müller-Quade
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Public Key Kryptographie* [IW4INPKK]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24115	Public Key Kryptographie (S. 111)	3	W	6	Müller-Quade
SemiKryp2	Seminar aus der Kryptographie (S. 378)	2	W/S	2	Müller-Quade

Module: Advanced Algorithms: Design and Analysis Module key: [IW4INAALGOA]

Subject: Informatics
Module coordination: Dorothea Wagner
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Advanced Algorithms: Design and Analysis* [IW4INAALGOA]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24171	Randomized Algorithms (S. 135)	2	W	3	Worsch
xParallAlgo	Parallel Algorithms (S. 399)	2	W/S	3	Sanders
xAlgoEng	Algorithm Engineering (S. 398)	2	W/S	3	Sanders, Wagner
24614	Algorithms for Planar Graphs (S. 152)	2/1	S	3/5	Wagner
24622	Algorithms in Cellular Automata (S. 156)	2/1	S	3	Worsch
24079s	Seminar in Algorithm Design (S. 103)	2	W/S	3	Wagner
24621	Algorithms for Visualization of Graphs (S. 155)	2/1	S	3/5	Wagner, Nöllenburg
25706	Nature-inspired Optimisation (S. 253)	2/1	W	5	Mostaghim, Shukla
24079p	Practical Course in Algorithm Design (S. 102)	4	W/S	5	Sanders, Wagner, Krug
AlgoRout	Algorithms for Routing (S. 346)	2/1	S	3/5	Wagner
24654	Algorithms for Ad-hoc and sensor networks (S. 167)	2	S	3	Katz

Module: Advanced Algorithms: Engineering and Applications [IW4INAALGOB] Module key:

Subject: Informatics
Module coordination: Dorothea Wagner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Advanced Algorithms: Engineering and Applications* [IW4INAALGOB]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079p	Practical Course in Algorithm Design (S. 102)	4	W/S	5	Sanders, Wagner, Krug
xAlgoEng	Algorithm Engineering (S. 398)	2	W/S	3	Sanders, Wagner
25704	Organic Computing (S. 251)	2/1	S	5	Schmeck, Mostaghim
25706	Nature-inspired Optimisation (S. 253)	2/1	W	5	Mostaghim, Shukla
AlgoRout	Algorithms for Routing (S. 346)	2/1	S	3/5	Wagner
xParallAlgo	Parallel Algorithms (S. 399)	2	W/S	3	Sanders
24621	Algorithms for Visualization of Graphs (S. 155)	2/1	S	3/5	Wagner, Nöllenburg
24079s	Seminar in Algorithm Design (S. 103)	2	W/S	3	Wagner
24614	Algorithms for Planar Graphs (S. 152)	2/1	S	3/5	Wagner
24622	Algorithms in Cellular Automata (S. 156)	2/1	S	3	Worsch
24171	Randomized Algorithms (S. 135)	2	W	3	Worsch
24654	Algorithms for Ad-hoc and sensor networks (S. 167)	2	S	3	Katz

Module: Einführung in die Algorithmentechnik — Module key: [IW4INEALGT]

Subject: Informatics
Module coordination: Dorothea Wagner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Einführung in die Algorithmentechnik* [IW4INEALGT]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079	Algorithm Design (S. 101)	3/1	W	6	Wagner, Sanders
24079s	Seminar in Algorithm Design (S. 103)	2	W/S	3	Wagner

Module: Web-Anwendungen und Web-Technologien — Module key: [IW4INWAWT]

Subject: Informatics
Module coordination: Sebastian Abeck
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Web-Anwendungen und Web-Technologien* [IW4INWAWT]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24153/24604	Advanced Web Applications (S. 131)	2/0	W/S	4	Abeck
24304/24873	Practical Course Web Technologies (S. 141)	2/0	W/S	5	Abeck, Gebhart, Hoyer, Link, Pansa

Module: Sprachtechnologie und Compiler — Module key: [IW4INCOMP1]

Subject: Informatics
Module coordination: Gregor Snelting
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Sprachtechnologie und Compiler* [IW4INCOMP1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24134	Sprachtechnologie und Compiler (S. 121)	4/2	W	8	Snelting

Module: Software Systems

Module key: [IW4INSWS]

Subject: Informatics
Module coordination: Ralf Reussner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Software Systems* [IW4INSWS]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
SWSSem	Seminar Software-Systeme (S. 359)	2	W/S	3	Reussner
SWTSem	Seminar in Software Engineering (S. 362)	2	W/S	3	Tichy, Reussner, Snelting
KbSWA	Komponentenbasierte Software-Architektur (S. 350)	2	S	3	Reussner, Kuperberg, Krogmann
24660	Software Development for modern, parallel platforms (S. 168)	2	S	3	Tichy, Pankratius, Otto
MKP	Multikernpraktikum (S. 351)	2		3	Tichy
24112	Multicore Computers and Computer Clusters (S. 109)	2	W	3	Tichy, Pankratius, Victor
24125/24673	Reading Group (S. 118)	1	W/S	1	Reussner, Krogmann, Kuperberg
24626	Component Based Software Engineering (S. 159)	2	S	3	Reussner, Kuperberg, Krogmann
24641	Specification and Verification of Software (S. 163)	3	S	5	Beckert

Module: Software-Methodik

Module key: [IW4INSWM]

Subject: Informatics
Module coordination: Ralf Reussner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Software-Methodik* [IW4INSWM]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
KbSWA	Komponentenbasierte Software-Architektur (S. 350)	2	S	3	Reussner, Kuperberg, Krogmann
24608	Empirical Software Engineering (S. 150)	2	S	3	Tichy
24634	Moderne Entwicklungsumgebung am Beispiel von .NET (S. 161)	2	S	3	Tichy, Gelhausen, Ladani
SWSich	Software-Sicherheit (S. 360)	2/1	W/S	3	Snelting
24636	Performance Engineering of Enterprise Software Systems (S. 162)	2	S	3	Reussner, Kounev
24625	Model Driven Software Development (S. 158)	2	S	3	Reussner, Becker
24125/24673	Reading Group (S. 118)	1	W/S	1	Reussner, Krogmann, Kuperberg
24626	Component Based Software Engineering (S. 159)	2	S	3	Reussner, Kuperberg, Krogmann
SWT2	Software Engineering II (S. 361)	3/1	W	6	Reussner, Tichy

Module: Praxis des Web Engineering

Module key: [IW4INPWE]

Subject: Informatics
Module coordination: Wilfried Juling
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Praxis des Web Engineering* [IW4INPWE]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering (S. 117)	2/0	W	4	Nußbaumer
24880/24291	Praktikum Web Engineering (S. 179)	2/0	W/S	5	Juling, Nußbaumer, Majer, Freudenstein

Module: Wireless Networking

Module key: [IW4INWN]

Subject: Informatics
Module coordination: Martina Zitterbart
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Wireless Networking* [IW4INWN]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24148	Verkehrstelematik (Traffic Telematics) (S. 129)	2/0	W	4	Härri, Hartenstein
24104	Wireless Sensor-Actuator-Networks (S. 105)	2/0	W	4	Zitterbart
24669	Simulation of Computer Networks (S. 172)	2/0	S	4	Hartenstein
24643	Mobile Communication (S. 164)	2/0	S	4	Waldhorst
24146	Ubiquitous Computing (S. 127)	2/0	W	4	Juling
24601	Network Security: Architectures and Protocols (S. 148)	2/0	S	4	Schöller
24128	Telematics (S. 119)	2	W	4	Zitterbart

Module: Networking Labs

Module key: [IW4INNL]

Subject: Informatics
Module coordination: Martina Zitterbart
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Networking Labs* [IW4INNL]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24674	Next Generation Internet (S. 175)	2/0	S	4	Bless
24104	Wireless Sensor-Actuator-Networks (S. 105)	2/0	W	4	Zitterbart
PrakATM	Praktikum Advanced Telematics (S. 356)	2	W/S	5	Zitterbart
24669	Simulation of Computer Networks (S. 172)	2/0	S	4	Hartenstein
24878	Praktikum Simulation von Rechnernetzen (S. 178)	0/2	S	5	Hartenstein
24149	Network and IT-Security Management (S. 130)	2/1	W	5	Hartenstein
24601	Network Security: Architectures and Protocols (S. 148)	2/0	S	4	Schöller

Module: Future Networking — Module key: [IW4INFN]

Subject: Informatics
Module coordination: Martina Zitterbart
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Future Networking* [IW4INFN]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24674	Next Generation Internet (S. 175)	2/0	S	4	Bless
24132	Multimedia Communication (S. 120)	2/0	W	4	Bless
24643	Mobile Communication (S. 164)	2/0	S	4	Waldhorst
24104	Wireless Sensor-Actuator-Networks (S. 105)	2/0	W	4	Zitterbart
24128	Telematics (S. 119)	2	W	4	Zitterbart
24148	Verkehrstelematik (Traffic Telematics) (S. 129)	2/0	W	4	Härri, Hartenstein

Module: Networking

Module key: [IW4INNW]

Subject: Informatics
Module coordination: Martina Zitterbart
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Networking* [IW4INNW]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24128	Telematics (S. 119)	2	W	4	Zitterbart
24110	High Performance Communication (S. 107)	2/0	W	4	Zitterbart
24674	Next Generation Internet (S. 175)	2/0	S	4	Bless
24669	Simulation of Computer Networks (S. 172)	2/0	S	4	Hartenstein
24132	Multimedia Communication (S. 120)	2/0	W	4	Bless
24601	Network Security: Architectures and Protocols (S. 148)	2/0	S	4	Schöller

Module: Netzsicherheit - Theorie und Praxis — Module key: [IW4INNTP]

Subject: Informatics
Module coordination: Martina Zitterbart
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Netzsicherheit - Theorie und Praxis* [IW4INNTP]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24601	Network Security: Architectures and Protocols (S. 148)	2/0	S	4	Schöller
24149	Network and IT-Security Management (S. 130)	2/1	W	5	Hartenstein
24115	Public Key Kryptographie (S. 111)	3	W	6	Müller-Quade
SymChif	Symmetrische Verschlüsselungsverfahren (S. 381)	2	S	3	Müller-Quade
SemiKryp2	Seminar aus der Kryptographie (S. 378)	2	W/S	2	Müller-Quade

Module: Communication and Database Systems — Module key: [IW4INKD]

Subject: Informatics
Module coordination: Klemens Böhm, Martina Zitterbart
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Communication and Database Systems* [IW4INKD]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24574	Communication and Database Systems (S. 146)	4/2	S	4/8	Böhm, Zitterbart

Module: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI]

Module key:

Subject: Informatics
Module coordination: Klemens Böhm
Credit points (CP): 8

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Innovative Konzepte des Daten- und Informationsmanagements* [IW4INIKDI]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24118	Data Warehousing and Mining (S. 112)	2/1	W	5	Böhm
db_impl	Database Implementation and Tuning (S. 382)	2/1	S	5	Böhm
dbe	Deployment of Database Systems (S. 383)	2/1	W	5	Böhm
24114	Distributed Data Management (S. 110)	2/1	W	5	Böhm
semis	Seminar Information Systems (S. 396)	2	W/S	4	Böhm
MOD	Moving Objects Databases (S. 352)	2	W	3	Böhm
24111	Workflowmanagement-Systems (S. 108)	2	W	3	Mülle
24141	Information Integration and Web Portals (S. 125)	2	W	3	Mülle
24605	Datenschutz und Privatheit in vernetzten Informationssystemen (S. 149)	2	S	3	Buchmann
PLV	Praxis des Lösungsvertriebs (S. 353)	2	S	1	Böhm, Hellriegel
PUB	Praxis der Unternehmensberatung (S. 355)	2	W/S	1	Böhm, Dürr
PMP	Projektmanagement aus der Praxis (S. 354)	2	S	1	Böhm, Schnober

Module: Data Warehousing und Mining in Theorie und Praxis Module key: [IW4INDWMTP]

Subject: Informatics
Module coordination: Klemens Böhm
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Data Warehousing und Mining in Theorie und Praxis* [IW4INDWMTP]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24874	Practical Course Data Warehousing and Mining (S. 177)	2	S	4	Böhm
24118	Data Warehousing and Mining (S. 112)	2/1	W	5	Böhm
dbe	Deployment of Database Systems (S. 383)	2/1	W	5	Böhm
db_impl	Database Implementation and Tuning (S. 382)	2/1	S	5	Böhm
24114	Distributed Data Management (S. 110)	2/1	W	5	Böhm

Module: Datenbanktechnologie in Theorie und Praxis — Module key: [IW4INDBTP]

Subject: Informatics
Module coordination: Klemens Böhm
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Datenbanktechnologie in Theorie und Praxis* [IW4INDBTP]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
dbprakt	Practical Course Database Systems (S. 384)	2	W	4	Böhm
praktvd	Practical Course Distributed Data Management (former Practical Course Database Systems) (S. 394)	2	W	4	Böhm
24114	Distributed Data Management (S. 110)	2/1	W	5	Böhm
24118	Data Warehousing and Mining (S. 112)	2/1	W	5	Böhm
dbe	Deployment of Database Systems (S. 383)	2/1	W	5	Böhm
db_impl	Database Implementation and Tuning (S. 382)	2/1	S	5	Böhm

Module: Dynamische IT-Infrastrukturen

Module key: [IW4INDITI]

Subject: Informatics
Module coordination: Hannes Hartenstein
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Dynamische IT-Infrastrukturen* [IW4INDITI]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering (S. 117)	2/0	W	4	Nußbaumer
24669	Simulation of Computer Networks (S. 172)	2/0	S	4	Hartenstein
24146	Ubiquitous Computing (S. 127)	2/0	W	4	Juling
24878	Praktikum Simulation von Rechnernetzen (S. 178)	0/2	S	5	Hartenstein
24074	Vernetzte IT-Infrastrukturen (S. 100)	2/1	W	5	Juling
24149	Network and IT-Security Management (S. 130)	2/1	W	5	Hartenstein

Module: Biosignalverarbeitung

Module key: [IW4INBSV]

Subject: Informatics
Module coordination: Tanja Schultz
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Biosignalverarbeitung* [IW4INBSV]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24105	Biosignale und Benutzerschnittstellen (S. 106)	4/0	W	6	Schultz, Wand
24600	Multilinguale Mensch-Maschine-Kommunikation (S. 147)	4/0	S	6	Schultz, Putze, Schlippe
24119	Analyse und Modellierung menschlicher Bewegungsabläufe (S. 113)	2/0	W	3	Wörner, Schultz
24905	Praktikum Biosignale (S. 181)	2	S	3	Schultz, Gehrig, Wand

Module: Sprachverarbeitung

Module key: [IW4INSV]

Subject: Informatics
Module coordination: Tanja Schultz
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Sprachverarbeitung* [IW4INSV]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24145	Grundlagen der Automatischen Spracherkennung (S. 126)	4	W	6	Waibel, Stüker
24600	Multilinguale Mensch-Maschine-Kommunikation (S. 147)	4/0	S	6	Schultz, Putze, Schlippe
24620	Maschinelle Übersetzung (S. 154)	2	S	3	Waibel
24381	Seminar Kognitive Interaktionssysteme (S. 144)	2	W	3	Schultz, Putze
24370	Seminar Speaker Recognition and Biometrics (S. 142)	2	W	3	Schultz, Qian Yang
24298	Praktikum Automatische Spracherkennung (S. 140)	2	W	3	Waibel, Stüker
24280	Praktikum Multilingual Speech Processing (S. 138)	2	W	3	Schultz, Schlippe, Westphal

Module: Bewegungsbasierte Mensch-Maschine Interaktion Module key: [IW4INBMMI]

Subject: Informatics
Module coordination: Annika Wörner
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Bewegungsbasierte Mensch-Maschine Interaktion* [IW4INBMMI]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24119	Analyse und Modellierung menschlicher Bewegungsabläufe (S. 113)	2/0	W	3	Wörner, Schultz
24373	Seminar Vom Mensch zum Roboter (S. 143)	2	W/S	3	Wörner, Feldmann, Köhler
24288/24893	Praktikum Anthropomatik: Bewegungsbasierte Applikationssteuerung (S. 139)	4	W/S	3	Wörner, Köhler, Schulz
24905	Praktikum Biosignale (S. 181)	2	S	3	Schultz, Gehrig, Wand

Module: Kurven und Flächen

Module key: [IW4INKUF]

Subject: Informatics
Module coordination: Hartmut Prautzsch
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Kurven und Flächen* [IW4INKUF]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24670	Kurven und Flächen im CAD I (S. 173)	2	S	3	Prautzsch, Umlauf
KFCAD2	Kurven und Flächen im CAD II (S. 348)	2	W	3	Prautzsch
KFCAD3	Kurven und Flächen im CAD III (S. 349)	2		3	Prautzsch
RaSp	Rationale Splines (S. 358)	2	W	3	Prautzsch
24122	Unterteilungsalgorithmen (S. 115)	2	W	3	Prautzsch
24175	Netze und Punktwolken (S. 137)	2	W	3	Prautzsch
24122	Angewandte Differentialgeometrie (S. 116)	2	W	3	Prautzsch

Module: Algorithmen der Computergraphik — Module key: [IW4INACG]

Subject: Informatics
Module coordination: Hartmut Prautzsch
Credit points (CP): 9

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Algorithmen der Computergraphik* [IW4INACG]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24138	Einführung in die Computergraphik (S. 123)	2	W	3	Bender
24618	Graphisch-geometrische Algorithmen (S. 153)	2/1/0	S	5	Schmitt, Umlauf
24670	Kurven und Flächen im CAD I (S. 173)	2	S	3	Prautzsch, Umlauf
KFCAD2	Kurven und Flächen im CAD II (S. 348)	2	W	3	Prautzsch
24175	Netze und Punktwolken (S. 137)	2	W	3	Prautzsch
GVsem	Seminar Geometrieverarbeitung (S. 347)	2	W/S	3	Prautzsch
24884	Praktikum Geometrisches Modellieren (S. 180)	2	S	3	Prautzsch, Diziol
24173	Medizinische Simulationssysteme I (S. 136)	2	W	3	Dillmann, Röhl, Speidel
24676	Medizinische Simulationssysteme II (S. 176)	2	S	3	Dillmann, Unterhinninghofen, Suwelack

Module: Service Technology

Module key: [IW4INAIFB1]

Subject: Informatics
Module coordination: Stefan Tai
Credit points (CP): 9

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 rounded to the first decimal.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Service Technology* [IW4INAIFB1]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25770	Service Oriented Computing 1 (S. 265)	2/1	W	5	Tai
25772	Service Oriented Computing 2 (S. 266)	2/1	S	5	Tai, Studer
25820	Lab Class Web Services (S. 272)	2	W	4	Tai, Studer, Satzger, Zirpins

Module: Cloud Computing — Module key: [IW4INAIFB2]

Subject: Informatics
Module coordination: Stefan Tai
Credit points (CP): 8

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 rounded to the first decimal.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Cloud Computing* [IW4INAIFB2]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25776	Cloud Computing (S. 268)	2/1	W	5	Tai, Kunze
SemAIFB5	Seminar eOrganization (S. 367)	2/0	W/S	3	Tai
25820	Lab Class Web Services (S. 272)	2	W	4	Tai, Studer, Satzger, Zirpins

Module: Web Service Engineering

Module key: [IW4INAIFB3]

Subject: Informatics
Module coordination: Stefan Tai
Credit points (CP): 8

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 rounded to the first decimal.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Web Service Engineering* [IW4INAIFB3]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25774	Web Service Engineering (S. 267)	2/1	S	5	Zirpins
SemAIFB5	Seminar eOrganization (S. 367)	2/0	W/S	3	Tai
25820	Lab Class Web Services (S. 272)	2	W	4	Tai, Studer, Satzger, Zirpins

Module: Web Data Management — Module key: [IW4INAIFB4]

Subject: Informatics
Module coordination: Rudi Studer
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The lecture *Semantic Web Technologies II* [25750] 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.

Courses in module *Web Data Management* [IW4INAIFB4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25748	Semantic Web Technologies I (S. 258)	2/1	W	5	Studer, Rudolph
25750	Semantic Web Technologies II (S. 259)	2/1	S	5	Studer, Agarwal
25776	Cloud Computing (S. 268)	2/1	W	5	Tai, Kunze
25070p	Advanced Lab Applied Informatics (S. 183)	2	W/S	4	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

Module: Intelligent Systems and Services — Module key: [IW4INAIFB5]

Subject: Informatics
Module coordination: Rudi Studer
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students

- know the different network 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 network learning procedures within the finance sector.

Courses in module *Intelligent Systems and Services* [IW4INAIFB5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25742	Knowledge Discovery (S. 257)	2/1	W	5	Studer
25762	Intelligent Systems in Finance (S. 262)	2/1	S	5	Seese
25772	Service Oriented Computing 2 (S. 266)	2/1	S	5	Tai, Studer
25860sem	Special Topics of Knowledge Management (S. 273)	2/1	W/S	5	Studer
25702	Algorithms for Internet Applications (S. 250)	2/1	W	5	Schmeck
25724	Database Systems and XML (S. 255)	2/1	W	5	Oberweis
25070p	Advanced Lab Applied Informatics (S. 183)	2	W/S	4	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

Module: Semantic Technologies — Module key: [IW4INAIFB6]

Subject: Informatics
Module coordination: Rudi Studer
Credit points (CP): 8

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Semantic Technologies* [IW4INAIFB6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25750	Semantic Web Technologies II (S. 259)	2/1	S	5	Studer, Agarwal
25070s	Seminar in Applied Informatics (S. 184)	2	W/S	3	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

Module: Ubiquitous Computing

Module key: [IW4INAIFB7]

Subject: Informatics
Module coordination: Hartmut Schmeck
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Ubiquitous Computing* [IW4INAIFB7]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24146	Ubiquitous Computing (S. 127)	2/0	W	4	Juling
25702	Algorithms for Internet Applications (S. 250)	2/1	W	5	Schmeck
25704	Organic Computing (S. 251)	2/1	S	5	Schmeck, Mostaghim
24149	Network and IT-Security Management (S. 130)	2/1	W	5	Hartenstein
24146p	Advanced Lab in Ubiquitous Computing (S. 128)	2/0	W/S	4	Schmeck

Module: Organic Computing — Module key: [IW4INAIFB8]

Subject: Informatics
Module coordination: Hartmut Schmeck
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Organic Computing* [IW4INAIFB8]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25704	Organic Computing (S. 251)	2/1	S	5	Schmeck, Mostaghim
25706	Nature-inspired Optimisation (S. 253)	2/1	W	5	Mostaghim, Shukla
25700sp	Special Topics of Efficient Algorithms (S. 249)	2/1	W/S	5	Schmeck
25760	Complexity Management (S. 260)	2/1	S	5	Seese
25070p	Advanced Lab Applied Informatics (S. 183)	2	W/S	4	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

Module: eCollaboration — Module key: [IW4INAIFB9]

Subject: Informatics
Module coordination: Andreas Oberweis
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The course *Datenbanksysteme und XML* [25724] has to be attended

Learning Outcomes
The students

- can use languages and methods for planning and design of eCollaboration,
- know the basics of XML, as well as appropriate data models and are capable of generating XML documents,
- are able to understand the difficulties to manage complex systems and processes,
- know the outer frame of IT in an enterprise and know which functions IT has within an enterprise,
- are able to evaluate, select and to use appropriate tools taking into account the current situation.

Content
ECollaboration covers all forms of cooperation and coordination in electronic networks, and is practiced in many forms. The ubiquitous availability of new information and communication technologies in increasingly becoming smaller and more powerful devices enables new forms of eCollaboration. These will not only change the business world and public administration, but will also change fundamentally the private lives of people. This module teaches methodological foundations of applied computer science for eCollaboration applications covering languages for modelling of structured and unstructured processes of eCollaboration and methods for the design and analysis of eCollaboration scenarios. In addition, this module imparts knowledge of software systems to support eCollaboration (e.g., groupware systems, workflow management systems, document management systems).

Courses in module *eCollaboration* [IW4INAIFB9]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25724	Database Systems and XML (S. 255)	2/1	W	5	Oberweis
25735	Document Management and Groupware Systems (S. 256)	2	S	4	Klink
25788	Strategic Management of Information Technology (S. 270)	2/1	S	5	Wolf
25760	Complexity Management (S. 260)	2/1	S	5	Seese
25784	Management of IT-Projects (S. 269)	2/1	S	5	Schätzle
25070p	Advanced Lab Applied Informatics (S. 183)	2	W/S	4	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

Module: Development of Distributet Business Information Systems [IW4INAIFB10]

Module key:

Subject: Informatics
Module coordination: Andreas Oberweis
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
The course *Verteilte Datenbanksysteme: Basistechnologie für eBusiness* [25722] has to be attended

Learning Outcomes
Die Studierenden

- 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.

Courses in module *Development of Distributet Business Information Systems* [IW4INAIFB10]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25722	Distributed Database Systems: Basic Technology for e-Business (S. 254)	2/1	S	5	Oberweis
25791	n.n. (S. 271)	2/0	W	4	Kneuper
25764	IT Complexity in Practice (S. 264)	2/1	W	5	Kreidler
25774	Web Service Engineering (S. 267)	2/1	S	5	Zirpins
25070p	Advanced Lab Applied Informatics (S. 183)	2	W/S	4	Oberweis, Schmeck, Seese, Stucky, Studer, Tai

4.6 Law

Module: Intellectual Property Law — Module key: [IW4JURA4]

Subject: Law
Module coordination: Thomas Dreier
Credit points (CP): 9

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.

Prerequisites
Keine.

Conditions
None.

Learning Outcomes

Content

Courses in module *Intellectual Property Law* [IW4JURA4]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24501	Internet Law (S. 145)	2/0	S	3	Dreier
24121	Copyright (S. 114)	2/0	W	3	Dreier
24661	Patent Law (S. 169)	2/0	S	3	Geissler
24136/24609	Trademark and Unfair Competition Law (S. 122)	2/0	W/S	3	Matz, Sester
24612	Computer Contract Law (S. 151)	2/0	S	3	Bartsch

Module: Private Business Law — Module key: [IW4JURA5]

Subject: Law
Module coordination: Peter Sester
Credit points (CP): 9

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.

Prerequisites
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.

Conditions
None.

Learning Outcomes

Content

Courses in module *Private Business Law* [IW4JURA5]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24650	Civil Law for Advanced (S. 166)	2/0	S	3	Sester
24671	Law of Contracts (S. 174)	2/0	S	3	Sester
24167	Employment Law I (S. 133)	2	W	3	Hoff
24668	Employment Law II (S. 171)	2	S	3	Hoff
24168	Tax Law I (S. 134)	2/0	W	3	Dietrich
24646	Tax Law II (S. 165)	2/0	S	3	Dietrich

Module: Public Business Law — Module key: [IW4JURA6]

Subject: Law
Module coordination: Indra Spiecker genannt Döhmann
Credit points (CP): 9

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Courses in module *Public Business Law* [IW4JURA6]

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24632	Telecommunications Law (S. 160)	2/0	S	3	Spiecker genannt Döhmann
24082	Public Media Law (S. 104)	2	W	3	Kirchberg
24666	European and International Law (S. 170)	2/0	S	3	Spiecker genannt Döhmann
24140	Environmental Law (S. 124)	2	W	4	Spiecker genannt Döhmann
24018	Data Protection Law (S. 99)	2/0	W	3	Spiecker genannt Döhmann

5 Courses

5.1 Mandatory

Course: Business Administration in Information Engineering and Management Course key: [26500]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Information Engineering and Management [IW4WWIW] (S. 14)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	104
1.3	98
1.7	92
2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

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

Conditions
None.

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.

Basic 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: Principles of Information Engineering and Management Course key: [26450]

Lecturers: Christof Weinhardt, Jan Kraemer, Clemens van Dinther
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Information Engineering and Management [IW4WWIW] (S. 14)

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.

Prerequisites
None.

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 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

Basic literature
1. Shapiro, C., Varian, H., Information Rules: A Strategic Guide to the Network Economy. Harvard Business School Press 1999.
2. Stahlknecht, P., Hasenkamp, U., Einführung in die Wirtschaftsinformatik. Springer Verlag 7. Auflage, 1999.
3. Wirth, H., Electronic Business. Gabler Verlag 2001.

Course: Markov Decision Models I — Course key: [25679]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Stochastic Models in Information Engineering and Management [IW4WWOR] (S. 15), Special Topics in Optimization [IW4OR7] (S. 52)

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).

Prerequisites
None.

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

Basic literature
Lecture Notes

Complementary literature
Waldmann, K.H. , Stocker, U.M. (2004): Stochastische Modelle - eine anwendungsorientierte Einführung; Springer

5.2 Elective

Course: Data Protection Law — Course key: [24018]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [IW4JURA6] (S. 94)

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

Prerequisites
Keine.

Conditions
None.

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
abstracts, sketches on blackboard, slides

Basic literature
Will be announced in the course.

Complementary 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: Vernetzte IT-Infrastrukturen Course key: [24074]

Lecturers: Wilfried Juling
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
Dependencies according to the module.

Learning Outcomes
Goal of this lecture is to introduce the basic descriptions and methodologies of computer networks.

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

Basic 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.

Complementary 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.

Course: Algorithm Design — Course key: [24079]

Lecturers: Dorothea Wagner, Peter Sanders
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Einführung in die Algorithmentechnik [IW4INEALGT] (S. 61)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The students

- get a deep insight into the most important subareas of algorithmics,
- get a broad algorithmic understanding,
- get the ability to understand and determine the running times of algorithms,
- get the knowledge of fundamental algorithms and data structures, as well as the ability to apply them to new problems.

Content
The Lecture “Algorithm Design” (german name is “Algorithmentechnik”) deepens the most important subareas of algorithmics. This, for example, includes graph algorithms, advanced data structures, design principles for algorithms, algorithmic geometry, and combinatorial optimization. Moreover, different methodic approaches are deepened. For Example, randomized algorithms, approximation algorithms, parallel algorithms, online algorithms, and algorithm engineering.

Basic literature
None

Complementary literature

- K. Mehlhorn, P. Sanders. Algorithms and Data Structures – The Basic Toolbox. Springer, 2008, to appear.
- T. H. Cormen, C. E. Leiserson, R. L. Rivest u.a. Introduction to Algorithms / Algorithmen – eine Einführung. MIT Press, 1990-2001 / Oldenburg 2004.
- Thomas Ottmann und Peter Widmayer. Algorithmen und Datenstrukturen. Spektrum, Akad. Verl., 1990-2002.
- Uwe Schöning. Algorithmik. Spektrum Akademischer Verlag, 2001.
- Reinhard Diestel. Graph Theory. Springer-Verlag, 2005.
- D. Jungnickel. Graphen, Netzwerke und Algorithmen. BI-Wissenschaftsverlag, 1994.
- J. D. Horton A polynomial-time algorithm to find the shortest cycle basis of a graph. SIAM Journal on Computing Vol. 16, Issue 12, 1987.
- Leon Peeters. Cyclic Railway Timetable Optimization. Dissertation, 2003.
- R. G. Downey, M. R. Fellows, Parameterized Complexity. Springer, 1999.

Course: Practical Course in Algorithm Design — Course key: [24079p]

Lecturers: Peter Sanders, Dorothea Wagner, Marcus Krug
Credit points (CP): 5 **Hours per week:** 4
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
Lecture *Algorithmentechnik*

Conditions
None.

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: Seminar in Algorithm Design — Course key: [24079s]

Lecturers: Dorothea Wagner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60), Einführung in die Algorithmentechnik [IW4INEALGT] (S. 61)

Learning Control / Examinations

Prerequisites
None.

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.

Course: Public Media Law — Course key: [24082]

Lecturers: Christian Kirchberg
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [IW4JURA6] (S. 94)

Learning Control / Examinations

Prerequisites
None.

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).

Basic 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: Wireless Sensor-Actuator-Networks — Course key: [24104]

Lecturers: Martina Zitterbart
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Networking Labs [IW4INNL] (S. 68), Future Networking [IW4INFN] (S. 69)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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.

Basic literature
H. Karl, and A. Willig, *Protocols and Architectures for Wireless Sensor Networks*, Wiley and Sons, 2005, ISBN 0470095105.

Course: Biosignale und Benutzerschnittstellen Course key: [24105]

Lecturers: Tanja Schultz, Wand
Credit points (CP): 6 **Hours per week:** 4/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Biosignalverarbeitung [IW4INBSV] (S. 77)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: High Performance Communication — Course key: [24110]

Lecturers: Martina Zitterbart
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Networking [IW4INNW] (S. 70)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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.

Basic literature
H. Perros. Connection-oriented Networks. John Wiley & Sons, 2005, ISBN 0-470-02163-2.

Complementary 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: Workflowmanagement-Systems Course key: [24111]

Lecturers: Jutta Mülle
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

Prerequisites
Knowledge about database systems, e.g. from the lecture *Communications and Database Systems* [24574].

Conditions
None.

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.

Media
Slides.

Basic literature

- W.M.P. van der Aalst. The Application of Petri Nets to Workflow Management. The Journal of Circuits, Systems and Computers, Seiten 1-45, Band 7:1, 1998.
- S. Jablonski, M. Böhm, W. Schulze (Hrsg.): Workflow-Management - Entwicklung von Anwendungen und Systemen. dpunkt-Verlag, Heidelberg, 1997
- 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
- Michael Havey: Essential Business Process Modeling. O´Reilly Media, Inc., 2005

Complementary literature

- M. Dumas, Wil M. P. van der Aalst, Arthur H. M. ter Hofstede (eds.): Process-Aware Information Systems. Wiley, 2005
- D. Harel: Statecharts: A Visual Formalism for Complex Systems, Science of Computer Programming Vol. 8, 1987.
- Dirk Wodtke, Gerhard Weikum A Formal Foundation for Distributed Workflow Execution Based on State Charts. Foto N. Afrati, Phokion Kolaitis (Eds.): Database Theory - ICDT ´97, 6th International Conference, Delphi, Greece, January 8-10, 1997, Proceedings. Lecture Notes in Computer Science 1186, Springer Verlag, Seiten 230-246, 1997.
- H.M.W. Verbeek, T. Basten, and W.M.P. van der Aalst Diagnosing workflow processes using Woflan. Computing Science Report 99/02, Eindhoven University of Technology, Eindhoven, 1999.

Course: Multicore Computers and Computer Clusters — Course key: [24112]

Lecturers: Walter F. Tichy, Pankratius, Victor
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students are able to:

- explain the fundamental concepts of parallel computing;
- describe and apply parallel programing models;
- explain the basic definitions and properties of system architectures of multicore computers and computer clusters, including networks and system software;
- describe parallel algorithms and derive their complexity.

Content

- This course conveys the theory and practical aspects of multicore computers and computer clusters.
- System achitectures as well as programing concepts are covered.
- Network technology, selected high speed networks (e.g. Gigabit, Ethernet, Myrinet, Infiniband) and comunication libraries are surveyed.
- Ressource management, scheduling, distributed/parallel file systems, programing models (e.g. MPI, transactional memory, Javaparty), and parallel algorithms are introduced.

Media
Lecture presentations

Complementary literature
Additional literature will be announced in class.

Course: Distributed Data Management — Course key: [24114]

Lecturers: Klemens Böhm
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73), Data Warehousing und Mining in Theorie und Praxis [IW4INDWMTP] (S. 74), Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

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

Conditions
None.

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.

Basic 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.

Course: Public Key Kryptographie — Course key: [24115]

Lecturers: Jörn Müller-Quade
Credit points (CP): 6 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57), Public Key Kryptographie [IW4INPKK] (S. 58), Netzsicherheit - Theorie und Praxis [IW4INNTP] (S. 71)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
- Skript zur Vorlesung, http://iaks-www.ira.uka.de/ (Zugangsdaten werden in der Vorlesung bekanntgegeben)

Complementary 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: Data Warehousing and Mining — Course key: [24118]

Lecturers: Klemens Böhm
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73), Data Warehousing und Mining in Theorie und Praxis [IW4INDWMTP] (S. 74), Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

Prerequisites
Knowledge about database systems, e.g. from the lecture *Communications and Database Systems* [24574].

Conditions
None.

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.

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

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

Course: Analyse und Modellierung menschlicher Bewegungsabläufe Course key: [24119]

Lecturers: Annika Wörner, Tanja Schultz
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Biosignalverarbeitung [IW4INBSV] (S. 77), Bewegungsbasierte Mensch-Maschine Interaktion [IW4INBMMI] (S. 79)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: Copyright

Course key: [24121]

Lecturers: Thomas Dreier
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [IW4JURA4] (S. 92)

Learning Control / Examinations
Written exam 100% (§4, Abs. 2, 1 of the SPO).

Prerequisites
None.

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
transparancies

Basic literature
Schulze, Gernot Meine Rechte als Urheber Verlag C.H.Beck, current edition

Complementary 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: Unterteilungsalgorithmen — Course key: [24122]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Angewandte Differentialgeometrie

Course key: [24122]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Web Engineering — Course key: [24124]

Lecturers: Martin Nußbaumer
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Praxis des Web Engineering [IW4INPWE] (S. 66), Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The goal of this course is to introduce the foundations, the methods and the techniques of web engineering. After this course, students have gained knowledge and insights of existing methods, technologies and system approaches and are enabled to design and evaluate such webbased systems.

Content
This course is designed as an introduction to the discipline of Web Engineering. This course will discuss the systematic production of Web-based applications and systems by focusing on the different phases and aspects of the Web application lifecycle. It will help you look at Web application phenomena, requirements, Web design and architecture, development and management from different perspectives - as Web designer, analyst, architect, component engineer, program manager, product manager or CIO for example. You will learn how to produce Web applications and agile systems from requirements engineering, concept, design, development, testing, deployment and up to operation, marketing, and evolution. Many examples will be shown and discussed - showing the need for expecting change and staying agile. This is not a programming course, you will only be introduced to the core technology aspects and are encouraged to consolidate the details.

Media
Slides

Basic literature
Gerti Kappel, Birgit Pröll, Siegfried Reich, Werner Retschitzegger (Hrsg.), Web Engineering - Systematische Entwicklung von Web- Anwendungen. dpunkt.verlag, ISBN:3-89864-234-8.
Thomas A. Powell, Web Site Engineering. Prentice Hall 1998.

Course: Reading Group

Course key: [24125/24673]

Lecturers: Ralf Reussner, Klaus Krogmann, Michael Kuperberg
Credit points (CP): 1 **Hours per week:** 1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64), Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Telematics — Course key: [24128]

Lecturers: Martina Zitterbart
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Future Networking [IW4INFN] (S. 69), Networking [IW4INNW] (S. 70)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
This course details selected protocols, architectures, techniques, and algorithms, which were already presented in the communications part of the course Communication and Database Systems [24574]. 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.

Basic 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

Complementary 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: Multimedia Communication — Course key: [24132]

Lecturers: Roland Bless
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Future Networking [IW4INFN] (S. 69), Networking [IW4INNW] (S. 70)

Learning Control / Examinations

Prerequisites
The communication part of Kommunikation und Datenhaltung (recommended).

Conditions
None.

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.

Basic literature
James F. Kurose, and Keith W. Ross *Computer Networking* 4th edition, Addison-Wesley/Pearson, 2007, ISBN 0-321-49770-8, Chapter Multimedia Networking.

Complementary 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: Sprachtechnologie und Compiler — Course key: [24134]

Lecturers: Gregor Snelting
Credit points (CP): 8 **Hours per week:** 4/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachtechnologie und Compiler [IW4INCOMP1] (S. 63)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Trademark and Unfair Competition Law — Course key: [24136/24609]

Lecturers: Yvonne Matz, Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [IW4JURA4] (S. 92)

Learning Control / Examinations

Prerequisites
None.

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.

Basic literature

- Berlit, Wolfgang: Markenrecht, Verlag C.H.Beck, ISBN 3-406-53782-0, neueste Auflage.

Course: Einführung in die Computergraphik — Course key: [24138]

Lecturers: Jan Bender
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Lehrbücher über Computergraphik

Course: Environmental Law — Course key: [24140]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [IW4JURA6] (S. 94)

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.

Prerequisites
None.
Knowledge of Law, esp. Public Law I or II are recommended.

Conditions
None.

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 certificates. 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
abstracts, sketches on blackboard, slides

Basic literature
Will be announced in the course.

Complementary literature
Will be announced in the course.

Course: Information Integration and Web Portals — Course key: [24141]

Lecturers: Jutta Mülle
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

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

Conditions
None.

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).

Basic literature

- Wassilios Kazakos, Andreas Schmidt, Peter Tomczyk: Datenbanken und XML. Konzepte, Anwendungen, Systeme, Heidelberg/Berlin: Springer, März 2002

Complementary 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: Grundlagen der Automatischen Spracherkennung Course key: [24145]

Lecturers: Alexander Waibel, Stüker
Credit points (CP): 6 **Hours per week:** 4
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic 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

Complementary literature

- Lawrence Rabiner and Ronald W. Schafer, Digital Processing of Speech Signals, Prentice Hall, 1978
- Schukat-Talamazzini, Automatische Spracherkennung

Course: Ubiquitous Computing — Course key: [24146]

Lecturers: Wilfried Juling
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76), Ubiquitous Computing [IW4INAIFB7] (S. 88)

Learning Control / Examinations
The assessment will consist of an oral exam (20 min) following § 4 Abs. 2 Nr. 2 SPO.

Prerequisites
None.

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

Basic 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

Complementary 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: Advanced Lab in Ubiquitous Computing — Course key: [24146p]

Lecturers: Hartmut Schmeck
Credit points (CP): 4 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Ubiquitous Computing [IW4INAIFB7] (S. 88)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Verkehrstelematik (Traffic Telematics) Course key: [24148]

Lecturers: Jerome Härri, Hannes Hartenstein
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Future Networking [IW4INFN] (S. 69)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
D. Helbing, “Verkehrsdynamik: Neue physikalische Modellierungskonzepte”, Springer, 1997, ISBN: 978-3-540-61927-7.
P. Carlo Cacciabue (Ed.), “Modelling Driver Behaviour in Automotive Environments”, Springer, 2007, ISBN: 978-1-84628-617-9.
P. Santi, “Topology Control in Wireless Ad Hoc and Sensor Networks”, John Wiley & Sons, 2005, ISBN: 978-0-470-09453-2.
I. Stojmenovic (Ed.), “Handbook of Wireless Networks and Mobile Computing”, John Wiley & Sons, 2002, ISBN: 978-0-471-41902-0
S. Basagni, M. Conti, S. Giordano, I. Stojmenovic (Eds.), “Mobile Ad Hoc Networking”, John Wiley & Sons, 2004, ISBN: 978-0-471-37313-1
M.K. Simon, M-S. Alouini, “Digital Communication over Fading Channels: A Unified Approach to Performance Analysis”, Wiley-Interscience, 2000, ISBN: 978-0471317791.
Marc Torrent Moreno, “Inter-Vehicle Communications : Achieving Safety in a Distributed Wireless Environment : Challenges, Systems and Protocols”, Ph.D Dissertation, Universitätsverlag Karlsruhe, 2007, ISBN 978-3-86644-175-0.
W. Franz, H. Hartenstein, M. Mauve (Eds.) “Inter-Vehicle-Communications - Based on Ad Hoc Networking Principles”, published by Universitätsverlag Karlsruhe, 2005, ISBN 3-937300-88-0.

Course: Network and IT-Security Management — Course key: [24149]

Lecturers: Hannes Hartenstein
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Networking Labs [IW4INNL] (S. 68), Netzsicherheit - Theorie und Praxis [IW4INNTP] (S. 71), Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76), Ubiquitous Computing [IW4INAIFB7] (S. 88)

Learning Control / Examinations

Prerequisites
Basics in computer networks, according to the lectures *Kommunikation und Datenhaltung* [24574] and *Vernetzte IT-Infrastrukturen* [24074] respectively are required.

Conditions
Dependencies according to the module description.

Learning Outcomes
The goal of this lecture is to introduce the basics of network and IT-security management. Technical as well as underlying management concepts should are described.

Content
The lecture covers architectures, models, protocols and tools for controlling and monitoring of heterogeneous networks. Additionally, issues related to security and reliability are also covered. The lecture presents technical solutions as well as corresponding management concepts. The first part of the lecture introduces management architecture in particular the Internet management architecture based on the SNMP protocol. Afterwards corresponding tools, platforms, and operational implementations are presented. Furthermore public IP coordination and current trends are described. In the IT-Security management part of the lecture the concept of a security process is introduced based on the BSI Grundschutz. Additional topics are access and identity management as well as firewalls, intrusion detection and prevention. Besides theoretical method and concepts, practical examples are shown.

Media
Slides

Basic literature
Jochen Dinger, Hannes Hartenstein, Netzwerk- und IT-Sicherheitsmanagement : Eine Einführung, Universitätsverlag Karlsruhe, 2008.

Complementary 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.

Course: Advanced Web Applications — Course key: [24153/24604]

Lecturers: Sebastian Abeck
Credit points (CP): 4 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web-Anwendungen und Web-Technologien [IW4INWAWT] (S. 62)

Learning Control / Examinations

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

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.

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.
- HUMAN TASKS: 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.

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)

Basic literature
Thomas Erl: Service-Oriented Architecture – Principles of Service Design, Prentice Hall, 2007.

Complementary 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.

Course: Wie die Statistik allmählich Ursachen von Wirkung unterscheiden lernt Course key: [24157]

Lecturers: Dominik Janzing
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
J. Pearl: Causality, 2000.
Spirtes, Glymour and Scheines: Prediction, Causation and Search, 1993

Course: Employment Law I — Course key: [24167]

Lecturers: Alexander Hoff
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

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

Prerequisites
None.

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.

Basic literature
tba at the beginning of the course.

Course: Tax Law I

Course key: [24168]

Lecturers: Detlef Dietrich
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

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

Prerequisites
None.

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

Basic literature

- Grashoff Steuerrecht, Verlag C. H. Beck, last edition
- Tipke/Lang Steuerrecht, Verlag C. H. Beck, last edition

Course: Randomized Algorithms — Course key: [24171]

Lecturers: Thomas Worsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
Students become acquainted with the basic important approaches to and techniques for applying randomization in algorithms and the tools for their analysis.
Students are able to identify and assess typical weak points in deterministic algorithms and to develop randomized alternatives to eliminate them.

Content
Randomized algorithms are not deterministic. Their behavior depends on the outcome of random experiments. This idea first became generally known due to Rabin's randomized primality test. Meanwhile randomized algorithms have been developed for quite a number of problems, and often they are faster (in one sense or another). Furthermore randomized algorithms sometimes are easier to understand and to implement than deterministic algorithms.
In the course not only different types of randomized algorithms (Las Vegas, Monte Carlo, ...) are present. In addition foundations and tools from probability theory are introduced as far as they are necessary for the analysis of the algorithms, and attention is given to further important concepts like Markov chains. Since stochastic methods are of importance in more and more fields in informatics, the usefulness of the course extends beyond the scope of randomized algorithms.
Contents:

- 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;

Basic 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

Complementary literature

- E. Behrends: Introduction to Markov Chains, Vieweg, 2000
- A. Borodin, R. El-Yaniv: Online Computation and Competitive Analysis, Cambridge Univ. Press, 1998

Course: Medizinische Simulationssysteme I — Course key: [24173]

Lecturers: Rüdiger Dillmann, Röhl, Speidel
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Netze und Punktwolken — Course key: [24175]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80), Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praktikum Multilingual Speech Processing — Course key: [24280]

Lecturers: Tanja Schultz, Schlippe, Westphal
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Tanja Schultz und Katrin Kirchhoff (Hrsg.), Multilingual Speech Processing, Elsevier, Academic Press, 2006

Course: Praktikum Anthropomatik: Bewegungsbasierte Applikationssteuerung Course key: [24288/24893]

Lecturers: Annika Wörner, Köhler, Schulz
Credit points (CP): 3 **Hours per week:** 4
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Bewegungsbasierte Mensch-Maschine Interaktion [IW4INBMMI] (S. 79)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praktikum Automatische Spracherkennung — Course key: [24298]

Lecturers: Alexander Waibel, Stüker
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- A. Waibel, K.F. Lee: Readings in Speech Recognition
- F. Jelinek: Statistical Methods of Speech Recognition
- Schukat-Talamazzini: Automatische Spracherkennung

Course: Practical Course Web Technologies — Course key: [24304/24873]

Lecturers: Sebastian Abeck, Gebhart, Hoyer, Link, Pansa
Credit points (CP): 5 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web-Anwendungen und Web-Technologien [IW4INWAWT] (S. 62)

Learning Control / Examinations

Prerequisites
Participation in the lecture *Advanced Web Applications* [24153/24604]

Conditions
None

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)

Basic literature

- Team guidelines of the research group
- Lecture notes “Advanced Web Applications”

Complementary literature
Literature basis of the respective project team

Course: Seminar Speaker Recognition and Biometrics — Course key: [24370]

Lecturers: Tanja Schultz, Qian Yang
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Vom Mensch zum Roboter — Course key: [24373]

Lecturers: Annika Wörner, Feldmann, Köhler
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Bewegungsbasierte Mensch-Maschine Interaktion [IW4INBMMI] (S. 79)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Kognitive Interaktionssysteme — Course key: [24381]

Lecturers: Tanja Schultz, Putze
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Internet Law — Course key: [24501]

Lecturers: Thomas Dreier
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [IW4JURA4] (S. 92)

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

Prerequisites
None.

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

Basic literature
Script, Internetrecht (Internet Law)

Complementary 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: Communication and Database Systems — Course key: [24574]

Lecturers: Klemens Böhm, Martina Zitterbart
Credit points (CP): 4/8 **Hours per week:** 4/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Communication and Database Systems [IW4INKD] (S. 72)

Learning Control / Examinations

Prerequisites
None.

Conditions
Lectures about system architecture and software engineering are recommended but not mandatory.

Learning Outcomes
The student

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

Media
Slides.

Basic literature

- W. Stallings: Data and Computer Communications. Prentice Hall, 2006.
- S. Abeck, P. C. Lockemann, J. Seitz, J. Schiller: Verteilte Informationssysteme, dpunkt-Verlag, 1. Auflage, 2002, ISBN-13: 978-3898641883
- S. Abeck, P.C. Lockemann, J. Schiller, J. Seitz: Verteilte Informationssysteme. dpunkt-Verlag, 2003.
- Andreas Heuer, Kai-Uwe Sattler, Gunther Saake: Datenbanken — Konzepte und Sprachen, 3. Aufl., mitp-Verlag, Bonn, 2007
- Alfons Kemper, André Eickler: Datenbanksysteme. Eine Einführung, 6. Aufl., Oldenbourg Verlag, 2006

Complementary literature

- F. Halsall: Computer Networking and the Internet. Addison-Wesley, 2005.
- 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.
- J.F. Kurose, K.W. Ross: Computer Networking - A Top-Down Approach featuring the Internet, Addison-Wesley, 2007.

Course: Multilinguale Mensch-Maschine-Kommunikation Course key: [24600]

Lecturers: Tanja Schultz, Putze, Schlippe
Credit points (CP): 6 **Hours per week:** 4/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Biosignalverarbeitung [IW4INBSV] (S. 77), Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary 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

Course: Network Security: Architectures and Protocols Course key: [24601]

Lecturers: Marcus Schöller
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Networking Labs [IW4INNL] (S. 68), Networking [IW4INNW] (S. 70), Netzsicherheit - Theorie und Praxis [IW4INNTP] (S. 71)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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 “Networksafety: 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 disussed explicitlly and their design decision considering safety 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 safety protocols IPSec, TLS/SSL, and protocols of infrastructure security.

Media
Slides.

Basic literature
Roland Bless et al. Sichere Netzwerkkommunikation. Springer-Verlag, Heidelberg, Juni 2005.

Complementary 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: Datenschutz und Privatheit in vernetzten Informationssystemen Course key: [24605]

Lecturers: Buchmann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced withon the leture slides.

Course: Empirical Software Engineering

Course key: [24608]

Lecturers: Walter F. Tichy
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Computer Contract Law — Course key: [24612]

Lecturers: Michael Bartsch
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [IW4JURA4] (S. 92)

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

Prerequisites
None.

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

Basic 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

Complementary literature
tba in the transparencies

Course: Algorithms for Planar Graphs — Course key: [24614]

Lecturers: Dorothea Wagner
Credit points (CP): 3/5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites

Conditions
None.

Learning Outcomes

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

Complementary literature
Takao Nishizeki and Norishige Chiba. Planar Graphs: Theory and Algorithms, volume 32 of Annals of Discrete Mathematics. North-Holland, 1988.

Course: Graphisch-geometrische Algorithmen — Course key: [24618]

Lecturers: Alfred Schmitt, Umlauf
Credit points (CP): 5 **Hours per week:** 2/1/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Maschinelle Übersetzung

Course key: [24620]

Lecturers: Alexander Waibel
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Sprachverarbeitung [IW4INSV] (S. 78)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Philipp Koehn: Statistical Machine Translation

Course: Algorithms for Visualization of Graphs — Course key: [24621]

Lecturers: Dorothea Wagner, Martin Nöllenburg
Credit points (CP): 3/5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites

Lecture *Algorithmentechnik* [24079] is recommended.

Conditions
None.

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
Slides.

Complementary literature

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

Course: Algorithms in Cellular Automata — Course key: [24622]

Lecturers: Thomas Worsch
Credit points (CP): 3 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
None.

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

Complementary 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: Ausgewählte Kapitel der Kryptographie — Course key: [24623]

Lecturers: Jörn Müller-Quade
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Model Driven Software Development — Course key: [24625]

Lecturers: Ralf Reussner, Steffen Becker
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

[1] Markus Völter and Tom Stahl, “Model-Driven Software Development”, Wiley, May, 2006
[2] Open Model CourseWare (OMCW) Eclipse Modelling Project, “Introduction to Model Engineering”, Jean Bézivin, ATLAS Group (INRIA & LINA), Nantes, Lecture Slides
[3] Ralf Reussner, Wilhelm Hasselbring, “Handbuch der Software-Architektur”, dpunkt Verlag, Heidelberg, 2nd edition, to appear
[4] Krzysztof Czarnecki and Simon Helsen, “Classification of Model Transformation Approaches”, Workshop on Generative Techniques in the Context of Model-Driven Approaches, OOPSLA 2003
[5] Meta Object Facility (MOF) 2.0 Query/View/Transformation Specification, formal/2008-04-03, Object Management Group (OMG), 2008, http://www.omg.org/docs/formal/08-04-03.pdf
[6] Object Management Group (OMG). Meta Object Facility (MOF) 2.0 XMI Mapping Specification, v2.1 (formal/05-09-01), 2006b, http://www.omg.org/cgi-bin/apps/doc?formal/05-09-01.pdf
[7] Object Management Group (OMG). Model Driven Architecture – Specifications, 2006c, http://www.omg.org/mda/specs.htm
[8] Object Management Group (OMG). MOF 2.0 Core Specification (formal/2006-01-01), 2006d, http://www.omg.org/cgi-bin/doc?formal/2006-01-01
[9] Object Management Group (OMG). Object Constraint Language, v2.0 (formal/06-05-01), 2006, http://www.omg.org/cgi-bin/doc?formal/2006-05-01
[10] Object Management Group (OMG). Unified Modeling Language Specification: Version 2, Revised Final Adopted Specification (ptc/05-07-04), 2005c, http://www.uml.org/#UML2.0
[11] K. Czarnecki and U. W. Eisenecker. Generative Programming. Addison-Wesley, Reading, MA, USA, 2000

Course: Component Based Software Engineering Course key: [24626]

Lecturers: Ralf Reussner, Michael Kuperberg, Klaus Krogmann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64), Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- C. Szyperski, D. Gruntz, S. Murer, Component Software, Addison-Wesley, 2002, 2nd Ed.
- F. Griffel, Componentware, dPunkt Verlag, 1998

Course: Telecommunications Law — Course key: [24632]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [IW4JURA6] (S. 94)

Learning Control / Examinations
The assessment consists of an written exam (following §4(2), 1 SPO).

Prerequisites
None.

Conditions
None.

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
Content structure

Basic 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.

Complementary literature
tba

Course: Moderne Entwicklungsumgebung am Beispiel von .NET Course key: [24634]

Lecturers: Walter F. Tichy, Gelhausen, Ladani
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Performance Engineering of Enterprise Software Systems Course key: [24636]

Lecturers: Ralf Reussner, Samuel Kounev
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic 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.

Complementary literature

1. Samuel Kounev, “Performance Engineering of Distributed Component-Based Systems - Benchmarking, Modeling and Performance Prediction”, Shaker Verlag, ISBN: 3832247130, 2005.
2. Lizy Kurian John, Lieven Eeckhout, “Performance Evaluation and Benchmarking“, CRC Press Inc., ISBN: 0849336228, 2005.
3. 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.
4. R. K. Jain , “The Art of Computer Systems Performance Analysis : Techniques for Experimental Design, Measurement, Simulation, and Modeling”, Wiley (April 1991), ISBN: 0471503363, 1991.
5. Kishor Trivedi, “Probability and Statistics with Reliability, Queuing, and Computer Science Applications”, John Wiley and Sons, ISBN 0-471-33341-7, New York, 2001.
6. 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.
7. 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.
8. 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.
9. 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.

Course: Specification and Verification of Software — Course key: [24641]

Lecturers: Bernhard Beckert
Credit points (CP): 5 **Hours per week:** 3
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
By looking at some selected typical examples the students will come to know and understand the
* theoretical basis,
* the central concepts and methods,
* case studies
of formal program development and verification.
Students will be able to read expressions from the specification language of the chosen methods, and be able understand how proof obligations are derived from verification tasks.

Content
The predicate logic introduced in the lecture „Formale Systeme“
contains too many idealizations to be useful for realistic
specification and verification. Extensions to a predicate logic with types, interpreted (fixed) domains and partial functions will be introduced to compensate this deficiency. Set theory is at the heart of many program development and verification methods. An axiomatisation of set theory will be presented together with hints to
its applications, e.g., within the specification languages UML+OCL, Z or B. To formalise and prove properties of programs a program logic is needed. Building on the students acquaintance with typed predicate logic and modal logic a modal program logic will be introduced; e.g., Hoare calculus, Dynamic Logic or a similar system. This introduction covers syntax, semantics and rules of a calculus. In addition to proof rules for an abstract programming language also some proof rules for a realistic language, e.g., Java, C, C# or Spec# will be demonstrated.

Complementary to the logic based approach to formal specification is the approach based on abstract machine models. We will present e.g., UML state charts, EventB, B-machines or AMS (Abstract State Machines).
The lecture finally covers a short introduction into theory and application of abstract data types.

Media
Lecture notes and slides are available from the course website

Basic literature
Lecture Notes: Formal Specification and Verification http://i12www.ira.uka.de/ pschmitt/FormSpez/skript.ps

Complementary literature
Verification of Object-Oriented Software: The KeY Approach
Bernhard Beckert, Reiner Hähnle, Peter H. Schmitt (Eds.)
Springer-Verlag, LNCS 4334.

Course: Mobile Communication — Course key: [24643]

Lecturers: Oliver Waldhorst
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Future Networking [IW4INFN] (S. 69)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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 Communication” 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 dispersion, modulation, and multiplexing are explained by application examples.

Media
Slides.

Basic literature
J. Schiller; Mobilkommunikation; Addison-Wesley, 2003.

Complementary 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: Tax Law II — Course key: [24646]

Lecturers: Detlef Dietrich
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

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

Prerequisites
None.

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

Basic 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: Civil Law for Advanced — Course key: [24650]

Lecturers: Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

Learning Control / Examinations

Prerequisites
None.

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.

Basic literature
Klunzinger, Eugen: Übungen im Privatrecht, Verlag Vahlen, ISBN 3-8006-3291-8, in der neuesten Auflage

Course: Algorithms for Ad-hoc and sensor networks Course key: [24654]

Lecturers: Bastian Katz
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Course: Software Development for modern, parallel platforms Course key: [24660]

Lecturers: Walter F. Tichy, Pankratius, Otto
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
Basic knowledge in the fields of sotware engineering and programming languages as for example teached in the lecture *Multikern-Rechner und Rechnerbündel* [24112] in the winter term is necessary.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture.

Complementary literature
Will be announced in the lecture.

Course: Patent Law — Course key: [24661]

Lecturers: Bernhard Geissler
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intellectual Property Law [IW4JURA4] (S. 92)

Learning Control / Examinations

Prerequisites
None.

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

Basic 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

Complementary literature
tba in the transparencies

Course: European and International Law

Course key: [24666]

Lecturers: Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Business Law [IW4JURA6] (S. 94)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Media
Content structure

Basic literature
Further details will be announced in the lecture.

Complementary literature
Further details will be announced in the lecture.

Course: Employment Law II — Course key: [24668]

Lecturers: Alexander Hoff
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

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.

Basic literature
Tba at the beginning of the course.

Course: Simulation of Computer Networks — Course key: [24669]

Lecturers: Hannes Hartenstein
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Wireless Networking [IW4INWN] (S. 67), Networking Labs [IW4INNL] (S. 68), Networking [IW4INNW] (S. 70), Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76)

Learning Control / Examinations

Prerequisites
Basics in computer networks, according to the lectures *Kommunikation und Datenhaltung* are required. Additionally the lecture Wahrscheinlichkeitstheorie und Statistik is required.

Conditions
Dependencies according to the module description.

Learning Outcomes
Goal of this lecture is to introduce on the one hand the theoretical basics of simulation of computer networks, and on the other hand practical insights into running simulation studies. An important issue is the modeling of the different building blocks used insimulations.

Content
The simulation of computer networks is a method to quickly and cost-efficiently study and evaluate protocols and therefore is an important tool for network research. While analytical approaches often have to fight against the complexity of the scenarios and field studies cause high costs concerning hardware, simulations allow to efficiently investigate on the parameter space with respect to network topologies, communication patterns and dependencies among protocols. However, simulations results are only of relevance if a precise modeling, simulation run and evaluation has been done. The lecture impart knowledge on the necessary basics with respect to mathematics and algorithms as well as practical experiences in the usage of simulators and simulation tools.

Media
Slides

Basic literature

- Averill Law, W. David Kelton, Simulation Modeling and Analysis, 4th ed., McGraw-Hill, 2006.

Course: Kurven und Flächen im CAD I — Course key: [24670]

Lecturers: Hartmut Prautzsch, Umlauf
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80), Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Prautzsch, Boehm, Paluszny: Bézier and B-Spline Techniques, Springer 2002

Complementary literature

- Farin: Curves and Surfaces for CAGD, Fifth Edition, 2002
- de Boor: A practical guide to splines, 2001

Course: Law of Contracts — Course key: [24671]

Lecturers: Peter Sester
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Private Business Law [IW4JURA5] (S. 93)

Learning Control / Examinations

Prerequisites
None.

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.

Basic literature
Tba at the beginning of the course.

Course: Next Generation Internet — Course key: [24674]

Lecturers: Roland Bless
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Networking Labs [IW4INNL] (S. 68), Future Networking [IW4INFN] (S. 69), Networking [IW4INNW] (S. 70)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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

Basic 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)

Complementary 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: Medizinische Simulationssysteme II — Course key: [24676]

Lecturers: Rüdiger Dillmann, Unterhinninghofen, Suwelack
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Practical Course Data Warehousing and Mining Course key: [24874]

Lecturers: Klemens Böhm
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Data Warehousing und Mining in Theorie und Praxis [IW4INDWMTP] (S. 74)

Learning Control / Examinations
The assessment will be an “Erfolgskontrolle anderer Art” and consists of several parts (projects, experiments, presentations and reports, according to §4, Abs 2 of the SPO). The course will be assessed with “passed” or “failed” (according to §9, Abs. 3 of the SPO). In order to get the passed assessment for the practical course, every part of the assessment must be passed successfully.

Prerequisites
None.

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.

Complementary 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: Praktikum Simulation von Rechnernetzen — Course key: [24878]

Lecturers: Hannes Hartenstein
Credit points (CP): 5 **Hours per week:** 0/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Networking Labs [IW4INNL] (S. 68), Dynamische IT-Infrastrukturen [IW4INDITI] (S. 76)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Averill Law, W. David Kelton, Simulation Modeling and Analysis, 4th ed., McGraw-Hill, 2006.

Course: Praktikum Web Engineering — Course key: [24880/24291]

Lecturers: Wilfried Juling, Nußbaumer, Majer, Freudenstein
Credit points (CP): 5 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Praxis des Web Engineering [IW4INPWE] (S. 66)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praktikum Geometrisches Modellieren — Course key: [24884]

Lecturers: Hartmut Prautzsch, Diziol
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary 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: Praktikum Biosignale — Course key: [24905]

Lecturers: Tanja Schultz, Gehrig, Wand
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Biosignalverarbeitung [IW4INBSV] (S. 77), Bewegungsbasierte Mensch-Maschine Interaktion [IW4INBMMI] (S. 79)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Private and Social Insurance — Course key: [25050]

Lecturers: Ute Werner, Heilmann, Besserer
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [IW4BWLFBV7] (S. 29)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- F. Büchner, G. Winter. Grundriss der Individualversicherung. 1995.
- P. Koch. Versicherungswirtschaft. 2005.
- Jahrbücher des GDV. Die deutsche Versicherungswirtschaft.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: Advanced Lab Applied Informatics — Course key: [25070p]

Lecturers: Andreas Oberweis, Hartmut Schmeck, Detlef Seese, Wolffried Stucky, Rudi Studer, Stefan Tai
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web Data Management [IW4INAIFB4] (S. 85), Intelligent Systems and Services [IW4INAIFB5] (S. 86), Organic Computing [IW4INAIFB8] (S. 89), eCollaboration [IW4INAIFB9] (S. 90), Development of Distributet Business Information Systems [IW4INAIFB10] (S. 91)

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.

Prerequisites
None.

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 learn during the course.
- present results of the research in written form generally found in scientific publications.

Content
The lab intensifies and extends specific topis which are discussed within corresponding lectures. Knowledge of these lecture topics is an advantage but not a precondition.

Media
Slides, access to internet resources

Basic 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 Applied Informatics — Course key: [25070s]

Lecturers: Andreas Oberweis, Hartmut Schmeck, Detlef Seese, Wolffried Stucky, Rudi Studer, Stefan Tai
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Semantic Technologies [IW4INAIFB6] (S. 87)

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.

Prerequisites
None.

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 learn 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. 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

Basic 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: Nonlinear Optimization I — Course key: [25111]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.
The examination can also be combined with the examination of *Nonlinear Optimization II* [25113]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Nonlinear Optimization I* [25111] and *Nonlinear Optimization II* [25113], upon attaining more then 50% 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* [25111] and *Nonlinear Optimization II* [25113], upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary literature

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- 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 — Course key: [25113]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.
The exam can also be combined with the examination of *Nonlinear Optimization I* [25111]. In this case, the duration of the written exam takes 120 minutes.
In a combined exam of *Nonlinear Optimization I* [25111] and *Nonlinear Optimization II* [25113], upon attaining more then 50% 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* [25111] and *Nonlinear Optimization II* [25113], upon attaining more then 50% of the computer exercise points, the grade of the passed exam is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary literature

- W. Alt, Nichtlineare Optimierung, Vieweg, 2002
- M.S. Bazaraa, H.D. Sherali, C.M. Shetty, Nonlinear Programming, Wiley, 1993
- 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: Special Topics in Optimization II — Course key: [25126]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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 two years is available online (www.ior.kit.edu).

Course: Special Topics in Optimization I — Course key: [25128]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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 two years is available online (www.ior.kit.edu).

Course: Seminar in Continous Optimization — Course key: [25131]

Lecturers: Oliver Stein
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

Prerequisites
See corresponding module information.

Conditions
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.

Basic literature
References and relevant sources are announced at the beginning of the seminar.

Course: Global Optimization I — Course key: [25134]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.
The examination can also be combined with the examination of *Global Optimization II* [25136]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [25134] and *Global Optimization II* [25136], upon attaining more then 50% 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* [25134] and *Global Optimization II* [25136], upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary 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 — Course key: [25136]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.
The examination can also be combined with the examination of *Global Optimization I* [25134]. In this case, the duration of the written examination takes 120 minutes.
In a combined examination of *Global Optimization I* [25134] and *Global Optimization II* [25136], upon attaining more then 50% 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* [25134] and *Global Optimization II* [25136], upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.

Prerequisites
None.

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.

Complementary 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: Mixed Integer Programming I — Course key: [25138]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.
The examination can also be combined with the examination of *Mixed Integer Programming II* [25140]. In this case, the duration of the written examination takes 120 minutes.

Prerequisites
None.

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.

Complementary literature
- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- 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 two years is available online (kop.ior.kit.edu).

Course: Mixed Integer Programming II — Course key: [25140]

Lecturers: Oliver Stein
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

Learning Control / Examinations
The assessment of the lecture is a written examination (60 minutes) according to §4(2), 1 of the examination regulation.
Examination are held in the semester of the lecture and in the following semester.
Upon attaining more then 50% of the exercise points, the grade of the passed examination is improved by a third of a grading step.
Upon attaining more then 50% of the computer exercise points, the grade of the passed examination is improved by a third of a grading step.
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.

Prerequisites
None.

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.

Complementary literature

- C.A. Floudas, Nonlinear and Mixed-Integer Optimization: Fundamentals and Applications, Oxford University Press, 1995
- 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 two years is available online (kop.ior.kit.edu).

Course: Modern Market Research — Course key: [25154]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Research [IW4BWLMAR2] (S. 33), Strategy, Innovation and Data Analysis [IW4BWLMAR3] (S. 34), Behavioral Approaches in Marketing and Data Analysis [IW4BWLMAR4] (S. 35), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37), Quantitative Marketing and OR [IW4OR1] (S. 48)

Learning Control / Examinations
See module description.

Prerequisites
Basic knowledge of statistics.

Conditions
None.

Learning Outcomes

Content

Basic literature
Further literature references are announced in the script.

Course: Marketing and Operations Research — Course key: [25156]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37), Quantitative Marketing and OR [IW4OR1] (S. 48)

Learning Control / Examinations

Prerequisites
Basics of Operations Research are required.

Conditions
None.

Learning Outcomes

Content

Basic literature
WIll be announced in the lecture. Further literature references are announced in the script.

Course: Corporate Planning and Operations Research Course key: [25158]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37), Quantitative Marketing and OR [IW4OR1] (S. 48)

Learning Control / Examinations
See module description.

Prerequisites
Basics of operations research are assumed.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced in the lecture. Further literature references are announced in the script.

Course: e-Business & electronic Marketing — Course key: [25160]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Market Research [IW4BWLMAR2] (S. 33), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Information Technology and Business Information — Course key: [25162]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategy, Innovation and Data Analysis [IW4BWLMAR3] (S. 34), Behavioral Approaches in Marketing and Data Analysis [IW4BWLMAR4] (S. 35), Successful Market Orientation [IW4BWLMAR5] (S. 36)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
None.

Conditions
None.

Learning Outcomes
(see description of the course)

Content
The goal of the course is to create a text that is comprehensive, practical, applied, and managerial and that presents a balanced coverage of both, quantitative and qualitative approaches. It takes the perspective of users of marketing research and set out to reflect the current trends in the use of computers (e.g. statistical packages and online research). The course covers as main topics an introduction to interactive mulimedia systems, techniques of internet marketing research, methods of primary data collection including questionnaires and scaling of psychological attributes, methods of observation, program analyzer, psychobiological methods, content analysis and cognitive response approach, experimental designs and panels, secondary data collection, management support systems, a case study in marketing decision support and an overview of philosophy of science.

Basic literature
(Literature is in English and German, see German description)

Course: International Marketing — Course key: [25164]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Market Research [IW4BWLMAR2] (S. 33), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
For lecture preparation and follow-up there is a recommended script, original literature and selected current study results.

- Berndt, R., Fantapié Altobelli, C., Sander, M. : Internationale Marketing-Politik. Springer Verlag 1997
- Berndt, R., Fantapié Altobelli, C., Sander, M.: Internationales Marketing-Management. Springer Verlag 1999
- Meffert, H., Bolz, J.: Internationales Marketing-Mangement. Kohlhammer 3. Aufl. 1998

Course: Marketing and Innovation

Course key: [25165]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Market Research [IW4BWLMAR2] (S. 33), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Strategic and Innovative Decision Making in Marketing Course key: [25166]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategy, Innovation and Data Analysis [IW4BWLMAR3] (S. 34), Successful Market Orientation [IW4BWLMAR5] (S. 36)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes
(see description of the course)

Content
The course places emphasis on the role of marketing in strategic planning. The planning and implementation stages are discussed using a case study in business portfolio analysis, talking about experience effects, approaches in defining strategic business units. A critical view on established paradigms versus weak signals from management practice is given. Further topics are innovation and diffusion models, behavioral approaches to innovative decision processes and a discussion on Porter's single diamond theory and globalization.

Basic literature
(Literature is in English and German, see German description)

Course: Behavioral Approaches in Marketing Course key: [25167]

Lecturers: Bruno Neibecker
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Behavioral Approaches in Marketing and Data Analysis [IW4BWLMAR4] (S. 35), Successful Market Orientation [IW4BWLMAR5] (S. 36)

Learning Control / Examinations
Examination performance will consist of a written exam accorcing to the description of the module (written exam following §4(2), 1 of the examination regulation).

Prerequisites
None.

Conditions
(see description of the module)

Learning Outcomes

Content
This course gives an introduction to consumer behavior and the influence of cognitive and emotional information processing on consumer decision making. The contribution of advertising response models is considered and faced with social and environmental aspects (e.g. cross-cultural influences) on consumer behavior, mass communication and internet advertising. In addition, a scientific case study on the effectiveness of TV-commercials is discussed. Central issues of the course:
Case Studies in brand management and advertising response.
Psychological factors (research design and test marketing / arousal / effectiveness of TV-commercials as case studies).
Emotions in marketing.
Information processing and retention in memory (schema theory / visual information processing).
Complex advertising response models (attitude towads the ad / attitude towards the brand / persuasion / context effects in learning / decision making / Means-end-theory and strategic advertising).
Social processes (culture / subculture / cross cultural influence / product design).

Basic literature
(Literature is in English and German, see German description)

Course: Entrepreneurship and Marketing — Course key: [25170]

Lecturers: Wolfgang Gaul
Credit points (CP): 2.5 **Hours per week:** 1/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Marketing Planning [IW4BWLMAR1] (S. 32), Market Research [IW4BWLMAR2] (S. 33), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37)

Learning Control / Examinations
See module description.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The Student should ...

Content

Course: Data Analysis and Operations Research — Course key: [25171]

Lecturers: Wolfgang Gaul
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Research [IW4BWLMAR2] (S. 33), Successful Market Orientation [IW4BWLMAR5] (S. 36), Entrepreneurship, Innovation and International Marketing [IW4BWLMAR6] (S. 37), Quantitative Marketing and OR [IW4OR1] (S. 48)

Learning Control / Examinations
See module description.

Prerequisites
Basics of data analysis and operations research are assumed.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar in Marketing

Course key: [25192]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar zu Marktforschung Course key: [25193]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master Seminar in Quantitative Marketing and OR Course key: [25194]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Master-Seminar Marketing Plannning — Course key: [25195]

Lecturers: Wolfgang Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the semester.

Course: Master Seminar in Entrepreneurship, Innovation and International MarketingCourse key: [25196]

Lecturers: Gaul
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Wird zur Seminarvorbereitung bekannt gegeben.

Course: Master-Seminar zum strategischen u. verhaltenswissenschaftlichen Marketing Course key: [25197]

Lecturers: Bruno Neibecker
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
Keine.

Conditions
Keine.

Learning Outcomes

Content

Basic literature
Will be allocated according the individual topics.

Course: Management Accounting — Course key: [25210]

Lecturers: Torsten Lüdecke
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

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.

Prerequisites
None.

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

Complementary 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: Valuation

Course key: [25212]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: F1 (Finance) [IW4BWLFBV1] (S. 25), F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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.

Complementary literature
Titman/Martin (2007): Valuation – The Art and Science of Corporate Investment Decisions, Addison Wesley.

Course: Corporate Financial Policy — Course key: [25214]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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

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

Course: Financial Intermediation — Course key: [25232]

Lecturers: Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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

Complementary literature

- Hartmann-Wendels/Pfingsten/Weber (2006): Bankbetriebslehre, 4. Auflage, Springer Verlag.
- Freixas/Rochet (1997): Microeconomics of Banking, MIT Press.

Course: Market Microstructure — Course key: [25240]

Lecturers: Torsten Lüdecke
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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
Folien.

Basic literature
keine

Complementary literature
See reading list.

Course: Seminar in Finance — Course key: [25293]

Lecturers: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

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.

Basic literature
Will be announced at the end of the foregoing semester.

Course: Exchanges Course key: [25296]

Lecturers: Jörg Franke
Credit points (CP): 1.5 **Hours per week:** 1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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?

Complementary literature
Educational material will be offered within the lecture.

Course: Business Strategies of Banks — Course key: [25299]

Lecturers: Wolfgang Müller
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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.

Complementary literature
- A script is disseminated chapterwise within the lecture.
- Hartmann-Wendels, Thomas; Pfingsten, Andreas; Weber, Martin; 2000, Bankbetriebslehre, 2. Auflage, Springer

Course: Multivariate Methods

Course key: [25317]

Lecturers: Wolf-Dieter Heller
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Statistical Methods in Risk Management [IW4STAT2] (S. 54)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic 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: Stochastic Calculus and Finance — Course key: [25331]

Lecturers: Svetlozar Rachev
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53)

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

Prerequisites
None.

Conditions
None

Learning Outcomes
After successful completion of the course students will be familiar with many common methods of pricing and portfolio models in finance. Emphasis we be put on both finance and the theory behind it.

Content
Stochastic processes (Poisson-process, Brownian motion, martingales), stochastic Integral (Integral, quadratic und co-variation, Ito-formula), stochastic differential equation for price-processes, trading strategies, option pricing(Feynman-Kac), neutral risk rating(equivalent martingale measure, Girsanov theorem), term structure models

Media
transparencies, exercises.

Basic literature
To be announced in lecture.

Complementary literature
Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Stochastic and Econometric Models in Credit Risk Management Course key: [25337]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Statistical Methods in Risk Management [IW4STAT2] (S. 54)

Learning Control / Examinations

Prerequisites
None.

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.

Basic 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

Course: Operational Risk and Extreme Value Theory — Course key: [25342]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Statistical Methods in Risk Management [IW4STAT2] (S. 54)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
Operational risk is defined as a consequence of critical contingencies most of which are quantitative in nature and many important questions regarding economic capital allocation for operational risk remain open. The existing quantitative models for operational risk (as well as for market and credit risk) make various assumptions about “normality” and practically exclude extreme and rare events. In this course we formalize the theory of operational risk and apply the extreme value theory for the purpose of calculating the economic capital requirement against unexpected operational losses.

Basic literature
Chernobai, A. Rachev, S., Fabozzi, F. Modeling, Analyzing, and Quantifying Operational Risk , John Wiley, Finance, 2006
P. Embrechts, C. Kluppelberg, T. Mikosch , Modeling Extremal Events , Springer, Berling 1997
Marcelo G. Cruz: Modelling, Measuring and Hedging Operational Risk, Wiley, NY, 2001

Course: Finance and Banking

Course key: [25350/1]

Lecturers: Karl-Heinz Vollmer
Credit points (CP): 5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Andrew Harvey: The Econometric Analysis of Time Series, 2nd Ed. 1993
- Andrew C. Harvey: Time Series Models, 2nd. Ed.
- Walter Enders: Applied Econometric Time Series, 2nd Ed., 1994
- Granger/Newbold: Forecasting Economic Time Series 2nd. Ed.
- Pindyck/Rubinfeld: Econometric Models and Economic Forecasts, 1998
- Elton/Gruber: Modern Portfolio Theory and Investment Analysis, 1995
- Byrne, Peter, Decision-Making in Property Development, 2nd Ed. 1996

Course: Statistical Methods in Financial Risk Management Course key: [25353]

Lecturers: Svetlozar Rachev
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Statistical Methods in Risk Management [IW4STAT2] (S. 54), Risk Management and Econometrics in Finance [IW4STAT3] (S. 55)

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).

Prerequisites
None.

Conditions
None.

Learning Outcomes
Introduction of statistical methods, topics commonly covered by courses on advanced statistics and econometrics supplemented by the latest scientific results in this area

Content
Financial risk management in financial instruments (risk indicators: Single Fixed Flow,Fixed Rate Bond, FRA, Interest Rate Futures, Interest Rate Swaps, FX Spot, FX Forward, “Plain Vanilla” Optionen) and portfolios (risk indicators: Pricing Environment, Interest Rate Factors, FX factors), credit risk, value-at-risk (VAR) and
asset liability management, evaluation of calibration models and measures of success in risk models, determination of operativ risk in the finacial industry.

Media
transparencies, exercises.

Basic literature
To be announced in lecture.

Course: Bank Management and Financial Markets, Applied Econometrics Course key: [25355]

Lecturers: Karl-Heinz Vollmer
Credit points (CP): 5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Bierwag: Duration-Analysis; Managing Interest Rat Risk, 1987
- Andrew Harvey: The Econometric Analysis of Time Series, 2nd. Ed. 1993
- Andrew Harvey: Time Series Models, 2nd. Ed. 1994
- Granger/Newbold: Forecasting Economic Time Series; 2nd. Ed. 1986
- Pindyck, Rubinfeld: Econometric Models and Economic Forecasts, 1998
- B. Rolfes: Gesamtbanksteuerung, 1999

Course: Portfolio and Asset Liability Management — Course key: [25357]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53), Statistical Methods in Risk Management [IW4STAT2] (S. 54)

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).

Prerequisites
None.

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.

Basic literature
To be announced in lecture.

Complementary literature
To be announced in lecture.

Course: Financial Time Series and Econometrics — Course key: [25359]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53), Risk Management and Econometrics in Finance [IW4STAT3] (S. 55)

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).

Prerequisites
None.

Conditions
None.

Learning Outcomes
After successful completion of the course students will have the knowledge and qualification to comprehend the essential models -incl. state of the arts science- in financial econometrics, as well as risk measurement and management.

Content
Linear financial time series models: ARMA, ARIMA and forecasting, integrated time series models and so called long memory processes.
Non linear financial time series models: test for odyssey properties, stochastic variance and ARCH-process, regime switching models, test for non linearity, root of unit test and cointegration

Media
transparencies lecture, exercises

Basic literature
Mills: The Econometric Modelling Of Financial Markets. Cambridge University Press.

Course: Game Theory II

Course key: [25369]

Lecturers: Siegfried Berninghaus
Credit points (CP): 4.5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applied Strategic Decisions [IW4VWL2] (S. 44)

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

Prerequisites
See corresponding module information.
Basic knowledge of mathematics and statistics is assumed.

Conditions
None.

Learning Outcomes
This course teaches advanced knowledge in strategic decision theory. Latest developments in game theory are discussed. The student learns to judge complex strategic problems and to offer adequate solutions.

Content
This lecture aims at apmplifying the students' knowledge in game theory. Main topics are further concepts of non-cooperative game theory, cooperative game theory, evolutionary game theory and bargaining theory.

Media
Folien, Übungsblätter.

Basic literature

- Berninghaus/Ehrhart/Güth, Strategische Spiele, 2. Auflage, Springer Verlag, 2006
- van Damme, Stability and Perfection of Nash Equilibria, 2. Auflage, Springer Verlag, 1991

Complementary literature

- Aumann/Hart (edts.), Handbook of Game Theory I-III, Elsevier Publishers, North Holland, 1992/1994/2002

Course: Experimental Economics — Course key: [25373]

Lecturers: Siegfried Berninghaus, Bleich
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Market Engineering [IW4BWLISM3] (S. 21), Applied Strategic Decisions [IW4VWL2] (S. 44)

Learning Control / Examinations
The assessment consists of an 80 min written exam. The lecturer may offer the opportunity to reach up to 10 points by writing a seminar thesis and a presentation to an individually announced topic.

Prerequisites
See corresponding module information.

Conditions
None.

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 market equilibria, 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.

Complementary 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.

Course: Data Mining — Course key: [25375]

Lecturers: Gholamreza Nakhaeizadeh
Credit points (CP): 5 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Statistical Methods in Risk Management [IW4STAT2] (S. 54)

Learning Control / Examinations

Prerequisites
None.

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

Basic 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: Advanced Econometrics of Financial Markets Course key: [25381]

Lecturers: Svetlozar Rachev
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Mathematical and Empirical Finance [IW4STAT1] (S. 53), Risk Management and Econometrics in Finance [IW4STAT3] (S. 55)

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).

Prerequisites
None.

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.

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

Course: Auction Theory — Course key: [25408]

Lecturers: Karl-Martin Ehrhart, Stefan Seifert
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Engineering [IW4BWLISM3] (S. 21), Communications & Markets [IW4BWLISM5] (S. 23), Applied Strategic Decisions [IW4VWL2] (S. 44)

Learning Control / Examinations
Written exam of 80 mins (§4(2), 1 SPO). Exam is offered each semester.

Prerequisites
We suggest to attend either Game Theory I or Economics of Uncertainty beforehand.

Conditions
None.

Learning Outcomes
The student
- understands problems of auction design and empirical methods,
- designs and analyzes auction desgins,
- evaluates empirically demo-experiments.

Content
Auction theory is based on game theory. Practical aspects and experiences are also discussed. Main topics are: Single- and multi-unit auctions, procurement auctions, license auctions, electronic auctions (e.g. eBay, C2C, B2B), multi-attributive auctions.

Complementary literature
Berninghaus, S., K.-M. Ehrhart und W. Güth: Strategische Spiele, 2nd extended edition, Springer Verlag, 2006
- Krishna, V.: Auction Theory, Academic Press,2002
- Kräkel, M.: Auktionstheorie und interne Organisation, Gabler Verlag, 1992
- 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: Facility Location and Strategic Supply Chain Management Course key: [25486]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

Learning Control / Examinations
The assessment consist of a written exam (120 min) according to Section 4 (2), 1 of the examination regulation.
The exam takes place in every semester.

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

Conditions
None.

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.

Complementary 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 lecture is offered in every summer term.
The planned lectures and courses for the next three years are announced online.

Course: Tactical and Operational Supply Chain Management Course key: [25488]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

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.

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

Conditions
None.

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.

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

Course: Seminar in Discrete Optimization — Course key: [25491]

Lecturers: Stefan Nickel
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

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

Conditions
Attendance is compulsory.
If possible, at least one module of the institute should be taken before attending the seminar.

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 current topic of the seminar will be announced at the end of the preceding term on the internet.

Basic literature
Literature and relevant sources will be announced at the beginning of the seminar.

Remarks
The seminar is offered in each term.

Course: Welfare Economics — Course key: [25517]

Lecturers: Clemens Puppe
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Allocation and Equilibrium [IW4VWL7] (S. 45), Social Choice Theory [IW4VWL9] (S. 47)

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.
The exam takes place in every semester. Re-examinations are offered at every ordinary examination date.

Prerequisites
The courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014] have to be completed beforehand.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- J. Rawls: *A Theory of Justice*. Harvard University Press (1971)
- J. Roemer: *Theories of Distributive Justice*. Harvard University Press (1996)

Course: Game Theory I — Course key: [25525]

Lecturers: Siegfried Berninghaus
Credit points (CP): 4.5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Applied Strategic Decisions [IW4VWL2] (S. 44), Social Choice Theory [IW4VWL9] (S. 47)

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.

Prerequisites
Basic knowledge of mathematics and statistics is assumed.
See corresponding module information.

Conditions
None.

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.

Basic 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

Complementary literature
- Binmore, Fun and Games, DC Heath, Lexington, MA, 1991

Course: Advanced Microeconomic Theory — Course key: [25527]

Lecturers: Clemens Puppe
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Allocation and Equilibrium [IW4VWL7] (S. 45)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Decision Theory and Objectives in Applied Politics — Course key: [25537]

Lecturers: Tangian
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Social Choice Theory [IW4VWL9] (S. 47)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Mathematical Theory of Democracy

Course key: [25539]

Lecturers: Tangian
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Social Choice Theory [IW4VWL9] (S. 47)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Theory of Economic Growth — Course key: [25543]

Lecturers: Marten Hillebrand
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Macroeconomic Theory [IW4VWL8] (S. 46)

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.

Prerequisites
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Conditions
None.

Learning Outcomes

Content

Course: Theory of Business Cycles — Course key: [25549]

Lecturers: Marten Hillebrand
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 3
Teaching language: Englisch
Part of the modules: Allocation and Equilibrium [IW4VWL7] (S. 45), Macroeconomic Theory [IW4VWL8] (S. 46)

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.

Prerequisites
Basic knowledge in micro- and macroeconomics, as conveyed in the courses *Economics I: Microeconomics* [25012] and *Economics II: Macroeconomics* [25014], is assumed.
According the focus of the course quantitativ-mathematical modelling should be in participiant's interest.

Conditions
None.

Learning Outcomes

Content

Complementary 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: Quality Control II — Course key: [25659]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with quality assurance I. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The lecture provides students with knowledge of modern techniques in reliability engineering.

Content
See module.

Media
Blackboard, Slides, Flash Animations.

Basic literature
Lecture Notes

Complementary literature
- BARLOW, R.E., PROSCHAN, F.: Statistische Theorie der Zuverlässigkeit. Harri Deutsch, Thun-Frankfurt, 1978.
- 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: Simulation I — Course key: [25662]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

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).

Prerequisites
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [25040] and *Introduction to Operations Research II* [25043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].

Conditions
None.

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: Discrete event simulation, generation of random numbers, generating discrete and continous random variables, statistical analysis of simulated data, variance reduction techniques, case studies.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Basic literature

- Lecture Notes
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Complementary 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 — Course key: [25665]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

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).

Prerequisites
Foundations in the following fields are required:

- Operations Research, as lectured in *Introduction to Operations Research I* [25040] and *Introduction to Operations Research II* [25043].
- Statistics, as lectured in *Statistics I* [25008/25009] and *Statistics II* [25020/25021].
- *Simulation I*[25662]

Conditions
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

Basic literature

- Skript
- K.-H. Waldmann / U. M. Stocker: Stochastische Modelle - Eine anwendungsorientierte Einführung; Springer (2004).

Complementary 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: Quality Control I — Course key: [25674]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

Learning Control / Examinations
The assessment consists of an 2h written exam following §4(2), 1 SPO combined with quality management II. Credit from the voluntary computer lab is accounted for in the overall grade raising the exam grade by 0.3.

Prerequisites
None.

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
See module.

Media
Blackboard, Slides, Flash Animations.

Basic literature
Lecture Notes

Complementary literature
- Montgomory, 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: Markov Decision Models II — Course key: [25682]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Optimization in a Random Environment — Course key: [25687]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1/2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

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).

Prerequisites
None.

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.

Content
See module.

Media
Blackboard, Slides, Flash Animations, Simulation Software

Basic literature
Lecture Notes.

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Special Topics of Efficient Algorithms — Course key: [25700sp]

Lecturers: Hartmut Schmeck
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Organic Computing [IW4INAIFB8] (S. 89)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: Algorithms for Internet Applications — Course key: [25702]

Lecturers: Hartmut Schmeck
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Intelligent Systems and Services [IW4INAIFB5] (S. 86), Ubiquitous Computing [IW4INAIFB7] (S. 88)

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) (the bonus exam may be split into several shorter written tests).
The grade of this course is the achieved grade in the written examination. If this grade is at least 4.0 and at most 1.3, a passed bonus exam will improve it by one grade level (i.e. by 0.3 or 0.4).

Prerequisites
None.

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, - the architectures and methodologies of firewalls.

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 (firewalls), data compression, distributed computing on the Internet.

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

Basic 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.

Complementary literature
- Further references will be given in the course.

Course: Organic Computing — Course key: [25704]

Lecturers: Hartmut Schmeck, Sanaz Mostaghim
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60), Ubiquitous Computing [IW4INAIFB7] (S. 88), Organic Computing [IW4INAIFB8] (S. 89)

Learning Control / Examinations
The assessment of this course consists of a written examination (60 min) (following §4(2), 1 SPO) and of submitting written papers or of writing an additional examination (called "bonus exam", 60 min) (following §4(2), 3 SPO). The exam will be offered every second semester (summer term) and may be repeated at every ordinary exam date.

Prerequisites
None.

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).

Basic 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.

Complementary 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: Nature-inspired Optimisation — Course key: [25706]

Lecturers: Sanaz Mostaghim, Pradhyum Shukla
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60), Organic Computing [IW4INAIFB8] (S. 89)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Distributed Database Systems: Basic Technology for e-Business Course key: [25722]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Development of Distributet Business Information Systems [IW4INAIFB10] (S. 91)

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.

Prerequisites
Knowledge of course *Database Systems and XML* [25724] is expected.

Conditions
None.

Learning Outcomes
Students are familiar with the requirements and limitations of distributed database systems. Based on sound theoretical basis and practical exercises, they are able to design and build a distributed database system. They know methods to ensure error-free operation and the consistency of distributed databases and they are able to identify and to assess current and future application areas of distributed database systems. Furthermore, they know how to use them taking into account aspects of economy.

Content
This lecture deals with tasks in spatially distributed data management under special consideration of aspects of economy. Based on existing general knowledge in the field of database systems, the following topics will be addressed among other things: networked systems, design of distributed databases, distributed transaction concepts, request handling in distributed databases, distributed multi-user control, distributed error handling, and distributed data management on the internet.

Media
Slides, access to internet resources.

Basic literature
- P. Dadam: Verteilte Datenbanken und Client/Server-Systeme. Springer 1996
- M. T. Özsu, P. Valduriez: Principles of Distributed Database Systems. Prentice-Hall 1991

Complementary literature
Further literature is given in each lecture.

Course: Database Systems and XML — Course key: [25724]

Lecturers: Andreas Oberweis
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intelligent Systems and Services [IW4INAIFB5] (S. 86), eCollaboration [IW4INAIFB9] (S. 90)

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.

Prerequisites
None.

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.

Basic 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: Document Management and Groupware Systems Course key: [25735]

Lecturers: Stefan Klink
Credit points (CP): 4 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: eCollaboration [IW4INAIFB9] (S. 90)

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).

Prerequisites
None.

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.

Basic 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

Complementary literature
Further literature is given in each lecture individually.

Course: Knowledge Discovery — Course key: [25742]

Lecturers: Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intelligent Systems and Services [IW4INAIFB5] (S. 86)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Familiarity with fundamental knowledge discovery techniques, especially with standard supervised and unsupervised machine learning algorithms.

Content
The lecture gives an overview about machine learning techniques for knowledge discovery from large data sets. Core topics of the lectures are: CRISP process model, data warehouses and OLAP-techniques, visualization of large amounts of data, supervised learning techniques (in particular decision trees, neural networks, support vector machines and instance based learning), as well as unsupervised learning techniques (in particular association rules and clustering). Further, the lecture covers selected application scenarios such as e.g., Text Mining.

Media
Slides.

Basic literature
- Mitchell T: Machine Learning, 1997, McGraw-Hill.
- Berthold M, Hand D (eds): Intelligent Data Analysis, An Introduction, 2003, Springer.
- Witten IH, Frank E: Data Mining: Practical Machine Learning Tools and Techniques, 2005.
- Trevor Hastie and Robert Tibshirani and Jerome Friedman: The Elements of Statistical Learning, Springer Series in Statistics, Springer New York Inc. 2001

Complementary literature
None.

Course: Semantic Web Technologies I — Course key: [25748]

Lecturers: Rudi Studer, Sebastian Rudolph
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web Data Management [IW4INAIFB4] (S. 85)

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.

Prerequisites
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent.

Conditions
None.

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.

Basic 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.

Complementary 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.

Course: Semantic Web Technologies II — Course key: [25750]

Lecturers: Rudi Studer, Sudhir Agarwal
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web Data Management [IW4INAIFB4] (S. 85), Semantic Technologies [IW4INAIFB6] (S. 87)

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.

Prerequisites
Lectures on Informatics of the Bachelor on Information Management (Semester 1-4) or equivalent. *Semantic Web Technologies I* [25748] is recommended.

Conditions
none.

Learning Outcomes
- Detailed knowledge about the management and the usage of ontologies for Semantic Web Technologies
- Advanced skills in modelling knowledge for Semantic Web Technologies

Content
Building upon the content of the lecture “Semantic Web Technologies I”, the lecture covers methods for the realisation of intelligent systems on the world wide web and in other application domains. The lecture covers central aspects in the life cycle of ontologies and meta data, and in particular the following topics:
- Tools for managing metadaten and ontologies
- Knowledge representation using ontologies
- Semantic wikis
- Semantic Web Services
- Information integration
- Semantic Search
- Applications

Media
Slides.

Basic 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.

Complementary 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. Edition 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. Robin Milner. Communicating and Mobile Systems: The Pi Calculus.

Course: Complexity Management — Course key: [25760]

Lecturers: Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Organic Computing [IW4INAIFB8] (S. 89), eCollaboration [IW4INAIFB9] (S. 90)

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 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.

Prerequisites
A basic knowledge in informatics is suitable.

Conditions
None.

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.

Basic literature

- Franz Reither: Komplexitätsmanagement. Gerling Akademie Verlag, München 1997
- 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

Complementary 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.

Course: Intelligent Systems in Finance — Course key: [25762]

Lecturers: Detlef Seese
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intelligent Systems and Services [IW4INAIFB5] (S. 86)

Learning Control / Examinations
The assessment is a written examination.
See the German part for special requirements to be admitted for the examination.

Prerequisites
None.

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.

Basic 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.
- 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.

Complementary 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.

Course: IT Complexity in Practice — Course key: [25764]

Lecturers: Kreidler
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Development of Distributet Business Information Systems [IW4INAIFB10] (S. 91)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Will be announced in the lecture.

Course: Service Oriented Computing 1 Course key: [25770]

Lecturers: Stefan Tai
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Service Technology [IW4INAIFB1] (S. 82)

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).

Prerequisites
Lecture *AI2* [25033] is recommended.

Conditions
None.

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. In addition, software-as-a-service models and emerging trends (incl. Cloud Computing) will be presented and discussed. 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)
- Software-as-a-Service models
- Service intermediaries (markets)
- Mashups and situational applications
- Cloud computing

Media
Slides, access to internet resources.

Basic literature
Will be announced in the lecture.

Course: Service Oriented Computing 2 Course key: [25772]

Lecturers: Stefan Tai, Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Service Technology [IW4INAIFB1] (S. 82), Intelligent Systems and Services [IW4INAIFB5] (S. 86)

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).

Prerequisites
It is recommended to attend the course *Service-oriented Computing* [25770] beforehand.

Conditions
None.

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.

Basic literature
Literature will be announced in the lecture.

Course: Web Service Engineering — Course key: [25774]

Lecturers: Christian Zirpins
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Web Service Engineering [IW4INAIFB3] (S. 84), Development of Distributet Business Information Systems [IW4INAIFB10] (S. 91)

Learning Control / Examinations
The assessment consists of an oral exam (20 min) (following §4(2), 2 SPO).

Prerequisites
None.

Conditions
The course might be combined with the lectures “Applied Informatics II - IT Systems for e-Commerce” and “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.

Basic literature
Compulsory literature will be announced in the course.

Remarks
This course will be offered from summer term 2009 on.

Course: Cloud Computing

Course key: [25776]

Lecturers: Stefan Tai, Kunze
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Cloud Computing [IW4INAIFB2] (S. 83), Web Data Management [IW4INAIFB4] (S. 85)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Management of IT-Projects — Course key: [25784]

Lecturers: Roland Schätzle
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: eCollaboration [IW4INAIFB9] (S. 90)

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.

Prerequisites
None.

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.

Basic 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: Strategic Management of Information Technology Course key: [25788]

Lecturers: Thomas Wolf
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: eCollaboration [IW4INAIFB9] (S. 90)

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

Prerequisites
None.

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

Basic 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: n.n. Course key: [25791]

Lecturers: Ralf Kneuper
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Development of Distributet Business Information Systems [IW4INAIFB10] (S. 91)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Lab Class Web Services — Course key: [25820]

Lecturers: Stefan Tai, Rudi Studer, Gerhard Satzger, Christian Zirpins
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Service Technology [IW4INAIFB1] (S. 82), Cloud Computing [IW4INAIFB2] (S. 83), Web Service Engineering [IW4INAIFB3] (S. 84)

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.

Prerequisites
The lecture *Service Oriented Computing 1* [25772] is recommeded.

Conditions
None.

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 service value networks on the Internet. Based on concrete application scenarios for Web-based business service networks, 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.

Basic literature
For introduction, the following books are recommended:
- M. P. Papazoglou. Web Services: Principles and Technology. Pearson, 2007.
- G. Alonso, F. Casati, H. Kuno, and V. Machira ju. Web Services - Concepts, Architec-tures and Applications. Springer, 2004.

Specific literature will be announced in the course.

Course: Special Topics of Knowledge Management — Course key: [25860sem]

Lecturers: Rudi Studer
Credit points (CP): 5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Intelligent Systems and Services [IW4INAIFB5] (S. 86)

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.

Prerequisites
The lecture *Angewandte Informatik I - Modellierung* [25070] is a prerequisite.

Conditions
None.

Learning Outcomes
The students acquire the skills, methods and tools in one area of “knowledge management” to demonstrate their mastery and innovativeness.
This event aims at providing basic principles and methods in the context of the practical application of KM. On the basis of a fundamental understanding of these concepts and methods taught to students they 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 Knowledge Management
- Formal Concept Analysis

Complementary literature
Depends on the actual content.

Course: Management and Strategy — Course key: [25900]

Lecturers: Hagen Lindstädt
Credit points (CP): 4 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [IW4BWLUO1] (S. 38)

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.

Prerequisites
None.

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.

Basic 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: Managing Organizations — Course key: [25902]

Lecturers: Hagen Lindstädt
Credit points (CP): 4 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [IW4BWLUO1] (S. 38)

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.

Prerequisites
None.

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.

Basic literature
- Kieser, A.; Walgenbach, P.: *Organisation*. Schäffer-Poeschel, 4. Aufl. Stuttgart 2003.
- Robey, D.; Sales, C.A.: *Designing Organizations*, McGraw-Hill. 4. Aufl. Boston 1994.
- Scholz, C.: *Strategische Organisation*. 2. Aufl. Landsberg/Lech 2000.
- Staehle, W.H.: *Management*. Vahlen, 8. Aufl. München 1999.

The relevant excerpts and additional sources are made known during the course.

Course: Organization Theory — Course key: [25904]

Lecturers: Hagen Lindstädt
Credit points (CP): 6 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [IW4BWLUO1] (S. 38), Strategic Decision Making and Organization Theory [IW4BWLUO3] (S. 39)

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

Prerequisites
None.

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.

Basic 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: Modeling Strategic Decision Making — Course key: [25908]

Lecturers: Hagen Lindstädt
Credit points (CP): 6 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [IW4BWLUO1] (S. 38), Strategic Decision Making and Organization Theory [IW4BWLUO3] (S. 39)

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Prerequisites
None.

Conditions

Following § 17, 3 of „Prüfungsordnung Informationswirtschaft“ a seminar of this module has to be chosen and completed.

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.

Basic literature

- Eisenführ, F.; Weber, M.: *Rationales Entscheiden*. Springer, 4. Aufl. Berlin 2003.[1]
- Laux, H.: Entscheidungstheorie. Springer, 6. Aufl. Berlin 2003.[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: Value-Based Instruments of Corporate Strategy Course key: [25912]

Lecturers: Ulrich Pidun, Michael Wolff
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Strategic Corporate Management and Organization [IW4BWLUO1] (S. 38), Strategic Decision Making and Organization Theory [IW4BWLUO3] (S. 39)

Learning Control / Examinations
Written exam 100% following §4, Abs. 2.

Prerequisites
None.

Conditions
none.

Learning Outcomes
The course follows two learning objectives. Firstly, the course participants are presented with the key concepts and models on which the current approaches of value-based management are based in theory and practice. Secondly the course participants should be enabled to transfer the concepts presented to real situations. In order to achieve these learning objectives the connection to classical strategy development instruments is discussed first. Then the various value levers and the concepts of value-based corporate management are presented. This includes both external aspects (such as valuing acquisitions) as well as internal ones ("integrated value management") by value-based corporate management.

Content
- Strategy development in corporate groups
- Growth as a strategic value lever
- Strategic valuation of acquisitions
- Introduction to value management
- Integrated value-based corporate management
- Downsides of multi-business corporations

Media
Slides.

Basic literature
- Brealy, R.A./Myers, S.C. (2000): Principles of Corporate Finance

The relevant excerpts and additional sources are made known during the course.

Course: Seminar: Management and Organization — Course key: [25915]

Lecturers: Hagen Lindstädt
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

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.

Basic literature
The relevant sources are made known during the course.

Course: Seminar: Management and Organization — Course key: [25916]

Lecturers: Hagen Lindstädt
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
Completion of all 1st an 2nd year modules of the Bachelor Program or Admission to the Master Program.

Conditions
None.

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.

Basic literature
The relevant sources are made known during the course.

Course: Planning and Management of Industrial Plants Course key: [25952]

Lecturers: Frank Schultmann
Credit points (CP): 5.5 **Hours per week:** 2/2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production II [IW4BWLIIP2] (S. 40)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Basic literature
will be announced in the course

Course: Production and Logistics Management — Course key: [25954]

Lecturers: Magnus Fröhling, Frank Schultmann
Credit points (CP): 5.5 **Hours per week:** 2/2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production III [IW4BWLIIP6] (S. 41)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
Within this lecture the main topics of operational production and logistics planning are presented. This comprises structure and functions of of production planning and control systems (PPC systems) as well as enterprise resource planning systems (ERP systems) and Advanced Planning Systems (APS). Planning tasks and exemplary methods, e.g. for master production scheduling (MPS), material requirements planning (MRP I) (demand planning, lot sizing), as well as sequencing, scheduling and capacity planning are discussed. Based on the MRP II concept also integrated approaches for PPC are introduced. Finally an overview on PPC and Enterprise Resource Planning and Advanced Planning Systems that are available on the market are given.

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

Basic literature
will be announced in the course

Course: Strategical Aspects of Energy Economy — Course key: [25958]

Lecturers: Armin Ardone
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [IW4BWLIIP5] (S. 43)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Energy Policy

Course key: [25959]

Lecturers: Martin Wietschel
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

Learning Control / Examinations

Prerequisites
Keine.

Conditions
Keine.

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.

Basic literature
Will be anounced in the lecture.

Course: Exhaust Emissions (VWL), Emissions into the Environment (ING) Course key: [25962]

Lecturers: Ute Karl
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Industrial Production II [IW4BWLIIP2] (S. 40)

Learning Control / Examinations
The assessment consists of an oral exam (20 min) at the beginning of the recess period (according to Section 4(2),2 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Compilation of documents will be released in the lecture.

Course: The Management of R&D Projects with Case Studies Course key: [25963]

Lecturers: Helwig Schmied
Credit points (CP): 3.5 **Hours per week:** 2/2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production III [IW4BWLIIP6] (S. 41)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung.

Prerequisites
None.

Conditions
None

Learning Outcomes

Content

- The communication between R&D, Production and Marketing
- Problems concerning the measurement of the productivity of the R&D system
- Methods for improving the productivity of the R&D system
- Planning of R&D projects with the help of the Communication Matrix-Methods for controlling R&D projects´ progress
- The marketing of scientific competencies
- The Communication Matrix as tool for the implementation of simultaneous engineering
- Case studies

Basic literature
will be announced in the course

Course: Computer-based Planning and Control of Production and Simulation of Processes Course key: [25975]

Lecturers: Magnus Fröhling, Dominik Möst, Frank Schultmann
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production III [IW4BWLIIP6] (S. 41)

Learning Control / Examinations
The assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content
After an introduction into the structure, the history and still existent 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 planing models on the other hand. Finally, commercially available, industry-specific software tools are described, focussing on for production planning (PP) and materials management (MM) out of the mySAP ERP system from SAP. In this context the lecture is completed by computer-assisted courses in production planning and materials management with the help of the mySAP ERP system from SAP.

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

Basic literature
will be announced in the course

Course: Material Flow Analysis and Life Cycle Assessment Course key: [25995]

Lecturers: Liselotte Schebek
Credit points (CP): 3.5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Industrial Production II [IW4BWLIIP2] (S. 40)

Learning Control / Examinations
The assessment consists of a written test paper at the end of term according to Section 4(2), 3 of the examination regulation.

Prerequisites
None.

Conditions
None.

Learning Outcomes

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.

Basic literature
will be annouced in the course

Course: Basics of Liberalised Energy Markets Course key: [25998]

Lecturers: Wolf Fichtner
Credit points (CP): 3.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Course: Technological Change in Energy Industry — Course key: [26000]

Lecturers: Martin Wietschel
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [IW4BWLIIP5] (S. 43)

Learning Control / Examinations
The assessment consists of a written exam.

Prerequisites
Keine.

Conditions
Keine.

Learning Outcomes

Content

Course: Heat Economy — Course key: [26001]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [IW4BWLIIP5] (S. 43)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Energy Systems Analysis — Course key: [26002]

Lecturers: Dominik Möst
Credit points (CP): 3 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [IW4BWLIIP5] (S. 43)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Energy and Environment

Course key: [26003]

Lecturers: Ute Karl, n.n.
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Energy Industry and Technology [IW4BWLIIP5] (S. 43)

Learning Control / Examinations
The assessment consists of a written exam.

Prerequisites
Keine.

Conditions
None.

Learning Outcomes

Content

Course: Energy Trade and Risk Management — Course key: [26020]

Lecturers: Kai Hufendiek
Credit points (CP): 3.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Gas-Markets Course key: [26022]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Simulation Game in Energy Economics — Course key: [26025]

Lecturers: Wolf Fichtner
Credit points (CP): 3 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes
See module description.

Content

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

Course: Regulation Theory and Practice — Course key: [26234]

Lecturers: Kay Mitusch
Credit points (CP): 4 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Basics of Liberalised Energy Markets [IW4BWLIIP4] (S. 42)

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.

Prerequisites
Basic knowledge of microeconomics and skills of undergraduate studies or a bachelor´s degree are required.
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.

Conditions
May not be examined, when te examination of *Regulation* [26026] was already taken.

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.

Basic literature
Literature and lecture notes are handed out during the course.

Remarks
Dr. Kopp´s lecture *Regulation* [26206] (held for the last time in the WT 09/10) is substituted by the lecture *Regulation Theory and Practice* [26234] by Prof. Mitusch (held for the first time in the ST 10); only one of these lectures can be taken into account.

Course: Life and Pensions

Course key: [26310]

Lecturers: Christian Hipp, Vogt, Besserer
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [IW4BWLFBV4] (S. 27)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
E. Neuburger, Mathematik und Technik betrieblicher Pensionszusagen, Karlsruhe, 1997
H.U. Gerber. Lebensversicherungsmathematik. Berlin 1986
F. Isenbart, H. Münzer, Lebensversicherungsmathematik für Praxis und Studium. Wiesbaden
Ahrendt/Förster/Rößler: Steuerrecht der betrieblichen Altersversorgung Band I und II, Köln
Andresen/Förster/Rößler/Rühmann: Arbeitsrecht der betrieblichen Altersversorgung, Band I und II, Köln
R. Höfer, Reinhold, Gesetz zur Verbesserung der betrieblichen Altersversorgung. Kommentar, München
Schriftenreihe Angewandte Versicherungsmathematik - Heft 25 -

Course: Reinsurance — Course key: [26312]

Lecturers: Christian Hipp, Stöckbauer
Credit points (CP): 4.5 **Hours per week:** 4
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [IW4BWLFBV4] (S. 27)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Pfeiffer, C.: Einführung in die Rückversicherung, Wiesbaden, Gabler, 1986.
Mack: Schadenversicherungsmathematik. Schriftenreihe angewandte Versicherungsmathematik Band 28. Verlag VW Karlsruhe.
Embrechts, Klüppelberg, Mikosch: Modelling Extremal Events. Springer 1998.

Course: Insurance Optimisation

Course key: [26316]

Lecturers: Christian Hipp
Credit points (CP): 4.5 **Hours per week:** 3
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [IW4BWLFBV4] (S. 27)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Korn, R. Optimal Portfolios. World Scientific 1997
- Taksar, M. Optimal Risk/Dividend Distribution Control Models: Applications to Insurance. Math.Meth.OR 2000
- Hipp, C. und Plum, M. Optimal investment for an investor with state dependent income, and for insurers. Finance and Stochastics 2003.
- Hipp, Vogt: Optimal Dynamic Reinsurance. ASTIN Bulletin, Vol 33 2003.

Course: Insurance Accounting — Course key: [26320]

Lecturers: Ute Werner, Ludwig
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [IW4BWLFBV6] (S. 28)

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).

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Marketing — Course key: [26323]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [IW4BWLFBV6] (S. 28)

Learning Control / Examinations
The assessment consists of an oral exam (according to Section 4 (2), 2 of the examination regulation) and oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation).
The overall grade consists of the valuation of the oral presentations (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature

- Farny, D.. Versicherungsbetriebslehre (Kapitel III.3 sowie V.4). Karlsruhe 2006
- Kurtenbach / Kühlmann / Käßer-Pawelka. Versicherungsmarketing. . . . Frankfurt 2001
- Wiedemann, K.-P./Klee, A. Ertragsorientiertes Zielkundenmanagement für Finanzdienstleister, Wiesbaden 2003

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Production — Course key: [26324]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [IW4BWLFBV6] (S. 28)

Learning Control / Examinations
The assessment consists of an oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
P. Albrecht. Zur Risikotransformationstheorie der Versicherung: Grundlagen und ökonomische Konsequenzen. Mannheimer Manuskripte zur Versicherungsbetriebslehre und Risikotheorie Nr. 36
D. Farny. Versicherungsbetriebslehre. 2006.
H. Neugebauer. Kostentheorie und Kostenrechnung für Versicherungsunternehmen. 1995
A. Wiesehan. Geschäftsprozessoptimierung für Versicherungsunternehmen. München 2001

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Enterprise Risk Management — Course key: [26326]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [IW4BWLFBV9] (S. 30)

Learning Control / Examinations
The assessment consists of an oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

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 optimization approaches that allow to consider area-specific objectives, risk-bearing capacity and risk acceptance.

Content
1. Concepts and practice of risk management, based on decision theory
2. Goals, strategies and measures 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.

Basic 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.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Service Management — Course key: [26327]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [IW4BWLFBV6] (S. 28)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation). The overall grade consists of the valuation of the oral presentation (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Ch. Belz, T. Bieger. Dienstleistungskompetenz und innovative Geschäftsmodelle, St. Gallen 2002.
M. Bruhn. Qualitätsmanagement für Dienstleistungen. 2. Aufl. Berlin 1997.
H. Corsten. Betriebswirtschaftslehre der Dienstleistungsunternehmen: Einführung. 2. Aufl. 1990.
A. Lehmann. Dienstleistungsmanagement: Strategien und Ansatzpunkte zur Schaffung von Service... 1995.
H. Meffert, M. Bruhn. Dienstleistungsmarketing: Grundlagen - Konzepte – Methoden. 2. Aufl. Wiesbaden 1997

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Multidisciplinary Risk Research — Course key: [26328]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [IW4BWLFBV10] (S. 31)

Learning Control / Examinations
The assessment consists of oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end o the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

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 case studies.

Content
The course consists of two chapters:
In the theoretical part risk concepts of various disciplines will be 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 the 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 will be discussed. Specific problems in the context of intercultural research will be considered too.

Basic 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.
- http://www.bevoelkerungsschutz.ch
- M. Nippa. Risikoverhalten von Managern bei strategischen Unternehmensentscheidungen – eine erste Annäherung. 1999.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Insurance Risk Management — Course key: [26335]

Lecturers: Ute Werner, Maser
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [IW4BWLFBV7] (S. 29)

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) .

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary 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. To attend the course please register at the secretariat of the chair of insurance science.

Course: Risk Controlling in Insurance Groups — Course key: [26336]

Lecturers: Ute Werner, Müller
Credit points (CP): 2 **Hours per week:** 1/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [IW4BWLFBV7] (S. 29)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
H. Perlet. Controlling im internationalen Versicherungskonzern.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: Saving Societies — Course key: [26340]

Lecturers: Christian Hipp, N.N.
Credit points (CP): 4,5 **Hours per week:** 3/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Applications of Actuarial Sciences I (BWL) [IW4BWLFBV4] (S. 27)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Degner, J./Röher, A.: Die Bausparkassen, 6. Auflage 1986, Fritz Knapp Verlag Frankfurt/M.
Laux, H.: Die Bausparfinanzierung. Die finanziellen Aspekte des Bausparvertrages als spar- und Kreditinstrument, 6. Auflage 1992, Verlag Recht und Wirtschaft GmbH, Heidelberg.
Laux, H.: Bausparwissen für Bankkaufleute, Baufinanzierungs- und Anlageberater, 6. Auflage 1993, Fritz Knapp Verlag, Frankfurt/M.
Laux, H.: Bauspartarife, 1988, Heft 20 der Schriftenreihe Angewandte Versicherungsmathematik, Verlag Versicherungswirtschaft e.V., Karlsruhe.
Schäfer, O./Cirpka, E./Zehnder, A.J.: Bausparkassengesetz und Bausparkassenverordnung, Kommentar, 5.Auflage 1999, Domus-Verlag GmbH, Bonn.

Course: Current Issues in the Insurance Industry — Course key: [26350]

Lecturers: Ute Werner, Heilmann
Credit points (CP): 2.5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management II [IW4BWLFBV7] (S. 29)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Schwebler, Knauth, Simmert. Kapitalanlagepolitik im Versicherungsbinnenmarkt. 1994
Seng. Betriebliche Altersversorgung. 1995
von Treuberg, Angermayer. Jahresabschluss von Versicherungsunternehmen. 1995

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: International Risk Transfer — Course key: [26353]

Lecturers: Wolfgang Schwehr
Credit points (CP): 2,5 **Hours per week:** 2/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [IW4BWLFBV9] (S. 30)

Learning Control / Examinations

Prerequisites
None.

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.

Basic literature

- K. Geratewohl. Rückversicherung: Grundlagen und Praxis Band 1-2.
- Brühwiler/ Stahlmann/ Gottschling. Innovative Risikofinanzierung - Neue Wege im Risk Management.
- Becker/ Bracht. Katastrophen- und Wetterderivate.

Complementary literature

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.

Course: Risk Management of Microfinance and Private Households Course key: [26354]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [IW4BWLFBV10] (S. 31)

Learning Control / Examinations
The assessment consists of oral presentations within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation).
The overall grade consists of the valuation of the oral presentation and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Becoming acquainted with starting points for analysing the special risk situation of private households and micro enterprises; learning to synchonize 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), and we´ll discuss approaches for performance measurement from the perspectives of customers, suppliers, and investors.

Basic 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.

Complementary literature
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Public Sector Risk Management — Course key: [26355]

Lecturers: Reinhard Mechler
Credit points (CP): 2,5 **Hours per week:** 2/0
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [IW4BWLFBV9] (S. 30), Operational Risk Management II [IW4BWLFBV10] (S. 31)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
In additin to theoretical and methodological principles of risk research, operative risk management by various institutions and the corresponding characteristics of risk transfer are discussed in this course. As public households often act as “risk carriers of last resort”, i.e. carry risks that other institutions don´t prepare for, their risk management becomes increasingly important on an economic, social und political level.

Content
1. Risk concepts, risk management and the role of the public sector
2. Quantitative and qualitative methods of risk management
3. Problem areas of public sector risk management

- Natural catastrophes
- Climate change
- Aging and social insurance
- Large-scale projects
- Terrorism

Basic literature
P. Bernstein. Against the Gods. Wiley, New York.
M. Fone / P. Young. Public Sector Risk Management, Butterworth Heinemann, Oxford
B. Flyvbjerg / N. Bruzelius / W. Rothengatter. Megaprojects and Risk: An Anatomy of Ambition. Cambridge University Press, Cambridge 2003.
A. Schick / H. Polackova Brixi. Government at Risk. World Bank and Oxford University Press, Washington DC 2004

Remarks
Block course. Please register at the secretariat of the chair of insurance science.

Course: Insurance Contract Law — Course key: [26360]

Lecturers: Ute Werner, Schwebler
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Insurance Management I [IW4BWLFBV6] (S. 28), Insurance Management II [IW4BWLFBV7] (S. 29)

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

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Römer/ Langheid. Versicherungsvertragsgesetz. 2. Auflage, München 2002. Schimikowski, Versicherungsvertragsrecht, 3. Auflage, München 2004. Weyers/ Wandt, Versicherungsvertragsrecht, 3. Auflage, Köln 2003.

Remarks
Block course. To attend the course please register at the secretariat of the chair of insurance science.
The course is offered extraordinarily in winter term 2009/10.

Course: Project Work in Risk Research — Course key: [26393]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management II [IW4BWLFBV10] (S. 31)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) and of the participation in working groups (according to Section 4 (2), 3 of the examination regulation).

Prerequisites
Willingness to work through literature beforehand in order to understand the topic better.

Conditions
None.

Learning Outcomes

Content

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Risk Communication — Course key: [26395]

Lecturers: Ute Werner
Credit points (CP): 4.5 **Hours per week:** 3/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operational Risk Management I [IW4BWLFBV9] (S. 30)

Learning Control / Examinations
The assessment consists of an oral presentation (incl. elaboration) within the lecture (according to Section 4 (2), 3 of the examination regulation) and an oral exam at the end of the semester (according to Section 4 (2), 2 of the examination regulation). The overall grade consists of the valuation of the oral presentation (incl. elaboration) and the valuation of the oral exam.

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary 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
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Management of Business Networks — Course key: [26452]

Lecturers: Christof Weinhardt, Jan Kraemer
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Service Management [IW4BWLISM6] (S. 24)

Learning Control / Examinations
The total grade for this lecture will consist to 50% of the grade achieved in the written mid term examination, to 10% of the assignments during the exercises, and to 40% of a project work, which includes a term paper and a presentation.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student will become acquainted with the theoretical fundamentals of economic networks and how to manage them. Support of economic networks by information systems will be accomplished by several case studies, which will be worked on by groups autonomously. Basic knowledge of organisation theory, network analysis, strategic & operative management and logic systems will be communicated to the student. Furthermore, he will have a focused view on the mechanisms and supporting tools for interaction between companies, especially in negotiations and negotiation-supporting systems. In small groups, the student is trained in team-oriented and autonomous working techniques. Within this domain, the student will be trained to seek and read relevant technical literature in English, the language of science, and to adopt it to a specific problem.

Content
The significant and lasting impact of web-based business-to-business (B2B) networks has just recently become apparent. The exploratory phase during the first Internet hype bred a variety of approaches which were often bold in business nature, yet simple and unfounded in system architecture. Only very few survived and proved sustainable. Nowadays web-based B2B networks are increasingly reappearing and even promoted by major traditional companies and governments. However, this new wave of networks is more mature and more powerful in functionality than their predecessors. As such they provide not only auction systems but also facilities for electronic negotiation. This implies a shift from price-focused to relationship-oriented trading. But what motivates this shift? Why do firms enter business networks? How can these networks be best supported by IT? The course intends to resolve these questions. Firstly, an introduction in organization theory will be given. Secondly, the problems of networks will be addressed. Thirdly, an analysis of how IT can alleviate those problems will be undertaken.

Media
Powerpoint presentations, recorded lecture available on the internet, (if circumstances allow videoconferencing).

Basic literature

- Milgrom, P., Roberts, J., Economics, Organisation and Management. Prentice-Hall, 1992.
- Shy, O., The Economics of Network Industries. Cambridge, Cambridge University Press, 2001.
- Bichler, M. The Future of e-Markets - Multi-Dimensional Market Mechanisms. Cambridge, Cambridge University Press, 2001.

Course: eFinance: Information Engineering and Management for Securities TradingCourse key: [26454]

Lecturers: Christof Weinhardt, Ryan Riordan
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Market Engineering [IW4BWLISM3] (S. 21)

Learning Control / Examinations
70% of the mark is based on the written examination and 30% is based on assignments during the exercises.

Prerequisites
None.

Conditions
None.

Learning Outcomes
The goal of the lecture is to make the students familiar with the theoretical as well as the practical aspects of electronic trading and exchanges and the IT systems used in the financial industry. While markets for products and services are discussed, the focus is on the trading of financial securities. Existing centralized equity exchanges face competition from new alternative trading systems make possible by today´s information technology. This course will also examine the impact and implications of this dynamic. The focus is on the economic and technical design of markets as information processing systems.

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

Basic 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

Complementary 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: Business Models in the Internet: Planning and Implementation Course key: [26456]

Lecturers: Christof Weinhardt, Carsten Holtmann
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Business & Service Engineering [IW4BWLISM4] (S. 22)

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.

Prerequisites
None.

Conditions
None

Learning Outcomes
This lecture aims at providing the students with knowledge about the lifecycles of web applications starting from economic concepts to the commercialization within the WWW. Students will learn, on the one hand, to analyze, design and to implement web applications and, on the other hand, to develop sustaining business models. This involves the analysis of the online users´ requirements and expectations, the assessment of the potential innovative web applications have, the study of web technologies allowing students to gauge their applicability.

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, (if circumstances allow videoconferencing)

Basic literature
Will be announced within the course.

Course: Computational Economics — Course key: [26458]

Lecturers: Jürgen Branke, Clemens van Dinther
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Market Engineering [IW4BWLISM3] (S. 21)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The Student should become acquainted with the methods of Computational Economics and be able to put them into practice. The focus is on two important modelling concepts “System Dynamics” and “Agent Models”, including the most important mathematical fundamentals. The goal is to understand the challenge and the possibilities of the modelling of limited rational behaviour and of ability to learn. The students should know the advantages and disadvantages of the different models and be able to use them according to the situation and to evaluate them with the help of adequate statistical methods for analyzing simulation results. Furthermore, the student should be able to apply the acquired knowledge adequately in practice. Therefore practical scenarios will be modelled and analyzed. The students should be capable of finding arguments for the chosen solutions and express them to others.

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 to model 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 modeled 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.

Basic 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 sciencces. CSED Working Paper No. 17, The Brookings Institution, 2000.
- K. Judd, Numerical Methods in Economics”. MIT Press, 1998, Kapitel 6-7.
- C. W. Kirkwood: SSystem dynamics methods - a quick introduction.
- A. M. Law and W. D. Kelton: “Simulation Modeling and Analysis”, McGraw-Hill, 2000.
- R. Sargent, SSimulation model verification and validation”. Winter Simulation Conference, 1991.
- L. Tesfation: Notes on LearningÏSU Technical Report, 2004.
- L. Tesfatsion, Ägent-based computational economics”. ISU Technical Report, 2003.

Complementary 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.

Course: Market Engineering: Information in Institutions Course key: [26460]

Lecturers: Christof Weinhardt, Jan Kraemer
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Electronic Markets [IW4BWLISM2] (S. 20), Market Engineering [IW4BWLISM3] (S. 21), Communications & Markets [IW4BWLISM5] (S. 23), Applied Strategic Decisions [IW4VWL2] (S. 44)

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.

Prerequisites
None.

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

Basic literature

1. Roth, A., The Economist as Engineer: Game Theory, Experimental Economics and Computation as Tools for Design Economics. Econometrica 70(4): 1341-1378, 2002.
2. Weinhardt, C. ,Holtmann, C., Neumann, D., Market Engineering. Wirtschaftsinformatik, 2003.
3. Wolfstetter, E., Topics in Microeconomics - Industrial Organization, Auctions, and Incentives. Cambridge, Cambridge University Press, 1999.
4. Smith, V. „Theory, Experiments and Economics“, The Journal of Economic Perspectives,Vol. 3, No. 1, 151-69 1989

Course: Communications Economics — Course key: [26462]

Lecturers: Stefan Seifert, Jan Kraemer
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Communications & Markets [IW4BWLISM5] (S. 23)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The lecture builds upon basic knowledge in game theory and particularly Industrial Organization. Students will be taught basic economic principles of the communications industry, in particular the economics of networks and digital goods. Moreover, provided with the toolsets of game-theory and industrial economics, students are taught how to formalize and then assess complex aspects of current regulatory and economic issues. Furthermore, students will be introduced to scientific work by reading and discussing supplementary research articles.

Content
The communications industry has become one of the key drivers for economic development and, following the liberalization of the sector in the late twentieth century, it has undergone a tremendous transformation. The lecture “Communications Economics” will not only provide students with a basic economic understanding of the communications sector by laying out the economic principles of network industries and digital goods, but also seeks to investigate business strategies, such as handset subsidies, flat rate tariffs or bundle pricing and regulatory challenges, such as Digital Convergence, call termination fees, separation of network infrastructure and services and efficient distribution of spectrum licenses.

Media
- Powerpoint,
- eLearning Platform Ilias

Basic literature
1. J.-J. Laffont, J. Tirole (2000): *Competition in Telecommunications*, MIT Press.
2. 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
3. Steger, U., Büdenbender, U., Feess, E., Nelles, D. (2008): *Die Regulierung elektrischer Netze: Offene Fragen und Lösungsansätze*, Springer
4. Varian, Hal (2006): “Intermediate microeconomics: a modern approach”, 7th edition (international student edition), Norton

Course: eServices — Course key: [26466]

Lecturers: Christof Weinhardt, Gerhard Satzger
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 3
Teaching language: Englisch
Part of the modules: Service Management [IW4BWLISM6] (S. 24)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
This lecture presents concepts, methods and application examples for the engineering and management of eServices. The students will get to know the basic principles and elements of eServices and their specific properties compared to physical goods. Creating eServices needs an overall view of information technology with regards to flexibility, safety, data security, measurability and cost allocation.
In addition, problems and solutions in designing and providing eServices are discussed; the elementary relationship to information management will also be treated. Application examples from industry stress the concepts´ application in the economy.

Content
So far, management studies usually focused on physical goods. However, due to the increasing development of information and communication technology, distribution of electronic services is becoming more important. Electronic services are characterized by an increasing degree of intangibility, interactivity and individuality. Traditional, goods-oriented models, methods and tools for are often found to be inadequate for service engineering and management.
Building on a systematic categorization of (e)Services, we cover concepts and foundations for engineering and managing IT-based services, allowing further specialization in subsequent courses. Topics include service innovation, service economics, service computing, transformation and coordination of service value networks as well as collaboration for knowledge intensive services.
In addition, application examples, guest lectures (e.g. business model changes driven by the advent of eServices) and a number of hands-on exercises will illustrate the applicability of the concepts.

Media
PowerPoint slides;

Course: Service Innovation — Course key: [26468]

Lecturers: Gerhard Satzger, Andreas Neus
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Business & Service Engineering [IW4BWLISM4] (S. 22), Service Management [IW4BWLISM6] (S. 24)

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.

Prerequisites
None.

Conditions
None.

Learning Outcomes
Understand the difference between innovation and invention, and that disruptive effects can be fast and wide-reaching.
Know examples for innovation via processes, organization, business models; see how service and product innovation differ
Understand the link between risk and innovation; be aware of obstacles to innovation and know how to address 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 of service innovation, open vs. closed innovation, how to leverage user communities to drive innovation and understand obstacles, and enablersand how to manage, incentivize and foster service innovation.

Basic 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

Complementary 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/DI/De
- 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: Seminar Service Science, Management & Engineering Course key: [26470]

Lecturers: Stefan Tai, Christof Weinhardt, Gerhard Satzger, Rudi Studer
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
Lecture *eServices* [26462] 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.

Course: Special Topics in Information Engineering & Management Course key: [26478]

Lecturers: Christof Weinhardt
Credit points (CP): 4.5 **Hours per week:** 3
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Business & Service Engineering [IW4BWLISM4] (S. 22), Communications & Markets [IW4BWLISM5] (S. 23)

Learning Control / Examinations
The student is evaluated based on the written and practical work, a presentation of the results in front of an audience and his contribution to the discussion.

Prerequisites
None.

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 encompases a documentation of the implemented work.

Media
- Power Point
- eLearning Plattform Ilias
- Software tools for development , if needed

Basic 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: http://www.im.uni-karlsruhe.de/lehre.
This lecture is first offered in the winter term 2009/10.

Course: Business and IT Service Management — Course key: [26484]

Lecturers: Gerhard Satzger
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Service Management [IW4BWLISM6] (S. 24)

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).

Prerequisites
None.

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 SOA-based 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)

Basic 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: Electronic Markets (Principles) Course key: [26502]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electronic Markets [IW4BWLISM2] (S. 20)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	104
1.3	98
1.7	92
2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

Prerequisites
None.

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.

Basic 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.

Complementary 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: Electronic Markets: Institutions and Market Mechanisms Course key: [26504]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Electronic Markets [IW4BWLISM2] (S. 20)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	104
1.3	98
1.7	92
2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

Prerequisites
None.

Conditions
None.

Learning Outcomes
The student
- specifies different organizational forms of electronic markets, classifies these markets according to their characteristics, and determines the optimal orginizational form for a given task
- defines markets in a structured way and knows the roles of the different players
- is aware of the possibilities and usage of nonlinear pricing and is able to set adequate tariffs

Content
The lecture treats the design of electronic markets. Therefore, interdependencies of market organization, market mechanisms, institutions and products are described and theoretical foundations are lectured.
The topics include:
- classification of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control
- ...

Within this course, we analyze in small groups different existing markts, the design of new markets, and the implementation of simple forms of auctions. An emphasis is set on the independent and careful study of relevant scientific articles and thereby the buildup of a collection on this topic.

Basic literature
Thomas Copeland and Fred Weston. Financial Theory and Corporate Policy. Addison-Wesley, Reading, 3 edition, 1988.
Philip Kotler. Marketing Management – analysis, planning, and control, Fourth Edition. Prentice Hall, 1980.
Paul Milgrom and John Roberts. Economics, Organisation and Management. Prentice Hall, 1 edition, 1992.
Michael E. Porter. Competitive Strategy : Techniques for Analyzing Industries and Competitors. Free Press, New York, 1998.

Complementary literature

Deutsche Börse AG. Xetra – market model stock trading rel. 7.0. Technical Report 11, Deutsche Börse AG, Deutsche Börse AG Neue Börsenstr. 1 60284 Frankfurt am Main, 09 2002.
Wiener Börse AG. DAS XETRA MARKTMODELL. Technical report, Wiener Börse AG, 2002.
Yakov Amihud and Haim Mendelson. Trading mechanisms and stock returns: An empirical investigation. The Journal of Finance, 42(3):533–553, 1987.
Martin Bichler. An experimental analysis of multi-attribute auctions. Decision Support Systems, 29, 2000.
Martin Bichler. Simulation multivariater Auktionen – Eine Analyse des OTC-handels mit Finanzderivaten. Wirtschaftsinformatik, 42(3):244–252, 2000.
Martin Bichler. The Future of e-Markets: Multidimensional Market Mechanisms. Cambridge University Press, Cambridge, 2001.
Carrie Beam and Arie Segev. Automated negotiations: A survey of the state of the art. Technical Report 97, Fisher Center for Information Technology and Marketplace Transformation, Haas School Business, University of California, Berkeley, 1997.
Steven J. Brams and Alan D. Taylor. Fair Division : From Cake-Cutting to Dispute Resolution. Cambridge University Press, Cambridge, 1996.
Steven J. Brams and Alan D. Taylor. The Win-Win Solution: Guaranteeing Fair Shares to Everybody. W.W. Norton, New York, 1999.
Edward R. Capen, Robert Clapp, and William Campbell. Competitive bidding in high- risk situations. Journal of Petroleum Technology, 23:641–653, 1971.
Thomas E. Copeland and Dan Galai. Information effects on the bid-ask spread. The Journal of Finance, 38(5):1457–1469, 1983.
Adrian Dragulescu. Applications of Physics to Economics and Finance: Money, Income, Wealth, and the Stock Market. PhD thesis, University of Maryland, College Park, 2002.
Sven De Vries and Rakesh Vohra. Combinatorial auctions: A survey. INFORMS Journal on Computing, 15(3):284–309, 2003.
Eugene F. Fama. Efficient capital markets: A review of theory and empirical work. The Journal of Finance, 25(2):383–417, May 1970.
Eugene F. Fama. Efficient capital markets: Reply. The Journal of Finance, 31(1):143–145, Mar 1976.
Eugene F. Fama. Efficient capital markets: Ii. The Journal of Finance, 46(5):1575–1617, Dec 1991.
Yuzo Fujishima, Kevin Leyton-Brown, and Yoav Shoham. Taming the computational complexity of combinatorial auctions: Optimal and approximate approaches. In Thomas Dean, editor, Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence, pages 548–553, San Francisco, CA, USA, 1999. Morgan Kaufmann Publishers Inc.
Robert Forsythe, Thomas R. Palfrey, and Charles R. Plott. Asset valuation in an experimental market. Econometrica, 50(3):537–568, May 1982.
Sanford J. Grossman and Merton H. Miller. Liquidity and market structure. The Journal of Finance, 43(3):617–633, Jul 1988.
Nils H. Hakansson, Avraham Beja, and Jivendra Kale. On the Feasibility of Automated Market Making by a Programmed Specialist. The Journal of Finance, 40(1):1–20, Mar 1985.
Charles Holt. Industrial organization: A survey of laboratory research. In The Handbook of Experimental Economics, chapter 5, pages 349–443. Princeton University Press, 1998.
Thomas Ho and Hans R. Stoll. Optimal dealer pricing under transactions and return uncertainty. Journal of Financial Economics, 9:47–73, 1981.
Paul Klemperer. Auction theory: A guide to the literature. Journal of Economics Surveys, 13(3):227–286, Jul 1999.
John Kagel and Alvin Roth. The Handbook of Experimental Economics. Princeton University Press, Princeton, 1998.
Frank Kelly and Richard Steinberg. A combinatorial auction with multiple winners for universal service. Management science, 46(4):586–596, 2000.
Roger B. Myerson. Incentive Compatibility and the Bargaining Problem. Econometrica, 47(1):61–74, Jan 1979.
Roger B. Myerson. Optimal auction design. Mathematics of Operations Research, 6(1):58–73, Feb 1981.
Noam Nisan. Bidding and allocation in combinatorial auctions. In Proceedings of the 2nd ACM conference on Electronic commerce, pages 1–12. ACM, 2000.
Maureen O´Hara and George S. Oldfield. The microeconomics of market making. The Journal of Financial and Quantitative Analysis, 21(4):361–376, Dec 1986.
Axel Ockenfels and Alvin E. Roth. Late and Multiple Bidding in Second Price Internet Auctions: Theory and Evidence Concerning Different Rules for Ending an Auction. Technical report, Faculty of Economics and Management, University of Magdeburg, P.O. Box 4120, D-39016 Magdeburg and Harvard University, Department of Economics and Graduate School of Business Administration, Soldiers Field Road, Baker Library 183, Boston, MA 02163, USA, 2001.
Alvin E. Roth and Axel Ockenfels. Last-minute Bidding and the Rules for Ending Second-price Auctions: Evidence from eBay and Amazon Auctions on the Internet. American Economic Review, 2003.
Michael H. Rothkopf, Aleksandar Pekec, and Ronald M. Harstad. Computationally Manageable Combinational Auctions. Management Science, 44(8):1131 – 1147, 1998.
Thomas Sandholm. An algorithm for optimal winner determination in combinatorial auctions. In Thomas Dean, editor, Proceedings of the Sixteenth International Joint Conference on Artificial Intelligence, pages 542–547, San Francisco, CA, USA, 1999. Morgan Kaufmann Publishers Inc.
Julia Schindler. Auctions with interdependent valuations : theoretical and empirical analysis, in particular of internet auctions. PhD thesis, WU-Wien, Augasse 2–6, A-1090 Wien, 2003.
Martin Shubik. Market Structure and Behavior. Harvard University Press, Cambridge, 1980.

Christoph Schlueter and Michael J. Shaw. A strategic framework for developing electronic commerce. IEEE Internet Computing, 1(6):20–28, 11/ 1997.
Robert Wilson. Nonlinear Pricing. Oxford University Press, Oxford, 1997.
Robert B. Wilson. Short course on nonlinear pricing. Technical report, Stanford Business School, Stanford, CA 94305–5015, 10 1999.
Andrew B. Whinston, Dale O. Stahl, and Soon-Yong Choi. The Economics of Electronic Commerce. MacMillan Publishing Company, Indianapolis, 1997.
Fredrik Ygge. Improving the computational efficiency of combinatorial auction algorithms. Technical report, Enersearch AB, Gothenburg, Schweden, 1999.

Course: Personalization and Recommender Systems Course key: [26506]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced CRM [IW4BWLISM1] (S. 19), Business & Service Engineering [IW4BWLISM4] (S. 22)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	104
1.3	98
1.7	92
2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

Prerequisites
None.

Conditions
Keine

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.

Basic 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.

Complementary 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: Customer Relationship Management — Course key: [26508]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Advanced CRM [IW4BWLISM1] (S. 19)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

Grade	Minimum points
1.0	104
1.3	98
1.7	92
2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

Prerequisites
None.

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 concepts 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

Basic literature
Christian Grönroos. Service Management and Marketing : A Customer Relationship Management Approach. Wiley, Chichester, 2nd edition, 2000.

Complementary 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: Master Seminar in Information Engineering and Management Course key: [26510]

Lecturers: Andreas Geyer-Schulz
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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).

Prerequisites
None.

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: Social Network Analysis in CRM — Course key: [26518]

Lecturers: Bettina Hoser
Credit points (CP): 4,5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced CRM [IW4BWLISM1] (S. 19)

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 12) from excersise work will be added. The grades of this lecture are assigned following the table below:

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2.0	86
2.3	80
2.7	74
3.0	68
3.3	62
3.7	56
4.0	50
4.7	40
5.0	0

Prerequisites
None

Conditions
keine

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

Basic 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.

Course: Interdisciplinary Seminar in Information Engineering and Management Course key: [26530]

Lecturers: Andreas Geyer-Schulz, Thomas Dreier
Credit points (CP): 6 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

Prerequisites
Students should participate in the Interdisciplinary Seminar as last course of the compulsory program of the “Master-Studiengang Informationswirtschaft”.

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: Derivatives

Course key: [26550]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F1 (Finance) [IW4BWLFBV1] (S. 25), F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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

Basic literature

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

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

Course: Asset Pricing — Course key: [26555]

Lecturers: Marliese Uhrig-Homburg, Martin E. Ruckes
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F1 (Finance) [IW4BWLFBV1] (S. 25), F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes
The objective of this course is to become familiar with investment decisions on stock and bond markets. The students will learn to assess risk and return of security portfolios and their influence on security prices.

Content
The lecture deals with investment decisions under uncertainty, where the main emphasis is on investment decisions on stock markets. At first, fundamental concepts of decision making under uncertainty are introduced. Then, after a discussion of the basic questions of corporate valuation, the lecture focuses on portfolio theory. After that, risk and return in equilibrium are derived using the Capital Asset Pricing Model and the Arbitrage Pricing Theory. The lecture concludes with investments on bond markets.

Complementary literature
Bodie/Kane/Marcus (2008): Investments, 7. Auflage

Course: Fixed Income Securities — Course key: [26560]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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.

Basic 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).

Complementary literature

- Hull, J., Options, Futures, & Other Derivatives, Prentice Hall, Sixth Edition, (2005).

Course: Credit Risk — Course key: [26565]

Lecturers: Marliese Uhrig-Homburg
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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

Basic 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).

Complementary 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: International Finance — Course key: [26570]

Lecturers: Marliese Uhrig-Homburg, Walter
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: F2 (Finance) [IW4BWLFBV2] (S. 26)

Learning Control / Examinations

Prerequisites
None.

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.

Complementary literature
- D. Eiteman et al. (2004): Multinational Business Finance, 10. Auflage

Course: Enterprise Hospital — Course key: [090428]

Lecturers: Stefan Nickel, Hansis
Credit points (CP): 2 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

Learning Control / Examinations
The assessment is an oral examination (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the lecture and the following lecture.

Prerequisites
None.

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 „Enterprise hospital“ 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.

Course: Algorithms for Routing — Course key: [AlgoRout]

Lecturers: Dorothea Wagner
Credit points (CP): 3/5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

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

Course: Seminar Geometrieverarbeitung — Course key: [GVsem]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Kurven und Flächen im CAD II — Course key: [KFCAD2]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80), Algorithmen der Computergraphik [IW4INACG] (S. 81)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature

- Prautzsch, Boehm, Paluszny: Bézier and B-Spline Techniques, Springer 2002

Complementary literature

- Farin: Curves and Surfaces for CAGD, Fifth Edition, 2002
- de Boor: A practical guide to splines, 2001

Course: Kurven und Flächen im CAD III

Course key: [KFCAD3]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: ??? **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Komponentenbasierte Software-Architektur Course key: [KbSWA]

Lecturers: Ralf Reussner, Michael Kuperberg, Klaus Krogmann
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64), Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Multikernpraktikum

Course key: [MKP]

Lecturers: Walter F. Tichy
Credit points (CP): 3 **Hours per week:** 2
Term: ??? **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Moving Objects Databases — Course key: [MOD]

Lecturers: Klemens Böhm
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Englisch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

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, Georgian soldiers withdrawing, natural phenomena such as cyclones or snowstorms, historic developments (e.g., exact location of the Austrian empire), or – last but not least – body movements and processes within the human body. In consequence, the problem how to organize such data and how to analyze it comes to the fore. This lecture targets at exactly this subject matter.

Key words:

- query languages for temporal data (i.e., data where data objects are furnished with temporal information such as time-stamps),
- 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.

Basic literature
Ralf Hartmut Güting, Markus Schneider: Moving Objects Databases, Academic Press, 2005

Complementary literature
Will be announced in the lecture.

Course: Praxis des Lösungsvertriebs — Course key: [PLV]

Lecturers: Klemens Böhm, Hellriegel
Credit points (CP): 1 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Complementary literature
Reiner Czichos: Creaktives Account-Management.

Course: Projektmanagement aus der Praxis — Course key: [PMP]

Lecturers: Klemens Böhm, Schnober
Credit points (CP): 1 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praxis der Unternehmensberatung — Course key: [PUB]

Lecturers: Klemens Böhm, Dürr
Credit points (CP): 1 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praktikum Advanced Telematics

Course key: [PrakATM]

Lecturers: Martina Zitterbart
Credit points (CP): 5 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Networking Labs [IW4INNL] (S. 68)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Praktikum aus der Kryptographie — Course key: [PrakKryp]

Lecturers: Jörn Müller-Quade
Credit points (CP): 3 **Hours per week:** 4
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Rationale Splines

Course key: [RaSp]

Lecturers: Hartmut Prautzsch
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Kurven und Flächen [IW4INKUF] (S. 80)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Software-Systeme

Course key: [SWSSem]

Lecturers: Ralf Reussner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Software-Sicherheit

Course key: [SWSich]

Lecturers: Gregor Snelting
Credit points (CP): 3 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Software Engineering II

Course key: [SWT2]

Lecturers: Ralf Reussner, Walter F. Tichy
Credit points (CP): 6 **Hours per week:** 3/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software-Methodik [IW4INSWM] (S. 65)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Software Engineering

Course key: [SWTSem]

Lecturers: Walter F. Tichy, Ralf Reussner, Gregor Snelting
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Software Systems [IW4INSWS] (S. 64)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Enterprise Information Systems Course key: [SemAIFB1]

Lecturers: Rudi Studer, Andreas Oberweis, Wolffried Stucky, Thomas Wolf, Ralf Kneuper
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

Prerequisites
See corresponding module information.

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 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

Basic literature
Literature will be given individually in the specific seminar.

Course: Seminar Efficient Algorithms — Course key: [SemAIFB2]

Lecturers: Hartmut Schmeck
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the semester.

Course: Seminar Complexity Management — Course key: [SemAIFB3]

Lecturers: Detlef Seese
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations
see German part

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes
see German part

Content
see German part

Basic literature
Will be announced in the lecture.

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 in the internet at http://www.aifb.uni-karlsruhe.de/Lehre.

Course: Seminar Knowledge Management — Course key: [SemAIFB4]

Lecturers: Rudi Studer
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

Prerequisites
See module description.

Conditions
None.

Learning Outcomes
The students will learn to perform literature searches on current topics in computer science 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.

Media
Slides.

Basic 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.)

Complementary literature
None.

Remarks
The number of students is limited. Students have to observe the designated registration process.

Course: Seminar eOrganization

Course key: [SemAIFB5]

Lecturers: Stefan Tai
Credit points (CP): 3 **Hours per week:** 2/0
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Cloud Computing [IW4INAIFB2] (S. 83), Web Service Engineering [IW4INAIFB3] (S. 84)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar in Insurance Management — Course key: [SemFBV1]

Lecturers: Ute Werner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the beginning of the lecture period.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Seminar in Operational Risk Management — Course key: [SemFBV2]

Lecturers: Ute Werner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at theend of the recess period.

Remarks
This course is offered irregularly. For further information, see: http://insurance.fbv.uni-karlsruhe.de
To attend the course please register at the secretariat of the chair of insurance science.

Course: Seminar in Risk Theory and Actuarial Science — Course key: [SemFBV3]

Lecturers: Christian Hipp
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
Knowledge of statistics and actuary science is an advantage.
The seminar is a good addition to the Bachelor module *Calculation and Control* [WW3BWLFBV2] and to the Master modules *Applications of Actuarial Sciences I/II* [WW4BWLFBV4/5] and *Insurance Statistics* [WW4BWLFBV8]. However these modules are not a prerequisite for the participation in the seminar.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Industrial Production

Course key: [SemIIP2]

Lecturers: Frank Schultmann, Magnus Fröhling, Michael Hiete
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Information Engineering and Management Course key: [SemIW]

Lecturers: Christof Weinhardt
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.

Conditions
Business Engineering/Economics Engineering: Preferably 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

Basic 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.im.uni-karlsruhe.de/lehre.

Course: Seminar aus Sicherheit

Course key: [SemSich]

Lecturers: Jörn Müller-Quade, Martina Zitterbart
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Computersicherheit [IW4INSICH] (S. 56)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar Stochastic Models — Course key: [SemWIOR1]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

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.

Prerequisites
None.

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; cf.
http://www4.wiwi.uni-karlsruhe.de/LEHRE/SEMINARE/

Media
Power Point and related presentation techniques.

Basic literature
Will be presented with the actual topic.

Course: Seminar Economic Theory — Course key: [SemWIOR2]

Lecturers: Clemens Puppe
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations

Prerequisites
See corresponding module information.
At least one of the courses *Game Theory I* [25525] and *Welfare Economics* [25517] should have been attended beforehand.

Conditions
None.

Learning Outcomes

Content

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Experimental Economics — Course key: [SemWIOR3]

Lecturers: Siegfried Berninghaus
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations
Term paper and presentation

Prerequisites
See corresponding module information.
A course in the field of Game Theory should be attended beforehand.

Conditions
None.

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.

Basic literature
Will be announced at the end of the recess period.

Course: Seminar in Game and Decision Theory — Course key: [SemWIOR4]

Lecturers: Siegfried Berninghaus
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations
Term paper and presentation

Prerequisites
Completion of all 1st an 2nd year modules of the Bachelor Program.
See corresponding module information.

Conditions
None.

Learning Outcomes
The seminar wants to deepen the methods of scientific work. Students shall learn to discuss critical the latest research results in game theory.
Procurement of SQs: 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.

Basic literature
Will be announced at the end of the recess period.

Course: Seminar aus der Kryptographie — Course key: [SemiKryp2]

Lecturers: Jörn Müller-Quade
Credit points (CP): 2 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Public Key Kryptographie [IW4INPKK] (S. 58), Netzsicherheit - Theorie und Praxis [IW4INNTP] (S. 71)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Seminar aus der Kryptographie — Course key: [SemiKryp3]

Lecturers: Jörn Müller-Quade
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Signale und Codes — Course key: [SigCo]

Lecturers: Jörn Müller-Quade
Credit points (CP): 3 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Computersicherheit [IW4INSICH] (S. 56), Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Basic literature
Shu Lin, Daniel Costello, “Error Control Coding”, 2nd Ed., Pearson Prentice Hall, 2004
Todd Moon, “Error Correction Coding”, Wiley, 2005
Weitere Literatur wird in der Vorlesung bekannt gegeben.

Complementary literature
Will be annonced in the lecture.

Course: Symmetrische Verschlüsselungsverfahren Course key: [SymChif]

Lecturers: Jörn Müller-Quade
Credit points (CP): 3 **Hours per week:** 2
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Computersicherheit [IW4INSICH] (S. 56), Fortgeschrittene Themen der Kryptographie [IW4INFKRYP] (S. 57), Netzsicherheit - Theorie und Praxis [IW4INNTP] (S. 71)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Database Implementation and Tuning — Course key: [db_impl]

Lecturers: Klemens Böhm
Credit points (CP): 5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73), Data Warehousing und Mining in Theorie und Praxis [IW4INDWMTP] (S. 74), Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

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

Conditions
None.

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.

Complementary 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: Deployment of Database Systems — Course key: [dbe]

Lecturers: Klemens Böhm
Credit points (CP): 5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73), Data Warehousing und Mining in Theorie und Praxis [IW4INDWMTP] (S. 74), Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
It will be announced in advance if the assessment consists of an 1h written exam following §4, Abs. 2, 1 of the Prüfungsordnung or of a 20 minute oral examination following §4, Abs. 2, 2 of the Prüfungsordnung.

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

Conditions
None.

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.

Basic 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.

Complementary 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: Practical Course Database Systems — Course key: [dbprakt]

Lecturers: Klemens Böhm
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
The assessment will be an “Erfolgskontrolle anderer Art” and consists of several parts (projects, experiments, presentations and reports, according to § 4 Abs 2 Nr. 3 SPO). The course will be assessed with “passed” or “failed” (according to § 9 Abs. 3 SPO). In order to get the passed assessment for the practical course, every part of the assessment must be passed successfully. If the pracital course ist quitt after the first lesson, the lecture will be assessed with “failed”.

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

Conditions
None.

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.

Basic literature
Please refer to the literature from the lecture “Deployment of Database Systems”.

Complementary literature
Please refer to the literature from the lecture “Deployment of Database Systems”.

Course: Operations Research in Health Care Management — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

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.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the summer term 2010.
The planned lectures and courses for the next three years are announced online.

Course: Operations Research in Supply Chain Management Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

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.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the summer term 2011.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: OR Models II — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49), Mathematical Programming [IW4OR6] (S. 51)

Learning Control / Examinations

Prerequisites
Successful completion of the course *Software Laboratory: OR-Models I* [25490].
Basic knowledge as conveyed in the module *Introduction to Operations Research* [WI1OR] is assumed.

Conditions
None.

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 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 Xpress-MP IVE with its modeling language Mosel. 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.

Remarks
The course is offered in every summer term.
The planned lectures and courses for the next three years are announced online.

Course: Graph Theory

Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the winter term 2011/2012.
The planned lectures and courses for the next three years are announced online.

Course: Practical Course: Health Care Management (with Case Studies) Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 7 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

Learning Control / Examinations
The assessment consists in a case study and the writing of a corresponding paper (according to §4(2), 1 of the examination regulation).
The examination is held in the term of the practical course and the following term.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly.
The curriculum of the next three years is available online.

Course: Location Theory

Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Mathematical Programming [IW4OR6] (S. 51)

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.

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

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is planned to be held in the winter term 2010/2011.
The planned lectures and courses for the next three years are announced online.

Course: OR-nahe Modellierung und Analyse realer Probleme (Projekt) Course key: [n.n.]

Lecturers: Karl-Heinz Waldmann
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Special Topics in Optimization [IW4OR7] (S. 52)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Remarks
The lecture is offered irregularly. The curriculum of the next two years is available online.

Course: Software Laboratory: SAP APO — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

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 lecture and the following term.

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

Conditions
None.

Learning Outcomes
Students acquire the ability to safely and efficiently use the software systems SAP and SAP APO.
As these software systems are used in many companies, the students get acquainted with an important and frequently used software tool from practice. Besides basic functional elements of the software, the course provides advanced knowledge for specific planning modules. Furthermore, students are enabled to model realistic logistical systems within the software framework.

Content
SAP Advanced Planning & Optimization (SAP APO) is a software solution for dynamic Supply Chain Management consisting of modules for detailed planning and optimization of all processes along a supply chain. These modules allow a concise and global control and planning of the supply chain on the intercompany level. As a part of mySAP Supply Chain Management (mySAP SCM), SAP APO is a logistics solution with integrated surplus. It covers all processes from the planning on a detailed level to the design of the actual network structure.
After an introductory overview of the organization of SAP and the concepts of SAP solutions, the system SAP Supply Chain Management (SCM) will be presented. In detail, the features of the module SAP SCM Advanced Planning and Optimization (APO) will be addressed.
Afterwards, students obtain a small example to get in touch with the standard user environment of the system. A case study taken from practice serves as the basis for a SAP APO-based implementation of a complete Supply Chain, beginning from suppliers, to production plants, warehouses, distribution centers, to the customers. In Demand Planning (DP) anonymous primary demand will be forecasted. In Supply-Network-Planning (SNP) feasible plans for the satisfaction of demands along the entire supply chain will be generated, while in Production Planning & Detailed Scheduling (PP/DS) clock-time-precise orders under consideration of constraints (capacities, setup costs,. . .) will be generated. The choice of appropriate means of transportation allows the planning of transportation and distribution tasks.

Remarks
The course is planned to be held in the summer term 2012.
The planned lectures and courses for the next three years are announced online.

Course: Software Laboratory: Simulation — Course key: [n.n.]

Lecturers: Stefan Nickel
Credit points (CP): 4.5 **Hours per week:** 2/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Operations Research in Supply Chain Management and Health Care Management [IW4OR4] (S. 49)

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 lecture and the following term.

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

Conditions
None.

Learning Outcomes
The course covers basic concepts of discrete event simulation models and qualifies students for the computer-based usage of simulation systems. Additionally, students deepen their knowledges for logical issues in modeling and discover the importance of statistical methods in simulation.

Content
Discrete event simulation is one of the fundamental modelling techniques and can be used in the analysis of systems where it is not possible to derive analytical results for the system due to complexity issues.
After an introduction to the basics of event-discrete simulation, the basic modeling approach for simulation systems is presented. The implementation of this paradigm is made with the simulation software ProModel. Therewith, students get an insight to system logics of the algorithms. In the practical part of the course, case-studies from industries and health care are discussed. Again, the implementation of identified OR problems is done with ProModel.

Remarks
The course is planned to be held in the summer term 2011.
The planned lectures and courses for the next three years are announced online.

Course: Practical Course Distributed Data Management (former Practical Course Database Systems) Course key: [praktvd]

Lecturers: Klemens Böhm
Credit points (CP): 4 **Hours per week:** 2
Term: Wintersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Datenbanktechnologie in Theorie und Praxis [IW4INDBTP] (S. 75)

Learning Control / Examinations
The assessment will be an “Erfolgskontrolle anderer Art” and consists of several parts (projects, experiments, presentations and reports, according to § 4 Abs 2 Nr. 3 SPO). The course will be assessed with “passed” or “failed” (according to § 9 Abs. 3 SPO). In order to get the passed assessment for the practical course, every part of the assessment must be passed successfully. If the pracital course ist quitt after the first lesson, the lecture will be assessed with “failed”.

Prerequisites
Knowledge about database systems, e.g. from the lecture “Communications and Database Systems”, as well as basic knowledge of JAVA programming.

Conditions
None.

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.

Basic literature
Please refer to the literature from the lecture “Distributed Data Management”.

Complementary literature
Please refer to the literature from the lecture “Distributed Data Management”.

Course: Seminar in Law

Course key: [rechtsem]

Lecturers: Thomas Dreier, Peter Sester, Indra Spiecker genannt Döhmann
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 3
Teaching language: Deutsch
Part of the modules: Interdisciplinary Seminar Module [IW4IWSEM] (S. 16)

Learning Control / Examinations
Written paper and oral presentation (§4, Abs. 2, 3 of the SPO).

Prerequisites
None.

Conditions
None.

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).

Basic literature
Tba in the lecture.

Course: Seminar Information Systems — Course key: [semis]

Lecturers: Klemens Böhm
Credit points (CP): 4 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Innovative Konzepte des Daten- und Informationsmanagements [IW4INIKDI] (S. 73)

Learning Control / Examinations
The assessment involves writing a seminar paper and an oral presentation as a graded “Erfolgskontrolle anderer Art” according to § 4 Abs. 2 Nr. 3 SPO. The final grade for the seminar will be the grade for the written paper which can be increased or decreased by up to two grade points (”Notenstufen”) according to the performance of the oral presentation.

Prerequisites
Lectures held at the Information Systems Group related to the current topic of the seminar are strongly recommended.

Conditions
None.

Learning Outcomes
Independent preparation and presentation of a seminar topic from the field of information systems adhering to scientific standards.

Content
The Information Systems Group offers at least one seminar covering selected topics from the wide area of information systems every semester (every seminar at the “Lehrstuhl für Systeme der Informationsverwaltung”, which is not an undergraduate seminar, counts as “Seminar Information Systems”). Usually, the topics will be close to current research of the group, e.g., peer-to-peer networks, database systems, data mining, sensor networks and workflow-management systems.
Details will be announced each semester (announcements at the notice boards of the institute and at the homepage of the Information Systems Group).

Media
Slides.

Basic literature
Will be announced for every seminar.

Complementary literature
Literature from lectures concerning the seminar topic.

Course: Sicherheit

Course key: [sich]

Lecturers: Jörn Müller-Quade
Credit points (CP): 6 **Hours per week:** 3/1
Term: Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Computersicherheit [IW4INSICH] (S. 56)

Learning Control / Examinations

Prerequisites
None.

Conditions
None.

Learning Outcomes

Content

Course: Algorithm Engineering — Course key: [xAlgoEng]

Lecturers: Peter Sanders, Dorothea Wagner
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
Lecture *Algorithmentechnik*

Conditions
None.

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, papers, source codes

Complementary literature

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

Remarks
The lecture will be offered again in the winter term 09/10.

Course: Parallel Algorithms — Course key: [xParallAlgo]

Lecturers: Peter Sanders
Credit points (CP): 3 **Hours per week:** 2
Term: Winter-/Sommersemester **Level:** 4
Teaching language: Deutsch
Part of the modules: Advanced Algorithms: Design and Analysis [IW4INAALGOA] (S. 59), Advanced Algorithms: Engineering and Applications [IW4INAALGOB] (S. 60)

Learning Control / Examinations

Prerequisites
Knowlegde from lecture *Algorithmentechnik* is required.

Conditions
None.

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

Complementary literature

- Sanders, Worsch. Parallele Programmierung mit MPI – ein Praktikum
- Kumar, Grama, Gupta und Karypis. Introduction to Parallel Computing.
- JáJá. An Introduction to Parallel Algorithms

Remarks
The lecture will be offered again in the winter term 09/10.

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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.

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Die Universität Karlsruhe (TH) hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss der Studierendenausbildung an der Universität Karlsruhe (TH) der Mastergrad stehen soll. Die Universität Karlsruhe (TH) sieht daher die an der Universität Karlsruhe (TH) angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

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.

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(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

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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.

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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.

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(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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