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6 **Appendix: Study- and Examination Regulation (15/04/2009, in German)**

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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 module should be taken until the end of 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.

![Figure 1: Structure of the Master Programme in Information Engineering and Management (Recommendation)](image-url)
2 Module Handbook - a helpful guide throughout the studies

The programme consists of several subjects (e.g. business administration, economics, operations research). Every subject is split into modules and each module itself consists 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 exist 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 handbook 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://studium.kit.edu/Seiten/FAQ.aspx

Repeating exams

Principally, a failed exam can repeated only once. If the repeat examination (including an eventually provided verbal repeat examination) will be failed as well, the examination claim is lost. Requests for a second repetition of an exam require the approval of the examination committee. A request for a second repetition has to be made without delay after loosing the examination claim. A counseling interview is mandatory. For further information see http://www.wiwi.kit.edu/serviceHinweise.php.
Bonus accomplishments and additional accomplishments

Bonus accomplishments can be achieved on the basis of entire modules or within modules, if there are alternatives at choice. Bonus accomplishments can improve the module grade and overall grade by taking into account only the best possible combination of all courses when calculating the grades. The student has to declare a Bonus accomplishment as such at the time of registration for the exams. Exams, which have been registered as Bonus accomplishments, are subject to examination regulations. Therefore, a failed exam has to be repeated. Failing the repeat examination implies the loss of the examination claim.

Additional accomplishments are voluntarily taken exams, which have no impact on the overall grade of the student and can take place on the level of single courses or on entire modules. It is also mandatory to declare an additional accomplishment as such at the time of registration for an exam. Up to 2 modules with a minimum of 9 CP may appear additionally in the certificate. After the approval of the examination committee, it is also possible to include modules in the certificate, which are not defined in the module handbook. Single additional courses will be recorded in the transcript of records. Courses and modules, which have been declared as bonus accomplishments, can be changed to additional accomplishments.

Further information

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

Used abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>LP/CP</td>
<td>Credit Points/ECTS</td>
</tr>
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<td>LV</td>
<td>course</td>
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<tr>
<td>RÜ</td>
<td>computing lab</td>
</tr>
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<td>summer term</td>
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<td>examination regulations</td>
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<td>Ü</td>
<td>exercise course</td>
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<td>V</td>
<td>lecture</td>
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<td>W</td>
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<td>Leistungspunkte/ECTS</td>
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<td>Vorlesung</td>
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<td>Wintersemester</td>
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3 Actual Changes

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

**IW4BWLISM5 - Communications & Markets (S. 19)**

Anmerkungen

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

The module will be offered latest until SS 2014.

**IW4VWL9 - Social Choice Theory (S. 42)**

Anmerkungen

See German version.

**IW4VWL10 - Telecommunications Markets (S. 43)**

Anmerkungen

The module will be offered latest until SS 2014.

**IW4STAT1 - Mathematical and Empirical Finance (S. 52)**

Anmerkungen

The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2015 on. The examination will probably be offered latest until summer term 2014.

The course Stochastic Calculus and Finance [2521331] will not be offered any more from winter term 2014/2015 on. The examination will probably be offered latest until winter term 2013/14.
4 Mandatory Modules

4.1 All Subjects

Module: Information Engineering and Management [IW4WWIWIW]

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

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Courses in module

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<th>Term</th>
<th>CP</th>
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<td>2540450</td>
<td>Principles of Information Engineering and Management</td>
<td>2/1 W</td>
<td>5</td>
<td>H. Gimpel, W. Michalk</td>
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<tr>
<td>2540500</td>
<td>Business Administration in Information Engineering and Management</td>
<td>2/1 S</td>
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<td>A. Geyer-Schulz</td>
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</table>

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

Conditions
None.

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

Content
The module Information Engineering and Management comprises the lectures Principles of Information Engineering and Management [2540450] and Business Administration in Information Engineering and Management [2540500].
In the lecture Principles of Information Engineering and Management, a clear distinction of information as a production, competitive, and economic good is introduced. The central role of information is explained through the concept of the “information lifecycle”. The single phases from extraction/generation through storage transformation and evaluation until the marketing and usage of information are analyzed from the business administration perspective and the microeconomic perspective. The state of the art of economic theory is presented throughout the different phases of the information lifecycle. The lecture is complemented by accompanying exercise courses.
In the lecture Business Administration in Information Engineering and Management, classical Business Administration is applied to businesses in an information- and communication-technological 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 automation 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 addressed by presenting models and methods from system dynamics.
Module: Stochastic Models in Information Engineering and Management [IW4WWOR]

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

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Courses in module

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<th>CP</th>
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<td>Markov Decision Models I</td>
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<td>W</td>
<td>5</td>
<td>K. Waldmann</td>
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</table>

Learning Control / Examinations

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

Conditions
None.

Learning Outcomes

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

Content

Markov chains are no longer a nice theory but an important tool in order to model, analyse, and optimize a stochastic system as it evolves over time.
Topics overview: Markov chains, Poisson Processes.

Remarks

The planned lectures and courses for the next two years are announced online (http://www.ior.kit.edu/)
### Module: Interdisciplinary Seminar Module [IW4IWSEM]

**Coordination:** Studiendekan (Fak. f. Wirtschaftswissenschaften), Studiendekan/in (Fak. f. Informatik)

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:**

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#### Courses in module

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<td>Master Seminar in Information Engineering and Management</td>
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<td>SemiW</td>
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<td>Practical Seminar Service Innovation</td>
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<td>Seminar Mobility Services</td>
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<td>SemFBV1</td>
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<td>W/S</td>
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<td>Seminar Financial Economics and Risk Management</td>
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<td>G. Sydow</td>
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Learning Control / Examinations
The assessment in this module is regulated by § 4 (2) 3, of the examination regulation for the Master Information Engineering and Management. Further details will be defined for each seminar separately.

Conditions
Students should have experience with literature search in informatics, economics, business administration, and law. They should know the methods of scientific work, presentation techniques for scientific presentations, as well as the form requirements of scientific publications (guide line for authors) and review processes for scientific publications. For further details see German version.

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

Content
The Students will be coached by a group of tutors which consists in each case of an tutor of informatics, economics and law.
Module: Master Thesis [IW4IWMATHEISIS]

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

<table>
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<th>ECTS Credits</th>
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Learning Control / Examinations
Examination by two examiners from the two faculties. For details refer to examination regulation. The examiner has to be involved in the degree programme. Involved in the degree programme are the persons that coordinate a module or a lecture of the degree programme.

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

Learning Outcomes
The student

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

Content

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

5.1 Business Administration

Module: Advanced CRM [IW4BWLISM1]

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<td>Customer Relationship Management</td>
<td>2/1</td>
<td>W</td>
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<td>Recommender Systems</td>
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<td>S</td>
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<td>2540518</td>
<td>Social Network Analysis in CRM</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

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

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

Remarks
The course Social Network Analysis in CRM [2540518] is currently not offered.
Module: Electronic Markets [IW4BWLISM2]

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

### ECTS Credits

- **Cycle:** Every term
- **Duration:** 1

### Courses in module

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<tr>
<th>ID</th>
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<td>2540502</td>
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<td>2561232</td>
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<td>W</td>
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### Learning Control / Examinations

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

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

### Conditions

None.

### Learning Outcomes

The student

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

### Content

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

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

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

Topics include:

- classification, analysis, and design of markets
- simulation of markets
- auction methods and auction theory
- automated negotiations
- nonlinear pricing
- continuous double auctions
- market-maker, regulation, control
Module: Market Engineering [IW4BWLISM3]

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

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Courses in module

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<th>Responsible Lecturer(s)</th>
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<td>Market Engineering: Information in Institutions</td>
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<td>S</td>
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<td>C. Weinhardt, M. Adam</td>
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<td>2590408</td>
<td>Auction Theory</td>
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<td>W</td>
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<td>2540454</td>
<td>eFinance: Information Engineering and Management for Securities Trading</td>
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<td>2540464</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

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

Learning Outcomes
The students

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

Content
This module explains the dependencies between the design of markets and their success. Markets are complex interaction of different institution and participants in a market behave strategically according to the market rules. The development and the design of markets or market mechanisms has a strong influence on the behavior of the participants. A systematic approach and a thorough analysis of existing markets is inevitable to design, create and operate a market place successfully. The approaches for a systematic analysis are explained in the mandatory course Market Engineering [2540460] by discussing theories about mechanism design and institutional economics. The student can deepen his knowledge about markets in a second course.
Module: Business & Service Engineering [IW4BWLISM4]

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

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Courses in module

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<td>2540456</td>
<td>Business Models in the Internet: Planning and Implementation</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
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<td>2540498</td>
<td>Special Topics in Information Engineering &amp; Management</td>
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<td>C. Weinhardt</td>
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<td>4,5</td>
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<td>2540533</td>
<td>Personalization and Services</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>A. Sonnenbichler</td>
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<tr>
<td>2595468</td>
<td>Service Innovation</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>G. Satzger, M. Kohler, N. Feldmann</td>
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<td>2595477</td>
<td>Practical Seminar Service Innovation</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes
The student should

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

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

Remarks
All practical Seminars offered at the IM can be chosen for Special Topics in Information Engineering & Management. Please update yourself on www.iism.kit.edu/im/lehre.
Module: Communications & Markets [IW4BWLISM5]

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

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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<td>2540462</td>
<td>Communications Economics</td>
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<td>2590408</td>
<td>Auction Theory</td>
<td>2/1</td>
<td>W</td>
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<td>K. Ehrhart</td>
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<td>Special Topics in Information Engineering &amp; Management</td>
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<td>C. Weinhardt</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

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

Learning Outcomes
The student is able to

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

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

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

The module will be offered latest until SS 2014.
Module: Service Management [IW4BWLISM6]

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

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<td>2595484</td>
<td>Business and IT Service Management</td>
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<td>2595468</td>
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<td>S</td>
<td>4.5</td>
<td>T. Setzer, H. Fromm</td>
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<td>2595505</td>
<td>Industrial Services</td>
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<td>W</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

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

Learning Outcomes
The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- systematically use vast amounts of available data for planning, operation, personalization and improvement of complex service offerings, and
- understand and analyze innovation processes in corporations.

Content
The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to systematically analyze vast amounts of data for planning, operation and improvement for complex service offerings. These tools enhance operational and strategic decision support and help to analyze and understand the overall innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

Remarks
In the summer term of 2012, the lectures eServices and Management of Business Networks were taken out of this module. They will be continued to be offered exclusively in the Bachelor modules. Modules correctly opened before the summer term, are not affected by this change.
# Module: Service Analytics [IW4BWLKSR1]

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

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## Courses in module

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<td>2540498</td>
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## Learning Control / Examinations

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

## Conditions

The course Service Analytics [2595501] is compulsory and must be examined.

## Recommendations

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

## Learning Outcomes

The student should learn to

- Understand different scenarios where analytics is applied in a service context
- Distinguish different analytics methods and concepts and learn when to apply them
- Apply analytics tools in a service context
- Analyze and solve real-world business problems through leveraging analytics

## Content

Modern economies have turned into “servitized” economies – with almost 70% of the gross value added being derived from the tertiary sector and with an increasing number of industrial companies proceeding to engage in service-type offerings. The adoption of analytics applied to services for leveraging the full potential of big data is still in its infancy - some areas like web analytics are more advanced, some other areas are just starting. This module strives to provide an overview on analytics methods applied in a service context and introduces different scenarios where analytics is applied to improve different kinds of services. The module offers the opportunity to apply and deepen this knowledge in hands-on tutorials and seminars.
Module: Service Design Thinking [IW4BWLKSR2]

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

<table>
<thead>
<tr>
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<th>Cycle</th>
<th>Duration</th>
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<tbody>
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Courses in module

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<th>CP</th>
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<td>6</td>
<td>W/S</td>
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Learning Control / Examinations
The assessment is carried out as a general exam (according to Section 4(2), 3 of the examination regulation). The overall grade of the module is the grade of the examination (according to Section 4(2), 3 of the examination regulation).

Conditions
The course Service Design Thinking is compulsory and must be examined.

Recommendations
This course is held in English – proficiency in writing and communication is required.

Learning Outcomes
- Deep knowledge of the innovation method “Design Thinking”, as introduced and promoted by Stanford University
- Development of new, creative solutions through extensive observation of oneself and one’s environment, in particular with regard to the relevant service users
- Know how to use prototyping and experimentation to visualize one’s ideas, to test and iteratively develop them, and to converge on a solution
- Communicate, work and present in an interdisciplinary and international project setting

Content
- Paper Bike: Learning about the basic method elements by building a paper bike that has to fulfill a given set of challenges.
- Design Space Exploration: Exploring the problem space through customer and user observation.
- Critical Function Prototype: Identification of critical features from the customer’s perspective that can contribute to the solution of the overarching problem. Building and testing prototypes that integrate these functionalities.
- Dark Horse Prototype: Inverting earlier assumptions and experiences, which leads to the inclusion of new features and solutions.
- Funky Prototype: Integration of the individually tested and successful functions to a complete solution, which is further tested and developed.
- Functional Prototype: Further selection and convergence of existing ideas. Building a higher resolution prototype that can be tested by customers.
- Final Prototype: Preparing and presenting the final solution to the customer.

Remarks
Due to the project nature of the course, the number of participants is limited. For further information see the course description.
Module: Finance 1 [IW4WLFBV1]

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

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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<td>S</td>
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<td>2530212</td>
<td>Valuation</td>
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<td>2530555</td>
<td>Asset Pricing</td>
<td>2/1</td>
<td>S</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
None.

Learning Outcomes
The student

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

Content
The courses of this module equip the students with core skills in economics and methodology in the field of modern finance. Securities which are traded on financial and derivative markets are presented, and frequently applied trading strategies are discussed. A further focus of this module is on the assessment of both profits and risks in security portfolios and corporate investment projects from a financial perspective.
Module: Finance 2 [IW4BWLFBV2]

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

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<td>Market Microstructure</td>
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<td>Business Strategies of Banks</td>
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<td>W 3</td>
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<td>2540454</td>
<td>eFinance: Information Engineering and Management for Securities Trading</td>
<td>2/1</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

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

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

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

Remarks
Only in the winter term 2011/2012 the lecture Market Microstructure [2530240] could be replaced by the lecture eFinance: Information Engineering and Management for Securities Trading [2540454] within the corresponding module. Who wanted to replace it in this way had to make the first attempt at passing the examination at the regular examination dates of this winter term 2011/2012. The general regulation concerning the second attempt at passing the examination remains unchanged. The lecture eFinance: Information Engineering and Management for Securities Trading [2540454] must not be chosen in all other cases within this module.
### Module: Insurance Management I [IW4BWLFBV6]

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

#### ECTS Credits  
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<td>Insurance Marketing</td>
<td>3/0</td>
<td>S</td>
<td>4,5</td>
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<td>Insurance Production</td>
<td>3/0</td>
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<td>4,5</td>
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<tr>
<td>Private and Social Insurance</td>
<td>2/0</td>
<td>W</td>
<td>2,5</td>
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<td>Current Issues in the Insurance Industry</td>
<td>2/0</td>
<td>S</td>
<td>2,5</td>
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<td>P&amp;C Insurance Simulation Game</td>
<td>3</td>
<td>W</td>
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<td>International Risk Transfer</td>
<td>2/0</td>
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<td>3/0</td>
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<td>Modelling, Measuring and Managing of Extreme Risks</td>
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<td>S</td>
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#### Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2) of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

#### Conditions
None.

#### Learning Outcomes
See German version.

#### Content
See German version.
Module: Insurance Management II [IW4BWLFBV7]

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

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

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

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

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

Learning Outcomes
See German version.

Content
See German version.

Remarks
See German version.
Module: Strategic Corporate Management and Organization [IW4BWL0U1]

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

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Courses in module

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<tr>
<td>2577902</td>
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<td>2/0 W 4</td>
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<tr>
<td>2577908</td>
<td>Modeling Strategic Decision Making</td>
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<td>2577910</td>
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<td>1/0 S 2</td>
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Learning Control / Examinations
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

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

Conditions
None.

Learning Outcomes

Content
The module emphasizes the following aspects: The students learn models and frameworks which are used in strategic management and managing organizations. In addition, the module provides knowledge about management concepts and their practical application.

The module addresses three focal points: First, the students will learn models, frameworks and theoretical findings of the economic organization theory. Further, questions of a value-based concern leadership are discussed. Finally, the limitations of the basic models of economic decision theory are identified and advanced concepts are developed.
Module: Strategic Decision Making and Organization Theory [IW4BWLWU03]

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

**ECTS Credits** 9  
**Cycle** Every term  
**Duration** 1

### Courses in module

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<td>2561127</td>
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**Learning Control / Examinations**

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

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

**Conditions**

None.

**Learning Outcomes**

**Content**
Module: Industrial Production II [IW4BWLIIIP2]

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

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Courses in module

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<td>Planning and Management of Industrial Plants</td>
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<td>W</td>
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<td>2581962</td>
<td>Emissions into the Environment</td>
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<td>W</td>
<td>3.5</td>
<td>U. Karl</td>
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<td>2581995</td>
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<td>2/0</td>
<td>W</td>
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<td>2581956</td>
<td>International Production</td>
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<td>W</td>
<td>3.5</td>
<td>H. Sasse</td>
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Learning Control / Examinations

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

Conditions

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

Learning Outcomes

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

Content

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

Remarks

Apart from the core course the courses offered are recommendations and can be replaced by courses from the Module Industrial Production III.
Module: Industrial Production III [IW4BWLIIIP6]

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

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<td>2581954</td>
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<td>M. Fröhling</td>
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<td>2581963</td>
<td>The Management of R&amp;D Projects with Case Studies</td>
<td>2/2</td>
<td>W/S</td>
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<td>2581961</td>
<td>Supply Chain Management with Advanced Planning Systems</td>
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<td>S</td>
<td>3,5</td>
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<td>2581992</td>
<td>Risk Management in Industrial Supply Networks</td>
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<td>2581957</td>
<td>Supply Chain Management in the automotive industry</td>
<td>2/0</td>
<td>W</td>
<td>3,5</td>
<td>T. Heupel, H. Lang</td>
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</table>

**Learning Control / Examinations**  
The assessment is carried out as partial exams (according to section 4 (2), 1 SPO) of the core course Production and Logistics Management [2581954] and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

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

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

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

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

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

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<th>ECTS Credits</th>
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Courses in module

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<tr>
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<td>2581998</td>
<td>Basics of Liberalised Energy Markets</td>
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<td>W</td>
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<tr>
<td>2581020</td>
<td>Energy Trade and Risk Management</td>
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<td>S</td>
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<td>K. Hufendiek</td>
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<td>S</td>
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<td>M. Wietschel</td>
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<td>2581022</td>
<td>Gas-Markets</td>
<td>2/0</td>
<td>W</td>
<td>3</td>
<td>A. Pustisek</td>
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<tr>
<td>2581025</td>
<td>Simulation Game in Energy Economics</td>
<td>2/0</td>
<td>S</td>
<td>3</td>
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<td>2560234</td>
<td>Regulation Theory and Practice</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>K. Mitusch</td>
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<td>2540464</td>
<td>eEnergy: Markets, Services, Systems</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>C. van Dinther, C. Weinhardt</td>
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Learning Control / Examinations
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately.

The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal. Additional courses might be accredited upon request.

Conditions
The lecture Basics of Liberalised Energy Markets [2581998] has to be examined.

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

Learning Outcomes
The student

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

Content
Basics of Liberalised Energy Markets: The European liberalisation process, energy markets, pricing, market failure, investment incentives, market power
Energy Trade and Risk Management: trade centres, trade products, market mechanisms, position and risk management
Gas-Markets: producing countries, provision structures, market places, pricing
Energy Policy: Management of energy flows, energy-political targets and instruments (emission trading etc.)
Simulation Game in Energy Economics: Simulation of the German electricity system
Module: Energy Economics and Technology [IW4BWLIIP5]

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

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Courses in module

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<td>2581001</td>
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<td>2581002</td>
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<td>V. Bertsch</td>
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<td>Efficient Energy Systems and Electric Mobility</td>
<td>2/0</td>
<td>S</td>
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<td>R. McKenna, P. Jochem</td>
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Learning Control / Examinations
The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations take place every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal. Additional courses might be accredited upon request.

Conditions
None.

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

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

Content
Strategical Aspects of Energy Economy: Long-term planning methods, generation technologies
Technological Change in Energy Economics: Future energy technologies, learning curves, energy demand
Heat Economy: district heating, heating technologies, reduction of heat demand, statutory provisions
Energy Systems Analysis: Interdependencies in energy economics, energy systems modelling approaches in energy economics
Energy and Environment: emission factors, emission reduction measures, environmental impact
Efficient Energy Systems and Electric Mobility: concepts and current trends in energy efficiency, Overview of and economical, ecological and social impacts through electric mobility
Module: Entrepreneurship (EnTechnon) [IW4BWLENT1]

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

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Courses in module

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<th>CP</th>
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<td>2545001</td>
<td>Entrepreneurship</td>
<td>2 W/S</td>
<td>3</td>
<td>O. Terzidis, W. Runge, A. Presse</td>
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<tr>
<td>2545010</td>
<td>Design Thinking</td>
<td>2 W/S</td>
<td>3</td>
<td>O. Terzidis, B. Kneisel, Dr. H. Haller</td>
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<tr>
<td>2545005</td>
<td>Business Planning</td>
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<td>3</td>
<td>O. Terzidis, A. Presse, J. Stohr</td>
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<tr>
<td>2545024</td>
<td>Developing and Validating Business Ideas</td>
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<td>3</td>
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<td>2545015</td>
<td>Innovation Management</td>
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<td>2540456</td>
<td>Business Models in the Internet: Planning and Implementation</td>
<td>2/1 S 4,5</td>
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<td>2513305</td>
<td>Developing Business Models for the Semantic Web</td>
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<td>2545016</td>
<td>Roadmapping</td>
<td>2 S</td>
<td>3</td>
<td>D. Koch</td>
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Learning Control / Examinations
See German version.

Conditions
None.

Learning Outcomes
Content
Module: Innovation Management [IW4BWLENT2]

Coordination: M. Weissenberger-Eibl
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Business Administration

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Courses in module

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<td>W</td>
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<td>D. Koch</td>
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<td>Knowledge Transfer in Innovation Management</td>
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<td>M. Weissenberger-Eibl, P. Roth</td>
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<td>Current issues in Innovation Management</td>
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<td>3</td>
<td>O. Terzidis, B. Kneisel, Dr. H. Haller</td>
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<td>3</td>
<td>O. Terzidis, C. Linz</td>
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Learning Control / Examinations
See German version.

Conditions
The lecture “Innovation Management” and one of the seminars of the chair for Innovation and Technology Management are compulsory. The second seminar can be chosen from the courses of the module.

Recommendations
None.

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

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

Content
The Innovation Management lecture course teaches concepts, strategies and methods which help students to form a systemic understanding of the innovation process and how to shape it. Building on this holistic understanding, the seminar courses then go into the subjects in greater depth and address specific processes and methods which are central to innovation management.
Module: Marketing Management [IW4BWLMAR5]

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

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Courses in module

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<td>2572167</td>
<td>Behavioral Approaches in Marketing</td>
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<td>2571176</td>
<td>Marketing Strategy Business Game</td>
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<td>2571185</td>
<td>Strategic Brand Management</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
Only one of the following courses can be counted towards the final grade of the module: Marketing Strategy Business Game, Business Plan Workshop or Strategic Brand Management.

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

- “Product and Innovation Marketing”
- “Market Research” – this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- “Strategic and Behavioral Marketing”
- “Strategic and Innovative Decision Making in Marketing”
- “Business Plan Workshop”
- “Marketing and Strategy Business Game”

Remarks
For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
Module: Sales Management [IW4BWLMAR6]

**Coordination:** M. Klarmann, M. Artz  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

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<td>2572157</td>
<td>Pricing</td>
<td>2</td>
<td>W</td>
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<tr>
<td>2571150</td>
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<td>2572180</td>
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**Learning Control / Examinations**

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

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

**Conditions**

None.

**Learning Outcomes**

**Content**

The aim of the module is to deepen the sales management knowledge of the students. Theoretical approaches often have a combined view on marketing and sales, whereas in practical surroundings the sales department is completely separated from the marketing tasks. Given this fact, we concentrate on pure sales management topics and address different facets of the sales management. Students can choose between the following courses:

- “Sales Management and Retailing”
- “Pricing”
- “Market Research” - this course has to be completed successfully by students interested in seminar or master thesis positions at the chair of marketing
- “Case Studies in Pricing”
- “Sales Strategy and Control”

**Remarks**

For further information please contact Marketing & Sales Research Group (marketing.iism.kit.edu).
Module: Strategy, Communication, and Data Analysis [IW4BWLMAR7]

**Coordination:** B. Neibecker  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

**ECTS Credits**  
**Cycle** Every term  
**Duration** 1

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<tr>
<td>2571165</td>
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<td>2571162</td>
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**Learning Control / Examinations**
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.
The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**
None.

**Learning Outcomes**
Beyond the learning outcomes given with the individual courses the module open the possibility for a systematic consolidation in marketing.

**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 drivers of success 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. In addition, consumer behavior approaches in marketing are discussed as an important research area with a strong interdisciplinary and empirical orientation.

**Remarks**
For further information please contact Marketing & Sales Research Group (marketing.ism.kit.edu).
Module: Management Accounting [IW4BWLlBU1]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

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<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>2579900</td>
<td>Management Accounting 1</td>
<td>2/2</td>
<td>S</td>
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<td>M. Wouters</td>
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<tr>
<td>2579902</td>
<td>Management Accounting 2</td>
<td>2/2</td>
<td>W</td>
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<td>M. Wouters</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the courses of this module. The assessment procedures are described for each course of the module separately. The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions None.

Learning Outcomes
Students have knowledge about various management accounting techniques through study of literature and practice.

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

Remarks
Students who like this module are probably also interested in the courses

- 2530216 Financial Management
- 2530210 Management Accounting
5.2 Economics

Module: Applied Strategic Decisions [IW4VWL2]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
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Courses in module

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<tr>
<th>ID</th>
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<th>Hours per week</th>
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<th>CP</th>
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<tbody>
<tr>
<td>n.n.</td>
<td>Advanced Game Theory</td>
<td>2/1</td>
<td>W</td>
<td>4,5</td>
<td>P. Reiss, C. Puppe</td>
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<tr>
<td>2590408</td>
<td>Auction Theory</td>
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<td>W</td>
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<td>K. Ehrhart</td>
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<tr>
<td>2540460</td>
<td>Market Engineering: Information in Institutions</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>C. Weinhardt, M. Adam</td>
</tr>
<tr>
<td>2540489</td>
<td>Experimental Economics</td>
<td>2/1</td>
<td>W</td>
<td>4,5</td>
<td>M. Adam, C. Weinhardt</td>
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<td>2520402/2520403</td>
<td>Predictive Mechanism and Market Design</td>
<td>2/1</td>
<td>W</td>
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<td>P. Reiss</td>
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<tr>
<td>2530214</td>
<td>Corporate Financial Policy</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>M. Ruckes</td>
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<tr>
<td>2530232</td>
<td>Financial Intermediation</td>
<td>3</td>
<td>W</td>
<td>4,5</td>
<td>M. Ruckes</td>
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<td>2520365</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 1-3 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
The course Advanced Game Theory is obligatory. Exception: The course Introduction to Game Theory [2520525] was completed.

Recommendations
Basic knowledge in game theory is assumed.

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

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

Remarks
The course Advanced Game Theory is not offered before Winter 2014/15.
The course Predictive Mechanism and Market Design is not offered each year.
Module: Allocation and Equilibrium [W4VWL7]

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

<table>
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Courses in module

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<tbody>
<tr>
<td>2520527</td>
<td>Advanced Topics in Economic Theory</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>M. Hillebrand, K. Mitusch</td>
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<tr>
<td>2520517</td>
<td>Welfare Economics</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>C. Puppe</td>
</tr>
<tr>
<td>25549</td>
<td>Theory of Business Cycles</td>
<td>2/1</td>
<td>W</td>
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<td>M. Hillebrand</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
None.

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

Learning Outcomes

Content

Remarks
See German version.
Module: Macroeconomic Theory [IW4VWL8]

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

<table>
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Courses in module

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<td>2520543</td>
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<td>Theory of Business Cycles</td>
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<td>W</td>
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<td>M. Hillebrand</td>
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<td>2561503</td>
<td>Theory of endogenous growth</td>
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<td>W</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
None.

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

Learning Outcomes

Content
Module: Social Choice Theory [IW4VL9]

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

<table>
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<tr>
<td>2520517</td>
<td>Welfare Economics</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>C. Puppe</td>
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<tr>
<td>2520525</td>
<td>Introduction to Game Theory</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>C. Puppe, P. Reiss</td>
</tr>
<tr>
<td>25539</td>
<td>Mathematical Theory of Democracy</td>
<td>2/1</td>
<td>W</td>
<td>4,5</td>
<td>A. Melik-Tangyan</td>
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Learning Control / Examinations

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

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

Conditions
None.

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

Learning Outcomes

Content
Remarks
See German version.
Module: Telecommunications Markets [IW4VWL10]

**Coordination:** K. Mitusch

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:** Economics

<table>
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**Courses in module**

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<th>Responsible Lecturer(s)</th>
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<tr>
<td>2561232</td>
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<td>W</td>
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<td>2540462</td>
<td>Communications Economics</td>
<td>2/1</td>
<td>S</td>
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<td>J. Kraemer</td>
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**Learning Control / Examinations**
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The exams are offered at the beginning of the recess period about the subject matter of the latest held lecture. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module separately. The overall grade for the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

**Conditions**
None.

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

**Content**
Accompanied by rapid technological developments the telecommunications markets have undergone substantial changes since their liberalization in the late 90s. Besides the former state-owned monopoly incumbents, a large number of new actors has established on different levels of the industry. While particularly on the service level, intensive competition has developed, some infrastructure elements still qualify as natural monopolies and are subject to regulation. With the rising number of actors, services and applications the economic correlations of these markets are getting more and more complex. Growing data volumes and technological developments give rise to ne new infrastructure investments. Actors have to consider direct and indirect network effects as they operate on several markets simultaneously and regulators need to keep the balance between fostering competition and incentivizing investments. The rapidly developing markets pose many issues that are worth to be discussed.

The two sector specific courses are complementary and address the most relevant aspects and economic effects that have influenced the development of telecommunications markets in the recent past and will most probably influence them in the future. For some topics the methods of industrial economics are applied, which makes the third course of the module, Industrial Organization, a perfect supplement to either of the two courses.

**Remarks**
The module will be offered latest until SS 2014.
Module: Economic Theory and its Application in Finance [IW4VWL14]

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

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<tr>
<td>2520527</td>
<td>Advanced Topics in Economic Theory</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>M. Hillebrand, K. Mitusch</td>
</tr>
<tr>
<td>2530214</td>
<td>Corporate Financial Policy</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>M. Ruckes</td>
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<tr>
<td>2530232</td>
<td>Financial Intermediation</td>
<td>3</td>
<td>W</td>
<td>4,5</td>
<td>M. Ruckes</td>
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<tr>
<td>2530555</td>
<td>Asset Pricing</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>M. Uhrig-Homburg, M. Ruckes</td>
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</table>

**Learning Control / Examinations**
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**Conditions**
The course „Advanced Topics in Economic Theory“ is compulsory and must be examined.

**Recommendations**
None.

**Learning Outcomes**
Students will learn the methods of formal economic modeling, particularly of General Equilibrium Theory and contract theory, as well as their applications to the topics in Finance, specifically the areas of financial markets and institutions and corporate finance. This will yield many useful insights into the relationship between firms and investors and the functioning of financial markets.

**Content**
The mandatory course „Advanced Topics in Economic Theory“ is devoted in equal parts to General Equilibrium Theory and to contract theory. The course „Asset Pricing“ will apply techniques of General Equilibrium Theory to valuation of financial assets. The courses „Corporate Financial Policy“ and „Finanzintermediation“ will apply the techniques of contract theory to issues of corporate finance and financial institutions.
Module: Microeconomic Theory [IW4VWL15]

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

ECTS Credits 9
Cycle Every term
Duration 2

Courses in module

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<td>n.n.</td>
<td>Advanced Game Theory</td>
<td>2/1</td>
<td>W</td>
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<td>P. Reiss, C. Puppe</td>
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<td>Advanced Topics in Economic Theory</td>
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<td>4,5</td>
<td>M. Hillebrand, K. Mitusch</td>
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<td>Social Choice Theory</td>
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<td>S</td>
<td>4,5</td>
<td>C. Puppe</td>
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The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Recommendations
None.

Learning Outcomes

Content
Module: Collective Decision Making [IW4VWL16]

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

ECTS Credits 9
Cycle Every term
Duration 2

Courses in module

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<td>25539</td>
<td>Mathematical Theory of Democracy</td>
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<td>W</td>
<td>4,5</td>
<td>A. Melik-Tangyan</td>
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<tr>
<td>n.n.</td>
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<td>Public Management</td>
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<td>W</td>
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<td>B. Wigger, Assistenten</td>
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Learning Control / Examinations
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The overall grade of the the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Recommendations
None.

Learning Outcomes
Content
Module: Experimental Economics [IW4VWL17]

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

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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<tr>
<td>2540489</td>
<td>Experimental Economics</td>
<td>2/1</td>
<td>W</td>
<td>4.5</td>
<td>M. Adam, C. Weinhardt</td>
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<tr>
<td>2520402/2520403</td>
<td>Predictive Mechanism and Market Design</td>
<td>2/1</td>
<td>W</td>
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<td>P. Reiss</td>
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<td>n.n.</td>
<td>Topics in Experimental Economics</td>
<td>2/1</td>
<td>S</td>
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<td>P. Reiss</td>
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Learning Control / Examinations
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The overall grade of the module is the average of the grades for each course weighted by the credits and truncated after the first decimal.

Conditions
The course Experimental Economics [2540489] is compulsory and must be examined.

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

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

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

Remarks
- The course Advanced Game Theory is not offered before Winter 2014/15.
- The course Predictive Mechanism and Market Design is not offered each year.
5.3 Operations Research


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

<table>
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<td>2550486</td>
<td>Facility Location and Strategic Supply Chain Management</td>
<td>2/1</td>
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<tr>
<td>2550488</td>
<td>Tactical and Operational Supply Chain Management</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>S. Nickel</td>
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<tr>
<td>2550480</td>
<td>Operations Research in Supply Chain Management</td>
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<td>W/S</td>
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<tr>
<td>2550495</td>
<td>Operations Research in Health Care Management</td>
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<td>W/S</td>
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<td>S. Nickel</td>
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<td>2550493</td>
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<td>W/S</td>
<td>3</td>
<td>S. Nickel, Hansis</td>
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<tr>
<td>2550498</td>
<td>Practical seminar: Health Care Management (with Case Studies)</td>
<td>2/1/2</td>
<td>W/S</td>
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<td>S. Nickel</td>
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<tr>
<td>2550497</td>
<td>Software Laboratory: OR Models II</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>S. Nickel</td>
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<td>2550488</td>
<td>Discrete-event Simulation in Production and Logistics</td>
<td>2/1</td>
<td>S</td>
<td>4,5</td>
<td>S. Nickel, S. Spieckermann</td>
</tr>
<tr>
<td>2550494</td>
<td>Supply Chain Management in the Process Industry</td>
<td>2/1</td>
<td>W</td>
<td>4,5</td>
<td>S. Nickel</td>
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</table>

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

Conditions
See German version.

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

Learning Outcomes
The student
- is familiar with basic concepts and terms of Supply Chain Management,
- knows the different areas of SCM and their respective optimization problems,
- is acquainted with classical location problem models (in planes, in networks and discrete) as well as fundamental methods for distribution and transport planning, inventory planning and management,
- is familiar with general procedures and characteristics of Health Care Management and the possibilities for adapting mathematical models for non-profit organizations,
- is able to model practical problems mathematically and estimate their complexity as well as choose and adapt appropriate solution methods.

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

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

Health Care Management addresses specific Supply Chain Management problems in the health sector. Important applications arise in scheduling and internal logistics of hospitals.

**Remarks**

Some lectures and courses are offered irregularly. The planned lectures and courses for the next three years are announced online.
Module: Mathematical Programming [IW4OR6]

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

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
</tr>
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<tbody>
<tr>
<td>25138</td>
<td>Mixed Integer Programming I</td>
<td>2/1</td>
<td>S</td>
<td>4.5</td>
<td>O. Stein</td>
</tr>
<tr>
<td>25140</td>
<td>Mixed Integer Programming II</td>
<td>2/1</td>
<td>W</td>
<td>4.5</td>
<td>O. Stein</td>
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<tr>
<td>2550128</td>
<td>Special Topics in Optimization I</td>
<td>2/1</td>
<td>W/S</td>
<td>4.5</td>
<td>O. Stein</td>
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<tr>
<td>2550126</td>
<td>Special Topics in Optimization II</td>
<td>2/1</td>
<td>W/S</td>
<td>4.5</td>
<td>O. Stein</td>
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<tr>
<td>2550484</td>
<td>Graph Theory and Advanced Location Models</td>
<td>2/1</td>
<td>W/S</td>
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<td>S. Nickel</td>
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<td>2550111</td>
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<td>2550113</td>
<td>Nonlinear Optimization II</td>
<td>2/1</td>
<td>S</td>
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<td>O. Stein</td>
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<td>2550134</td>
<td>Global Optimization I</td>
<td>2/1</td>
<td>W</td>
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<td>O. Stein</td>
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<td>2550136</td>
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<td>2/1</td>
<td>W</td>
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<td>O. Stein</td>
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<tr>
<td>2550120</td>
<td>Convex Analysis</td>
<td>2/1</td>
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<td>2550115</td>
<td>Parametric Optimization</td>
<td>2/1</td>
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<td>4.5</td>
<td>O. Stein</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

Conditions
See German version.

Learning Outcomes

The student

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

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

Remarks
The lectures are partly offered irregularly. The curriculum of the next three years is available online (www.ior.kit.edu). For the lectures of Prof. Stein a grade of 30 % of the exercise course has to be fulfilled. The description of the particular lectures is more detailed.
Module: Stochastic Modelling and Optimization [IW4OR7]

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

<table>
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Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
</tr>
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<tbody>
<tr>
<td>2550679</td>
<td>Markov Decision Models I</td>
<td>2/1/2</td>
<td>W</td>
<td>5</td>
<td>K. Waldmann</td>
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<tr>
<td>2550682</td>
<td>Markov Decision Models II</td>
<td>2/1/2</td>
<td>S</td>
<td>4,5</td>
<td>K. Waldmann</td>
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<tr>
<td>2550674</td>
<td>Quality Control I</td>
<td>2/1/2</td>
<td>W/S</td>
<td>4,5</td>
<td>K. Waldmann</td>
</tr>
<tr>
<td>25659</td>
<td>Quality Control II</td>
<td>2/1/2</td>
<td>W/S</td>
<td>4,5</td>
<td>K. Waldmann</td>
</tr>
<tr>
<td>25687</td>
<td>Optimization in a Random Environment</td>
<td>2/1/2</td>
<td>W/S</td>
<td>4,5</td>
<td>K. Waldmann</td>
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<tr>
<td>2550662</td>
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<td>W/S</td>
<td>4,5</td>
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<tr>
<td>2550665</td>
<td>Simulation II</td>
<td>2/1/2</td>
<td>W/S</td>
<td>4,5</td>
<td>K. Waldmann</td>
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<tr>
<td>25688</td>
<td>OR-orientied modeling and analysis of real problems (project)</td>
<td>1/0/3</td>
<td>W/S</td>
<td>4,5</td>
<td>K. Waldmann</td>
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</table>

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 separately.

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

Conditions
See German version.

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
Topics overview:
Markov Decision Models II: Queuing Systems, Stochastic Decision Processes
Simulation I: Generation of random numbers, Monte Carlo integration, Discrete event simulation, Discrete and continuous random variables, Statistical analysis of simulated data.
Simulation II: Variance reduction techniques, Simulation of stochastic processes, Case studies.
Quality Control I: Statistical Process Control, Acceptance Sampling, Design of experiments
Quality Control II: Reliability of complexe systems with and without repair, Maintenance
OR-orientied modeling and analysis of real problems: project-based modelling and analysis

Remarks
The planned lectures and courses for the next two years are announced online (http://www.ior.kit.edu/)
5.4 Statistics

Module: Mathematical and Empirical Finance [IW4STAT1]

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

<table>
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<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
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Courses in module

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<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>2520357/2520358</td>
<td>Portfolio and Asset Liability Management</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>W. Heller</td>
</tr>
<tr>
<td>2521331</td>
<td>Stochastic Calculus and Finance</td>
<td>2/1</td>
<td>W</td>
<td>4.5</td>
<td>W. Heller</td>
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</tbody>
</table>

Learning Control / Examinations

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

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

Conditions
None.

Learning Outcomes

Content

Remarks

The course Portfolio and Asset Liability Management [2520357] will not be offered any more from summer term 2015 on. The examination will probably be offered latest until summer term 2014.

The course Stochastic Calculus and Finance [2521331] will not be offered any more from winter term 2014/2015 on. The examination will probably be offered latest until winter term 2013/14.
## Module: Statistical Methods in Risk Management [IW4STAT2]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
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### Courses in module

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<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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</thead>
<tbody>
<tr>
<td>2520337</td>
<td>Stochastic and Econometric Models in Credit Risk Management</td>
<td>2/2</td>
<td>S</td>
<td>5</td>
<td>Y. Kim</td>
</tr>
<tr>
<td>2520357/2520358</td>
<td>Portfolio and Asset Liability Management</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>W. Heller</td>
</tr>
<tr>
<td>2520375</td>
<td>Data Mining</td>
<td>2</td>
<td>W/S</td>
<td>5</td>
<td>G. Nakhaeizadeh</td>
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<tr>
<td>2520317</td>
<td>Multivariate Methods</td>
<td>2/2</td>
<td>S</td>
<td>5</td>
<td>W. Heller</td>
</tr>
<tr>
<td>2521353</td>
<td>Statistical Methods in Financial Risk Management</td>
<td>2/1</td>
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<td>4.5</td>
<td>A. Nazemi</td>
</tr>
<tr>
<td>2521325/2521326</td>
<td>Statistics and Econometrics in Business and Economics</td>
<td>2/2</td>
<td>W</td>
<td>4.5</td>
<td>W. Heller</td>
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### Learning Control / Examinations

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

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

### Conditions

None.

### Learning Outcomes

Content
5.5 Informatics

Module: Computer Security [IW4INSICH]

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

ECTS Credits
Cycle
Duration

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
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<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24941</td>
<td>Security</td>
<td>3/1</td>
<td>S</td>
<td>6</td>
<td>D. Hofheinz</td>
</tr>
<tr>
<td>SemSich</td>
<td>Seminar in Security</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
<tr>
<td>24137</td>
<td>Signals and Codes</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
<tr>
<td>24629</td>
<td>Symmetric Encryption</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
<tr>
<td>24691</td>
<td>Cryptographic Voting Schemes</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
</tbody>
</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes
The student

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

Content
Theoretical and practical aspects of computer security

- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective methods / avoidance strategies
- Overview of opportunities for side channel attacks
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (eg, Diffie-Hellman)
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS)
Module: Advanced Topics in Cryptography [IW4INFKRYP]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
</tr>
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<tbody>
<tr>
<td>9</td>
<td>Every term</td>
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**Courses in module**

<table>
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<tr>
<th>Course ID</th>
<th>Course Title</th>
<th>Hours per week</th>
<th>Term</th>
<th>Credits</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24623</td>
<td>Selected topics in Cryptography</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
<tr>
<td>WSUW</td>
<td>How Statistics Begins to Understand the Difference Between Cause and Effect</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>D. Janzing</td>
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<tr>
<td>24137</td>
<td>Signals and Codes</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>J. Müller-Quade</td>
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<tr>
<td>24629</td>
<td>Symmetric Encryption</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
</tr>
<tr>
<td>24166</td>
<td>Provable Security in Cryptography</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>D. Hofheinz</td>
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<tr>
<td>24115</td>
<td>Asymmetric Encryption Schemes</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>J. Müller-Quade</td>
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<tr>
<td>24691</td>
<td>Cryptographic Voting Schemes</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
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<tr>
<td>24654</td>
<td>Digital signatures</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>D. Hofheinz</td>
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<tr>
<td>24165</td>
<td>Side-Channel Attacks in Cryptography</td>
<td>2/0</td>
<td>W</td>
<td>3</td>
<td>J. Müller-Quade, Antonio Almeida</td>
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</table>

**Learning Control / Examinations**

Lectures will be assessed in an oral overall exam on all taken lectures according to sec. 4 subsec. 2 no. 2 study and examination regulations. The grade of the module is the average of the single grades weighted by the related credit points and cut off after the first decimal place.

**Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

- Development of safety goals and classification of threats.
- Formal description of authentication systems.
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective methods / avoidance strategies
- Overview of opportunities for side channel attacks
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications.
- The current research issues from some of the following areas are covered:
  - Block ciphers, hash functions,
  - Public-key encryption, digital signature, key exchange.
- Basic security protocols such as fair coin toss over the phone, Byzantine Agreement, Dutch Flower Auctions, Zero Knowledge.
- Threat models and security definitions.
- Modular design and protocol composition.
- Security definitions of simulatability.
- Universal Composability.
- Deniability as an additional safety feature.
- Electronic Voting.
Module: Introduction to Algorithmics [IW4INEAT]

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

<table>
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<tr>
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Courses in module

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<tr>
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<th>CP</th>
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<tr>
<td>24079</td>
<td>Algorithms II</td>
<td>3/1</td>
<td>W</td>
<td>6</td>
<td>D. Wagner, P. Sanders</td>
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<tr>
<td>24819</td>
<td>Algorithm Design Seminar</td>
<td>2</td>
<td>W/S</td>
<td>4</td>
<td>D. Wagner</td>
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</tbody>
</table>

Conditions
None.

Learning Outcomes
The student

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

Content
This module conveys knowledge of basic theoretical and practical aspects of algorithmics. It covers common methods for the design and analysis of basic algorithmic problems as well as the fundamentals of common algorithmic methods such as approximations algorithms, linear programming, randomized algorithms, parallel algorithms and parameterized algorithms.
Module: Advanced Algorithms: Design and Analysis [IW4INAADA]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

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<td>T. Worsch</td>
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<td>24602</td>
<td>Parallel Algorithms</td>
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<td>W</td>
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<td>P. Sanders</td>
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<td>24123</td>
<td>Algorithm Engineering</td>
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<td>S</td>
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<td>P. Sanders, D. Wagner</td>
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<td>24622</td>
<td>Algorithms in Cellular Automata</td>
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<td>S</td>
<td>3</td>
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<td>Algorithm Design Seminar</td>
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<tr>
<td>ALGTprak</td>
<td>Practical Course in Algorithm Design</td>
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<td>P. Sanders, D. Wagner</td>
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<tr>
<td>24638</td>
<td>Algorithms for Routing</td>
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<td>AAS</td>
<td>Algorithms for Ad-Hoc and Sensor Networks</td>
<td>2/1</td>
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<td>ALGG</td>
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<td>2511106</td>
<td>Nature-inspired Optimisation Methods</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>S. Mostaghim, P. Shukla</td>
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<td>M. Nöllenburg, D. Wagner</td>
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</table>

Learning Control / Examinations

Conditions
None.

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

Content
This module conveys profound knowledge concerning theoretical aspects of algorithmics. Its focus is on the design and analysis of advanced algorithms, particularly, on algorithms for graphs, randomized algorithms, parallel algorithms and algorithms for NP-hard problems.
Module: Advanced Algorithms: Engineering and Applications [IW4INAALG0B]

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

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Courses in module

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<td>2511104</td>
<td>Organic Computing</td>
<td>2/1</td>
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<td>H. Schmeck, S. Mostaghim</td>
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<td>S</td>
<td>5</td>
<td>S. Mostaghim, P. Shukla</td>
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<td>24602</td>
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<td>24622</td>
<td>Algorithms in Cellular Automata</td>
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<td>3</td>
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<td>Randomized Algorithms</td>
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<td>D. Wagner</td>
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</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

The Student

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

Content

This module conveys profound knowledge concerning practical aspects of algorithmics and covers applications of algorithms for practical problems. Its focus is on the design, the practical implementation and the evaluation of algorithms, particularly, algorithms for graphs, parallel algorithms, algorithms for NP-hard problems, optimization algorithms inspired by nature, as well as algorithms from various areas of application.
Module: Language Technology and Compiler [IW4INCOMP1]

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

<table>
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Courses in module

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<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tr>
<td>24661</td>
<td>Language Technology and Compiler</td>
<td>4/2</td>
<td>S</td>
<td>8</td>
<td>G. Snelting</td>
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</table>

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

Conditions
None.

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

Content
- Structure of a compiler
- Lexical analysis
- Syntactic analysis
- Semantic analysis
- Code generation
- Code optimization
- Specific technologies: LL-Parser, LR/LALR-Parser, attributed grammars, instruction selection, register allocation, runtime mechanisms, memory management, static single assignment form and its usage in optimization
Module: Software Systems [IW4INSWS]

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

<table>
<thead>
<tr>
<th>Courses in module</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tr>
<td>24667</td>
<td>Component Based Software Architecture</td>
<td>2</td>
<td>S</td>
<td>3</td>
</tr>
<tr>
<td>24660</td>
<td>Software Development for Modern, Parallel Platforms</td>
<td>2</td>
<td>S</td>
<td>3</td>
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<tr>
<td>24112</td>
<td>Multicore Computers and Computer Clusters</td>
<td>2</td>
<td>W</td>
<td>3</td>
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<tr>
<td>24125 / 24673</td>
<td>Reading Group SpezVer: Specification and Verification of Software</td>
<td>1</td>
<td>W/S</td>
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<tr>
<td>24293</td>
<td>Multicore Programming in Practice: Tools, Models, Languages</td>
<td>4</td>
<td>W/S</td>
<td>6</td>
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<tr>
<td>24164</td>
<td>Software-Evolution</td>
<td>2</td>
<td>W</td>
<td>3</td>
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<tr>
<td>24187</td>
<td>Natural Language Processing and Software Engineering</td>
<td>2</td>
<td>W</td>
<td>3</td>
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<td>2400038</td>
<td>Automatic Test Generation</td>
<td>3</td>
<td>W</td>
<td>5</td>
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<td>24657</td>
<td>Applying Formal Verification</td>
<td>3</td>
<td>S</td>
<td>5</td>
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<tr>
<td>APS</td>
<td>Automatic Software Parallelization</td>
<td>2/1</td>
<td>S</td>
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**Learning Control / Examinations**
The assessment consists of an oral exam on the contents of each taken lecture and practical courses (approx. 25 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

Lesegruppe Softwaretechnik: ungraded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

The lecture Multicore Programming in Practice: Tools, Models, Languages [24293] will have a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. The assessment is explained in the course description.

The lecture Multicore Computers and Computer Clusters will have an assessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

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

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

**Learning Outcomes**
In the courses that comprise this module, students learn different approaches and techniques for systematic and high-quality development of software systems, e.g. requirements engineering, implementing components and services, use of parallelism and multi-core platforms, as well as the verification of created software systems.

**Content**
The content will be explained in the course descriptions.

**Remarks**
The lecture Multikernpraktikum is no longer offered.
The lecture Praktikum Performance von Anwendungen auf Cloud-Großrechner IBM z10 is no longer offered.
The lecture Security Engineering is not offered any longer.
Module: Software Methods [IW4INSWM]

**Coordination:** R. Reussner

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:** Informatics

<table>
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<th>Cycle</th>
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**Courses in module**

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<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24667</td>
<td>Component Based Software Architecture</td>
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<td>3</td>
<td>R. Reussner, Andreas Rentschler</td>
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<tr>
<td>24156</td>
<td>Empirical Software Engineering</td>
<td>2</td>
<td>S</td>
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<td>W. Tichy</td>
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<td>24634</td>
<td>Modern Development Environments using the example of .NET</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>W. Tichy, Gelhausen, Ladani</td>
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<tr>
<td>24125 / 24673</td>
<td>Reading Group</td>
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<td>24164</td>
<td>Software-Evolution</td>
<td>2</td>
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<td>3</td>
<td>K. Krogmann, K. Krogmann</td>
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<tr>
<td>24187</td>
<td>Natural Language Processing and Software Engineering</td>
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<td>W</td>
<td>3</td>
<td>W. Tichy</td>
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<td>24657</td>
<td>APS Automatic Software Parallelization</td>
<td>2</td>
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<td>3</td>
<td>R. Reussner, Lucia Kapova</td>
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</table>

**Learning Control / Examinations**

The assessment consists of an oral exam on the taken lectures and practical courses (approx. 45 minutes) according to section 4 subsection 2 no. 2 study and examination regulations. The grade of the module corresponds to the grade of the oral exam.

**Conditions**

None.

**Learning Outcomes**

The students learn the foundations and advanced methods for systematic planning, design, implementation, evaluation and enhancement of software systems. By acquiring knowledge and capabilities to critically evaluate modern technologies, the students are enabled to use these technologies purposefully and effectively. Apart from functional viewpoints and software properties, extra-functional properties such as security and performance are taught. Additionally, an overview of current research topics and challenges are offered.

**Content**

The content is explained in the course descriptions.
Module: Applied Web Engineering [IW4INPWE]

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

<table>
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Courses in module

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<tr>
<td>24124</td>
<td>Web Engineering</td>
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<td>H. Hartenstein, M. Nußbaumer</td>
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<td>24880</td>
<td>Practical Course Web Engineering</td>
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Learning Control / Examinations
The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The assessment is based on practical work and presentations according to § 4(2), 3 study and examination regulations. The grade of the module is the average of the single grades weighted by the related credit points.

Conditions
None.

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

Learning Outcomes

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

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

The module will convey practical knowledge of the Web’s fundamental languages and technologies, like (X)HTML/CSS and XML/XSL. Furthermore component-based Web engineering approaches and frameworks are applied in the software project. Another thematic focus of the course is on Web services as a fundamental building block for constructing service-oriented applications. By realizing a software project, the structured and disciplined application of the learnt technologies is emphasized.
Module: Wireless Networking [IW4INWN]

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

<table>
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Courses in module

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<th>CP</th>
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<td>24104</td>
<td>Wireless Sensor-Actuator-Networks</td>
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<td>4</td>
<td>M. Zitterbart</td>
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<tr>
<td>24669</td>
<td>Modeling and Simulation of Networks and Distributed Systems</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>H. Hartenstein</td>
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<tr>
<td>24643</td>
<td>Mobile Communication</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>O. Waldhorst, M. Zitterbart</td>
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<td>24146</td>
<td>Ubiquitous Computing</td>
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<td>W</td>
<td>4</td>
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<td>Network Security: Architectures and Protocols</td>
<td>2/0</td>
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<td>4</td>
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<tr>
<td>24128</td>
<td>Telematics</td>
<td>3</td>
<td>W</td>
<td>6</td>
<td>M. Zitterbart</td>
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Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

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

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

Learning Outcomes
Each student should be able

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

Content
This module details selected aspects of wireless communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.
Module: Networking Labs [IW4INNL]

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

<table>
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<td>Modeling and Simulation of Networks and Distributed Systems</td>
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<tr>
<td>24149</td>
<td>IT-Security Management for Networked Systems</td>
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<td>24601</td>
<td>Network Security: Architectures and Protocols</td>
<td>2/0</td>
<td>S</td>
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Learning Control / Examinations
The assessments for the individual lectures consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The assessments for practical courses will be assessments according to sec. 4 subsec. 2 no. 3 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.

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

One of the following combinations can be taken:
- Modeling and Simulation of Networks and Distributed Systems (24669) and Practical Course Modeling and Simulation of Networks and Distributed Systems (24878)
- Modeling and Simulation of Networks and Distributed Systems (24669) and IT-Security Management for Networked Systems (24149)

Learning Outcomes
Each student should be able
- to learn and apply the concepts and principals of wireless network design
- to identify the flaws and benefits of wireless communication systems
- to judge the performance of protocols, wireless networks and architectures
- master advanced protocols, architectures and algorithms of wireless communication systems

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

Remarks
If the lecture *Telematics* [24128] has not been taken yet, it has to be the first exam or examined simultaneously with the second chosen lecture.
Module: Future Networking [IW4INFN]

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

ECTS Credits: 8
Cycle: Every term
Duration: 1

Courses in module

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<td>2/0</td>
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<td>24132</td>
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<td>W</td>
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<tr>
<td>24643</td>
<td>Mobile Communication</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>O. Waldhorst, M. Zitterbart</td>
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<tr>
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<td>2/0</td>
<td>W</td>
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<td>Telematics</td>
<td>3</td>
<td>W</td>
<td>6</td>
<td>M. Zitterbart</td>
</tr>
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Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
It is recommended to take the exams at the same time as part of an overall exam.

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

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

Learning Outcomes
Each student should be able

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

Content
This module details selected aspects of future communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.
Module: Networking [IW4INNW]

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

<table>
<thead>
<tr>
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<th>Duration</th>
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**Courses in module**

<table>
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<tr>
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<th>Term</th>
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<tr>
<td>24128</td>
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<td>3</td>
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<tr>
<td>24674</td>
<td>Next Generation Internet</td>
<td>2/0</td>
<td>S</td>
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<td>R. Bless, M. Zitterbart</td>
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<tr>
<td>24669</td>
<td>Modeling and Simulation of Networks and Distributed Systems</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>H. Hartenstein</td>
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<tr>
<td>24132</td>
<td>Multimedia Communications</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>R. Bless, M. Zitterbart</td>
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<td>24601</td>
<td>Network Security: Architectures and Protocols</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>M. Schöller</td>
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<tr>
<td>PEprak</td>
<td>Lab Protocol Engineering</td>
<td>4</td>
<td>W</td>
<td>4</td>
<td>M. Zitterbart</td>
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</table>

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

**Conditions**
None.

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

**Learning Outcomes**
Each student should be able to
- to learn and use the concepts and principals of wired network design
- to identify the flaws and benefits of wired communication systems
- to judge the performance of protocols, wired networks and architectures
- master advanced protocols, architectures and algorithms of wired communication systems

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

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

ECTS Credits Cycle Duration
9 Every term 1

Courses in module

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<tr>
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<th>Term</th>
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<td>Network Security: Architectures and Protocols</td>
<td>2/0</td>
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</tr>
<tr>
<td>24149</td>
<td>IT-Security Management for Networked Systems</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>H. Hartenstein</td>
</tr>
<tr>
<td>24629</td>
<td>Symmetric Encryption</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>J. Müller-Quade</td>
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<tr>
<td>24941</td>
<td>Security</td>
<td>3/1</td>
<td>S</td>
<td>6</td>
<td>D. Hofheinz</td>
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<tr>
<td>SemiKryp3</td>
<td>Seminar in Cryptography</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>J. Müller-Quade</td>
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</table>

Learning Control / Examinations
The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The assessment of the seminar consists of a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. The assessment of the course Seminar in Cryptography [SemiKryp3] consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation). The seminar can be taken in this module with 2 credit points. This has to be approved by the examiner. The assessment of the lecture Security consists of a written exam (approx. 60 minutes) according to sec. 4 subsec. 2 no. 1 study and examination regulations. The grade of the module is the average of the single grades weighted by the related credit points. It is recommended to take the exams at the same time as part of an overall exam.

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

Recommendations
The lecture Security is a basis for this module.

Learning Outcomes
Each student should be able
• to recall the basic security mechanisms and theoretical foundations of networking security and cryptography
• to read and understand actual academic papers
• to judge the security level of actual security solutions
• to identify possible attacks on security solutions

Content
This module details selected aspects of networking security and cryptography in theory and praxis.
Module: Communication and Database Systems [IW4INKD]

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

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Courses in module

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<tr>
<td>24516</td>
<td>Database Systems</td>
<td>2/1</td>
<td>S</td>
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<td>K. Böhm</td>
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<tr>
<td>24519</td>
<td>Introduction in Computer Networks</td>
<td>2/1</td>
<td>S</td>
<td>4</td>
<td>M. Beigl, M. Zitterbart</td>
</tr>
</tbody>
</table>

Learning Control / Examinations
The assessment of the lecture Introduction in Computer Networks consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.
The assessment of the lecture Database Systems consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.
The grade of the module is the average of the single grades weighted with the related credit points and cut off after the first decimal place.

Conditions
None.

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

Content
Distributed information systems are worldwide information repositories which are accessible by everybody at any place of the world at any time. The physical distance is bridged by telecommunication systems, while database management technology manages and coordinates data for arbitrary periods of time. In order to understand globally running processes, one has to understand both data transmission techniques and database technology. Besides the telecommunication and database technologies on their own, an understanding of their cooperation is required, too.
Module: Innovative Concepts of Data and Information Management [IW4INIKDI]

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

<table>
<thead>
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<th>ECTS Credits</th>
<th>Cycle</th>
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Courses in module

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<tr>
<th>ID</th>
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<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24114</td>
<td>Data Warehousing and Mining</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>db_impl</td>
<td>Database Implementation and Tuning</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>240020</td>
<td>Deployment of Database Systems</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>24109</td>
<td>Distributed Data Management</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>24141</td>
<td>Information Integration and Web Portals</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>J. Mülle, A. Rashid</td>
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<tr>
<td>24605</td>
<td>Data Privacy Protection in Interconnected Information Systems</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>K. Böhm, Buchmann</td>
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<tr>
<td>PLV</td>
<td>Selling IT-Solutions Professionally</td>
<td>2</td>
<td>S</td>
<td>1</td>
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<td>PUB</td>
<td>Consulting in Practice</td>
<td>2</td>
<td>W/S</td>
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<td>PMP</td>
<td>Project Management in Practice</td>
<td>2</td>
<td>S</td>
<td>1</td>
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<tr>
<td>24522</td>
<td>Mechanisms and Applications of Workflow Systems</td>
<td>0/1</td>
<td>S</td>
<td>1</td>
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<tr>
<td>24111</td>
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<td>3</td>
<td>W</td>
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<td>J. Mülle, Silvia von Stackelberg</td>
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<td>24310</td>
<td>Indexing Structures for Efficient Query Processing on Large Databases</td>
<td>2</td>
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<td>4</td>
<td>K. Böhm, E. Müller</td>
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<tr>
<td>2400015</td>
<td></td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>K. Böhm, E. Müller</td>
</tr>
<tr>
<td>24647</td>
<td></td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>K. Böhm, E. Müller</td>
</tr>
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</table>

Learning Control / Examinations
The assessment consists of partial examinations on the selected courses that satisfy the minimum requirement of credit points. The assessments are explained in the course descriptions.

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

Conditions
None.

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

Learning Outcomes
The students

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

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

Remarks
The courses of this module are offered irregularly. Nonetheless, it is guaranteed that the module can be passed anytime.
# Module: Theory and Practice of Data Warehousing and Mining [IW4INDWMTP]

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

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## Courses in module

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<th>Term</th>
<th>CP</th>
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<tr>
<td>24874</td>
<td>Analyzing Big Data - Laboratory Course</td>
<td>2</td>
<td>S</td>
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<tr>
<td>24114</td>
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<td>2/1</td>
<td>W</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>2400020</td>
<td>Deployment of Database Systems</td>
<td>2/1</td>
<td>W</td>
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<td>K. Böhm</td>
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<tr>
<td>db_impl</td>
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<td>2/1</td>
<td>S</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>24109</td>
<td>Distributed Data Management</td>
<td>2/1</td>
<td>W</td>
<td>5</td>
<td>K. Böhm</td>
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<tr>
<td>2400015</td>
<td>Indexing Structures for Efficient Query Processing on Large Databases</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>K. Böhm, E. Müller</td>
</tr>
<tr>
<td>24647</td>
<td>Data Mining Paradigms and Methods for Complex Databases</td>
<td>2/1</td>
<td>S</td>
<td>5</td>
<td>K. Böhm, E. Müller</td>
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</tbody>
</table>

## Learning Control / Examinations

The assessment consists of an oral exam on the contents of the selected lecture (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The practical course requires an additional certificate following sec. 4 subsec. 2 no. 3 study and examination regulations.

The grade of the module is the grade of the oral exam.

## Conditions

At least one practical course has to be taken.

## Recommendations

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

## Learning Outcomes

The students

- know the research area of information systems in its various facets and are able to do scientific work in this area,
- are able to explain and to discuss complex aspects of the topics covered by this module with both experts and informed outsiders,
- know the concepts, algorithms, techniques and selected tools in the areas of data warehousing and data mining,
- are familiar with the practical challenges of data analysis and are able to develop respective solutions on their own.

## Content

This module aims at exposing students to modern information management, both, in ‘breadth’ and ‘depth’. We achieve ‘breadth’ by means of a close inspection and comparison of different systems and their respective aims. We achieve ‘depth’ by means of an extensive examination of the underlying concepts and design alternatives, their assessment as well as by discussing applications. In particular, we look at data warehousing and mining techniques not only from a theoretical point of view but deploy and realise such technologies in a practical course.

## Remarks

The courses of this module are offered irregularly. Nonetheless, it is guaranteed that the module can be passed anytime.
Module: Theory and Practice of Database Technology [IW4INDBTP]

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

**ECTS Credits: 9**  
**Cycle: Every term**  
**Duration: 1**

### Courses in module

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<tr>
<th>ID</th>
<th>Course</th>
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<th>Term</th>
<th>CP</th>
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<tr>
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<td>2</td>
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<td>practvd</td>
<td>Practical Course Distributed Data Management</td>
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<td>W</td>
<td>4</td>
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<td>S</td>
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<td>Indexing Structures for Efficient Query Processing on Large Databases</td>
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<td>24647</td>
<td>Data Mining Paradigms and Methods for Complex Databases</td>
<td>2/1</td>
<td>S</td>
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### Learning Control / Examinations

The assessment consists of an oral exam on the contents of the selected lecture (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The practical course requires an additional certificate following sec. 4 subsec. 2 no. 3 study and examination regulations.

The grade of the module is the grade of the oral exam.

### Conditions

One of the practical courses has to be taken.

### Learning Outcomes

**Content**

This module aims at exposing students to modern information management, both, in ‘breadth’ and ‘depth’. We achieve ‘breadth’ by means of a close inspection and comparison of different systems and their respective aims. We achieve ‘depth’ by means of an extensive examination of the underlying concepts and design alternatives, their assessment as well as by discussing applications. In particular, we look at the topics of this module not only from a theoretical point of view but deploy and realise the respective technologies in a practical course.

**Remarks**

The courses of this module are offered irregularly. Nonetheless, it is guaranteed that the module can be passed anytime.
Module: Dynamic IT-Infrastructures [IW4INDITI]

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

<table>
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Courses in module

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<th>CP</th>
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<tr>
<td>24669</td>
<td>Modeling and Simulation of Networks and Distributed Systems</td>
<td>2/0</td>
<td>S</td>
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<tr>
<td>24146</td>
<td>Ubiquitous Computing</td>
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<td>W</td>
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<td>24878</td>
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<tr>
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<td>5</td>
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<tr>
<td>24119</td>
<td>Distributed Systems - Grid and Cloud</td>
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<td>24074</td>
<td>Data and Storage Management</td>
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<td>W</td>
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<td>INS</td>
<td>Integrated Network and Systems Management</td>
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<td>S</td>
<td>4</td>
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<tr>
<td>24617</td>
<td>Parallel computer systems and parallel programming</td>
<td>2/0</td>
<td>S</td>
<td>4</td>
<td>A. Streit</td>
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</tbody>
</table>

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

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

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

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

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

Content
This module covers various aspects of dynamic IT infrastructures such as layout, design, concept, development, operation and performance evaluation as well as optimization. These topics are considered from a theoretical-analytical approach as well as from the perspective of the practical experiences of day-to-day use. Being a modern IT service provider, the Steinbuch Centre for Computing (SCC) serves as object of study, since it combines both aspects in real life.
Module: Biosignal Processing [IW4INBSV]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
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<tbody>
<tr>
<td>9</td>
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Courses in module

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<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24105</td>
<td>Biosignals and User Interfaces</td>
<td>4</td>
<td>W</td>
<td>6</td>
<td>T. Schultz, C. Herff, D. Heger</td>
</tr>
<tr>
<td>24600</td>
<td>Multilingual Human-Machine Communication</td>
<td>4</td>
<td>S</td>
<td>6</td>
<td>T. Schultz, F. Putze</td>
</tr>
<tr>
<td>24612</td>
<td>Cognitive Modeling</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>T. Schultz, F. Putze</td>
</tr>
<tr>
<td>24103</td>
<td>Design and Evaluation of innovative user interfaces</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>T. Schultz, F. Putze</td>
</tr>
<tr>
<td>BCI</td>
<td>Brain-Computer Interfaces</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>T. Schultz, C. Herff, D. Heger</td>
</tr>
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Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module is the average of the single grades weighted by the related credit points.
For appointments please e-mail helga.scherer@kit.edu.
It is recommended to schedule an appointment well in advance.

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

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

Content
This module introduces students to the foundations and applications of automatic recording, processing and interpretation of biosignals. The production of biosignals will be explained, followed by methods for recording and preprocessing. Furthermore, the lecture will explain the foundations of statistical modeling as it is used in current systems. Many examples illustrate the practical application for human-machine interaction.
Module: Speech Processing [IW4INSV]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
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Courses in module

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<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24145</td>
<td>Principles of Automatic Speech Recognition</td>
<td>4</td>
<td>W</td>
<td>6</td>
<td>A. Waibel, Sebastian Stüker</td>
</tr>
<tr>
<td>24600</td>
<td>Multilingual Human-Machine Communication</td>
<td>4</td>
<td>S</td>
<td>6</td>
<td>T. Schultz, F. Putze</td>
</tr>
<tr>
<td>24298</td>
<td>Practical Course Automatic Speech Recognition</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>A. Waibel, Stüker</td>
</tr>
<tr>
<td>24103</td>
<td>Design and Evaluation of innovative user interfaces</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>T. Schultz, F. Putze</td>
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<tr>
<td>mse</td>
<td>Seminar: Multilingual Speech Recognition</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>A. Waibel, S. Stüker, M. Müller</td>
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<tr>
<td>2400007</td>
<td>Seminar: Dialog Modeling for Human-Machine Interaction</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>A. Waibel, M. Schmidt</td>
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<tr>
<td>NNsem</td>
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<td>2</td>
<td>W</td>
<td>3</td>
<td>A. Waibel, T. Asfour, J. Gehring, S. Stüker</td>
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Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The grade of the module is the average of the single grades weighted by the related credit points.

Practical course Automatic Speech Recognition: In addition the student needs to submit a certificate (not graded) as an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. For appointments please e-mail helga.scherer@kit.edu. It is recommended to schedule an appointment well in advance.

Conditions
None.

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

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

Remarks
Lecture slides are available as pdf at http://csl.anthropomatik.kit.edu. Current literature will be announced in the lectures, seminars and practical courses.
Module: Curves and Surfaces [IW4INKUF]

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

<table>
<thead>
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**Courses in module**

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<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>KFCAD2</td>
<td>Curves and Surfaces in CAD I</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
<td>CFD2</td>
<td>Curves and Surfaces in CAD II</td>
<td>2</td>
<td>W</td>
<td>3</td>
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<tr>
<td>KFCAD3</td>
<td>Curves and Surfaces in CAD III</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
<td>rsp</td>
<td>Rationale Splines</td>
<td>2 oder 2/1</td>
<td>W</td>
<td>3 oder 5</td>
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<tr>
<td>24626</td>
<td>Subdivision algorithms</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
<td>24122</td>
<td>Meshes and point clouds</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
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<td>Applied Differential Geometry</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
<td>2400058</td>
<td>Geometric basics for Geometry Pro-</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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</table>

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Remarks**

Some courses are not offered every year, see http://i33www.ira.uka.de/pages/Lehre/VertiefungsgebietComputergraphik.html
Module: Context Sensitive Systems [IN4INKUS]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24658</td>
<td>Context Sensitive Systems</td>
<td>2</td>
<td>S</td>
<td>4</td>
<td>M. Beigl</td>
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<tr>
<td>24895</td>
<td>Practical Course: Context Sensitive ubiquitous Systems</td>
<td>4</td>
<td>S</td>
<td>5</td>
<td>M. Beigl</td>
</tr>
<tr>
<td>24844</td>
<td>Seminar: Ubiquitous Systems</td>
<td>2</td>
<td>W/S</td>
<td>4</td>
<td>M. Beigl</td>
</tr>
<tr>
<td>24146</td>
<td>Ubiquitous Computing</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>M. Beigl</td>
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<tr>
<td>24696</td>
<td>Reading Group Context Sensitive Systems</td>
<td>1</td>
<td>S</td>
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<td>M. Beigl</td>
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Learning Control / Examinations
Conditions
None.

Learning Outcomes
Content
## Module: Human-Machine-Interaction [IN4INMMI]

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

<table>
<thead>
<tr>
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<th>Cycle</th>
<th>Duration</th>
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### Courses in module

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<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tr>
<td>24844</td>
<td>Seminar: Ubiquitous Systems</td>
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<td>W/S</td>
<td>4</td>
<td>M. Beigl</td>
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<tr>
<td>24875</td>
<td>Practical Course: Sensor-based HCI</td>
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<td>S</td>
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<td>M. Beigl</td>
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<tr>
<td>24659</td>
<td>Human-Machine-Interaction Systems</td>
<td>2</td>
<td>S</td>
<td>4</td>
<td>M. Beigl, Takashi Miyaki</td>
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<td>24146</td>
<td>Ubiquitous Computing</td>
<td>2/0</td>
<td>W</td>
<td>4</td>
<td>M. Beigl</td>
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<td>24697</td>
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<tr>
<td>24648</td>
<td>Design Principles for Interactive Real-Time Systems*</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>E. Peinsipp-Byma, O. Sauer</td>
</tr>
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</table>

### Learning Control / Examinations

**Conditions**  
None.

### Learning Outcomes

**Content**

**Coordination:** H. Prautzsch

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:** Informatics

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### Courses in module

<table>
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<tr>
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<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24122</td>
<td>Meshes and point clouds</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
</tr>
<tr>
<td>24173</td>
<td>Medical Simulation Systems I</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>R. Dillmann, Röhl, Speidel</td>
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<tr>
<td>24676</td>
<td>Medical Simulation Systems II</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>R. Dillmann, Unterhinninghofen, Suwelack</td>
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<tr>
<td>24175</td>
<td>Geometric Optimization</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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<tr>
<td>ALGG</td>
<td>Computational Geometry</td>
<td>3</td>
<td>S</td>
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<td>M. Nöllenburg, D. Wagner</td>
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<tr>
<td>24626</td>
<td>Subdivision algorithms</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>H. Prautzsch</td>
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<td>24884</td>
<td>Practical course: Geometric Modeling</td>
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### Learning Control / Examinations

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

### Conditions

None.

### Learning Outcomes

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

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

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

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

Courses in module

<table>
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<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
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<tbody>
<tr>
<td>24941</td>
<td>Security</td>
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<td>S</td>
<td>6</td>
<td>D. Hofheinz</td>
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<tr>
<td>SemiKryp2</td>
<td>Seminar in Cryptography</td>
<td>2</td>
<td>W/S</td>
<td>2</td>
<td>J. Müller-Quade</td>
</tr>
</tbody>
</table>

Learning Control / Examinations

Conditions
None.

Learning Outcomes

The student

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

Content

- Theoretical and practical aspects of computer security
- Development of safety goals and classification of threats
- Presentation and comparison of different formal access control models
- Formal description of authentication systems, presentation and comparison of different authentication methods (passwords, biometrics, challenge-response protocols)
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective protection methods / avoidance strategies
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications
- Block ciphers, hash functions, digital signature, public key encryption and digital signatures (RSA, ElGamal), and various methods of key exchange (e.g., Diffie-Hellman)
- Furthermore, an introduction to provable security is provided, which presents some of the key security concepts (e.g. IND-CCA).
- Presentation of combinations of cryptographic modules using currently used protocols such as Secure Shell (SSH) and Transport Layer Security (TLS).
Module: Parallel Processing [IW4INPV]

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

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
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Courses in module

<table>
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<tr>
<th>ID</th>
<th>Course</th>
<th>Hours per week</th>
<th>Term</th>
<th>CP</th>
<th>Responsible Lecturer(s)</th>
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<tbody>
<tr>
<td>24161</td>
<td>Microprocessors II</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>W. Karl</td>
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<tr>
<td>24117</td>
<td>Heterogeneous Parallel Computing Systems</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>W. Karl</td>
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<tr>
<td>24660</td>
<td>Software Development for Modern, Parallel Platforms</td>
<td>2</td>
<td>S</td>
<td>3</td>
<td>W. Tichy</td>
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<tr>
<td>24112</td>
<td>Multicore Computers and Computer Clusters</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>W. Tichy</td>
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<tr>
<td>24606</td>
<td>Models of Parallel Processing</td>
<td>3</td>
<td>S</td>
<td>5</td>
<td>T. Worsch</td>
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<tr>
<td>24622</td>
<td>Algorithms in Cellular Automata</td>
<td>2/1</td>
<td>S</td>
<td>3</td>
<td>T. Worsch</td>
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<tr>
<td>24293</td>
<td>Multicore Programming in Practice: Tools, Models, Languages</td>
<td>4</td>
<td>W/S</td>
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<td>W. Tichy, T. Karcher, L. Rodriguez</td>
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<td>24602</td>
<td>Parallel Algorithms</td>
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<td>S</td>
<td>4</td>
<td>F. Padberg</td>
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<td>ASH</td>
<td>Algorithms for Memory Hierarchies</td>
<td>2</td>
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<td>P. Sanders, N. Sitchinava</td>
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</table>

Learning Control / Examinations
The assessment consists of oral exams of the taken courses according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The lecture Multicore Programming in Practice: Tools, Models, Languages [24293] will have an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. The assessment is explained in the course description.

The lecture Multicore Computers and Computer Clusters will have an assessment consists of a written exam according to section 4 subsection 2 no. 1 study and examination regulations.

Lecture Parallele Algorithms: The assessment consists of an oral exam according to sec. 4 subsec. 2 no. 2 study and examination regulations and an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations. Weighted 80 %, 20 %

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

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

Learning Outcomes

Content
Module: Web Engineering [IW4INWEBE]

**Coordination:** H. Hartenstein

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:** Informatics

<table>
<thead>
<tr>
<th>ECTS Credits</th>
<th>Cycle</th>
<th>Duration</th>
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</thead>
<tbody>
<tr>
<td>4</td>
<td>Every 2nd term, Winter Term</td>
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</table>

**Learning Control / Examinations**

The assessment consists of an oral exam (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The grade of the module corresponds to the grade of the oral exam.

**Conditions**

None.

**Learning Outcomes**

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

**Content**

This module will discuss the systematic construction of Web-based applications and systems by focusing on the different phases and aspects of the Web application lifecycle. It helps students to look at the Web phenomenon from different perspectives - e.g. as a Web designer, analyst, architect, component engineer, program manager, product manager or CIO. Students learn how to engineer Web applications and agile systems from requirements engineering, planning, design, development, testing, deployment and up to operation, maintenance and evolution. Many examples are shown and discussed, demonstrating the need for expecting change and staying agile. As this is not a programming course, students will be introduced to the core technology aspects and are encouraged to consolidate the details.
Module: Autonomous Robotics [IN4INAR]

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

ECTS Credits 9  Cycle Every term  Duration 2

Courses in module

<table>
<thead>
<tr>
<th>ID</th>
<th>Course</th>
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<td>24152</td>
<td>Robotics I – Introduction to robotics</td>
<td>2</td>
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<td>R. Dillmann, S. Schmidt-Rohr</td>
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<tr>
<td>24712</td>
<td>Robotics II - Programming of industrial and autonomous service robots</td>
<td>2</td>
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<td>24635</td>
<td>Robotik III - Sensors in Robotics</td>
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<td>24619</td>
<td>Biologically Inspired Robot</td>
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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Module: Web Data Management [IW4INAIFB4]

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

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Courses in module

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<td>2511504</td>
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<td>W/S</td>
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<td>A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai</td>
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<td>2511310</td>
<td>Semantic Web Technologies</td>
<td>2/1</td>
<td>S</td>
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Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

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

Learning Outcomes
Students

- develop ontologies for semantic web technologies und choose suitable representation languages,
- are able to provide data and applications via a cloud-based infrastructure
- transfer the methods and technologies of semantic web technologies and cloud computing to new application sectors,
- evaluate the potential of semantic web technologies and the cloud computing approaches for new application sectors.

Content
The module Web Data Management covers the basic principles, methods and applications for intelligent systems in the World Wide Web. Cloud Services are essential for the decentralized, scalable provision of data and applications as well as the methods of semantic web based on the description of data and services via metadata in form of so called ontologies. Formal principles and practical aspects such as knowledge modeling and available representation language tools for ontologies are covered in detail. Methods for the realization of intelligent systems within the World Wide Web are treated and applications as in Web 2.0 or Service Science are discussed and evaluated. Furthermore the application of modern Cloud technologies for the use of software and hardware as a service via internet is introduced. Cloud technologies allow the efficient implementation of applications on distributed computer clusters and permit a high scalability as well as new business models in the internet.
Module: Intelligent Systems and Services [IW4INAIFB5]

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

ECTS Credits: 9  
Cycle: Every term  
Duration: 1

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<td>A. Oberweis, H. Schmeck, D. Seese, R. Studer, S. Tai</td>
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</tbody>
</table>

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

Conditions
None.

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

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

In this module the most important network learning methods are introduced and their applicability is discussed with regard to different information sources such as data texts and images considering especially procedures for knowledge acquirement via data and text mining, natural analogue procedures as well as the application of organic learning procedures within the finance sector.
Module: Semantic Technologies [IW4INAIFB6]

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

ECTS Credits: 8
Cycle: Every term
Duration: 1

Courses in module

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</table>

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

Conditions
None.

Learning Outcomes
Content
Module: Ubiquitous Computing [IW4INAIFB7]

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

ECTS Credits | Cycle | Duration
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9 | Every term | 1

Courses in module

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

Conditions
None.

Learning Outcomes

Content
Module: Organic Computing [IW4INAIFB8]

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

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Courses in module

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<td>2511106</td>
<td>Nature-inspired Optimisation Methods</td>
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<td>Complexity Management</td>
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Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes
Content
Module: Development of Distributed Business Information Systems [IW4INAIFB11]

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

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<td>Database Systems and XML</td>
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<td>2590458</td>
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**Learning Control / Examinations**  
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

**Conditions**  
The course Datenbanksysteme und XML [2511202] must be examined.

**Learning Outcomes**  
The students  
- are familiar with the requirements and limitations of distributed database systems,  
- can ensure error-free operation and the consistency of distributed databases,  
- can master methods and concepts of essential algorithms in distributed systems,  
- are able to use methods of IT project management appropriate 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 acceptance of eCommerce the application of distributed information systems becomes particularly important.  
This module teaches concepts and methods for design and application of information systems.
Module: Service Computing 1 [IW4INAIFB12]

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

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Courses in module

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<td>2511506</td>
<td>Business Activity Management</td>
<td>2/1</td>
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Learning Control / Examinations
The assessment is carried out as partial exams (according to Section 4 (2), 13 SPO) of the core course and further single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module separately.

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

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

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

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

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

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

Remarks
The module is new in summer term 2011. It replaces part of the modules Service Technology [IW4INAIFB1], Cloud Computing [IW4INAIFB2], Web Service Engineering [IW4INAIFB3] and Service Technologies [IW4INSER] which are not offered any more. The course “Web Servicee Engineering” will not be offered any more from summer term 2012 on. The examination will be offered latest until summer term 2013 (repeaters only).
Module: Service Computing 2 [IW4INAIFB13]

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

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<td>2/1</td>
<td>S</td>
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Learning Control / Examinations

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

Conditions

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

Learning Outcomes

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

Content

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

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

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

Remarks

The module is new in summer term 2011. It replaces part of the modules Service Technology [IW4INAIFB1], Cloud Computing [IW4INAIFB2], Web Service Engineering [IW4INAIFB3] and Service Technologie [IW4INSER] which are not offered an more. The course “Web Servicee Engineering” will not be offered any more from summer term 2012 on. The examination will be offered latest until summer term 2013 (repeaters only).
Module: Fundamentals of Robotics [IW4INROB]

**Coordination:** R. Dillmann

**Degree programme:** Informationswirtschaft (M.Sc.)

**Subject:** Informatics

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<th>ECTS Credits</th>
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**Learning Control / Examinations**

The assessment consists of an oral exam on the contents of the taken lectures (approx. 45-60 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The grade of the module corresponds to the grade of the oral exam.

The exam can be taken every semester during the lecture period.

**Conditions**

The course *Robotics I – Introduction to robotics* [24152] has to be taken, the remaining lectures can be chosen freely from the offered courses.

**Recommendations**

Previous attendance in practical courses offered at the institute is recommended to gain practical experiences in different areas of robotics, complementing and deepening the theoretical knowledge from lectures.

**Learning Outcomes**

Students gain knowledge about the essential components of robotic systems and robotic controllers and their interaction. They shall have the ability to identify the different problems in a robotic system and have knowledge on solution approaches and applicable methods. They shall be able to choose appropriate components for simple applications and to choose appropriate designs for these components based on the intended application.

**Content**

The module provides an overview of the domain of robotics with its different tasks, problems and subproblems. It covers industrial robots in industrial production as well as service robots. The emphases are in the areas of robot control, perception, modeling and programming.

**Remarks**

To sign up please send an e-mail to: sekrdill@anthropomatik.kit.edu

It is recommended to schedule an appointment well in advance.
Module: Medical Simulation and Neural Medicine [IW4INMSNM]

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

ECTS Credits: 9
Cycle: Every term
Duration: 2

Courses in module

<table>
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<th>Term</th>
<th>CP</th>
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<tr>
<td>24173</td>
<td>Medical Simulation Systems I</td>
<td>2</td>
<td>W</td>
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<td>R. Dillmann, Röhl, Speidel</td>
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<tr>
<td>24676</td>
<td>Medical Simulation Systems II</td>
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<tr>
<td>24139</td>
<td>Human brain and central nervous system: anatomy, information transfer,</td>
<td>2</td>
<td>W/S</td>
<td>3</td>
<td>U. Spetzger</td>
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<tr>
<td>24678</td>
<td>signal processing, neurophysiology and therapy</td>
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Learning Control / Examinations
The assessment consists of an oral exam on the contents of the taken lectures (approx. 30-40 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.
The grade of the module corresponds to the grade of the oral exam.
The exam can be taken every semester during the lecture period.
To sign up please send an e-mail to: sekretariat.dillmann@ira.uka.de
It is recommended to schedule an appointment well in advance.

Conditions
Attendance of the lab classes and seminars on medical informatics offered by the institute is recommended since they offer the opportunity to extend theoretical and practical skills.

Recommendations
Attendance of the lab classes and seminars on medical informatics offered by the institute is recommended since they offer the opportunity to extend theoretical and practical skills.

Learning Outcomes
On completion of this module students will know the essential components of medical simulation systems and their interaction.
The objective is a basic methodological understanding regarding the identification of different problems as well as imparting knowledge of fundamental solution approaches for the design of medical simulation systems. The lecture aims to impart the competence to conceive dedicated systems and to make important design decisions correctly.
Students will have an understanding of construction and the complex functions of the human brain and the central nerve system. The basic principles of neural physiology are conveyed. Furthermore, diagnostic procedures are presented, with a focus on computer assisted and robot assisted surgical procedures.

Content
The module gives an overview of medical simulation systems and gives insight into applications of computer science to medical problems. Focus is on the fields of imaging and image processing, intra-operative assistance systems, and modeling and simulation of biological systems.
Furthermore, an overview on neural medicine and a basic understanding of physiology regarding senses and nerves is conveyed, which are an important interface to the innovative research area of neural prosthodontics. A close connection to the areas of imaging, image processing and operative support systems is shown. Concrete application examples from medical diagnosis and therapy are presented.
Module: Automated visual inspection [IW4INAS]

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

ECTS Credits: 9
Cycle: Every term
Duration: 1

Courses in module

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<th>CP</th>
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<tr>
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<tr>
<td>24172</td>
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<td>3</td>
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<tr>
<td>BAFsem</td>
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Learning Control / Examinations
The assessment consists of an oral exam (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The grade of the module corresponds to the grade of the oral exam.

Conditions
The course Automated Visual Inspection and Image Processing has to be taken.

Learning Outcomes
Content
Module: Machine Vision [IW4INMVW]

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

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Courses in module

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<td>W</td>
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<td>M. Heizmann</td>
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<tr>
<td>24684</td>
<td>Introduction to Video Analysis</td>
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<td>S</td>
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<td>24180</td>
<td>Computer Vision for Human-Computer Interaction</td>
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<td>24628</td>
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<td>R. Stiefelhagen, Hazim Ekenel</td>
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<tr>
<td>24893</td>
<td>Practical Course Computer Vision for Human-Computer Interaction</td>
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Learning Control / Examinations
The assessment consists of an oral exam (approx. 45 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The grade of the module corresponds to the grade of the oral exam.

Conditions
At least one course offered by the chair of Beyerer has to be taken.

Learning Outcomes
Content
Module: Automated Planning and Decision-making [IW4INAPE]

**Coordination:** J. Beyerer  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

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

**Conditions**  
The course *Probabilistische Planung* has to be taken.

**Learning Outcomes**

**Content**
Module: Image-based detection and classification [IN3INBDK]

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

ECTS Credits 9
Cycle Every term
Duration 1

Courses in module

<table>
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<th>ID</th>
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<td>6</td>
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<td>3</td>
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<td>3</td>
<td>J. Beyerer</td>
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<tr>
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<td>Image Data Compression</td>
<td>2</td>
<td>W</td>
<td>3</td>
<td>A. Pak, J. Beyerer</td>
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</table>

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

Conditions
The course Pattern Recognition has to be taken.

Learning Outcomes
Content
5.6 Law


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

<table>
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<td>3</td>
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<td>24136 / 24609</td>
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<td>VGE</td>
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Learning Control / Examinations
The assessment mix of each course of this module is defined for each course separately. The final mark for the module is the average of the marks for each course weighted by the credits and truncated after the first decimal.

Conditions
None.

Learning Outcomes

Content
Module: Private Business Law [IW4JURA5]

Coordination: Z. (ZAR)
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Law

ECTS Credits: 9
Cycle: Every term
Duration: 1

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

Conditions
None.

Recommendations
For the courses
- Civil Law for Advanced [24650]
- Law of Contracts [24671],

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

Learning Outcomes
The student
- has gained in-depth knowledge of German company law, commercial law and civil law;
- is able to analyze, evaluate and solve complex legal and economic relations and problems;
- is well grounded in individual labour law, collective labour law and commercial constitutional law, evaluates and critically assesses clauses in labour contracts;
- recognizes the significance of the parties to collective labour agreements within the economic system and has differentiated knowledge of labour disputes law and the law governing the supply of temporary workers and of social law;
- possesses detailed knowledge of national earnings and corporate tax law and is able to deal with provisions of tax law in a scientific manner and assesses the effect of these provisions on corporate decision-making.

Content
The module provides the student with knowledge in special matters in business law, like employment law, tax law and business law, which are essential for managerial decisions.
Module: Public Business Law [IW4JURA6]

Coordination: G. Sydow
Degree programme: Informationswirtschaft (M.Sc.)
Subject: Law

<table>
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Courses in module

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

Conditions
None.

Learning Outcomes

Content
Module: Governance, Risk & Compliance [IW4JURGRC]

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

<table>
<thead>
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Courses in module

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Learning Control / Examinations

Conditions
None.

Learning Outcomes

Content
Studien- und Prüfungsordnung der Universität Karlsruhe (TH) für den Masterstudiengang Informationswirtschaft

vom 15. April 2009


Der Rektor hat seine Zustimmung am 15. April 2009 erteilt.

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§ 5 Anmeldung und Zulassung zu den Prüfungen
§ 6 Durchführung von Prüfungen und Erfolgskontrollen
§ 7 Bewertung von Prüfungen und Erfolgskontrollen
§ 8 Wiederholung von Prüfungen und Erfolgskontrollen, Erlöschen des Prüfungsanspruchs
§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß
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§ 16 Umfang und Art der Masterprüfung
§ 17 Bestehen der Masterprüfung, Bildung der Gesamtnote
§ 18 Masterzeugnis, Masterurkunde, Transcript of Records und Diploma Supplement

III. Schlussbestimmungen
§ 19 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen
§ 20 Ungültigkeit der Masterprüfung, Aberkennung des Mastergrades
§ 21 Einsicht in die Prüfungsakten
§ 22 In-Kraft-Treten
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

§ 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.
(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.

§ 4 Aufbau der Prüfungen
(2) Erfolgskontrollen sind:
   1. schriftliche Prüfungen,
   2. mündliche Prüfungen oder
   3. Erfolgskontrollen anderer Art.

Erfolgskontrollen anderer Art sind z.B. Vorträge, 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.


(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. Im Falle von Kollegialprüfungen hört der Prüfer nicht auf, sondern hört auch auf alle anderen 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.


(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.
(2) Im Masterzeugnis dürfen nur folgende Noten verwendet werden:

<table>
<thead>
<tr>
<th>Notenwert</th>
<th>Bewertung</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sehr gut (very good)</td>
</tr>
<tr>
<td>2</td>
<td>gut (good)</td>
</tr>
<tr>
<td>3</td>
<td>befriedigend (satisfactory)</td>
</tr>
<tr>
<td>4</td>
<td>ausreichend (sufficient)</td>
</tr>
<tr>
<td>5</td>
<td>nicht ausreichend (failed)</td>
</tr>
</tbody>
</table>

hervorragende Leistung,
eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
eine Leistung, die durchschnittlichen Anforderungen entspricht,
eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
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 angezählt 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 eingezählt werden, wenn die Benotung nicht nach Absatz 3 erfolgt ist. Die zu dokumentierenden Erfolgskontrollen und die daran geknüpften Bedingungen werden im Studienplan festgelegt.

(7) Eine Modulteilprüfung ist bestanden, wenn die Note mindestens „ausreichend“ (4.0) ist.


(9) Die Ergebnisse der Masterarbeit, der Modulprüfungen bzw. der Modulteilprüfungen, der Erfolgskontrollen anderer Art sowie die erworbenen Leistungspunkte werden durch das Studienbüro der Universität erfasst.

(10) Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein. Eine Fachprüfung ist bestanden, wenn
die für das Fach erforderliche Anzahl von Leistungspunkten 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:

<table>
<thead>
<tr>
<th>ECTS-Note</th>
<th>Quote</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>10</td>
<td>gehört zu den besten 10% der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>B</td>
<td>25</td>
<td>gehört zu den nächsten 25% der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>C</td>
<td>30</td>
<td>gehört zu den nächsten 30% der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>D</td>
<td>25</td>
<td>gehört zu den nächsten 25% der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>E</td>
<td>10</td>
<td>gehört zu den letzten 10% der Studierenden, die die Erfolgskontrolle bestanden haben,</td>
</tr>
<tr>
<td>FX</td>
<td>nicht bestanden (failed) - es sind Verbesserungen erforderlich, bevor die Leistungen anerkannt werden,</td>
<td></td>
</tr>
<tr>
<td>F</td>
<td>nicht bestanden (failed) - es sind erhebliche Verbesserungen erforderlich.</td>
<td></td>
</tr>
</tbody>
</table>

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.


§ 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.


(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.


§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß


(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.

(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.


(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


§ 11 Masterarbeit


(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

(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.


(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


(2) Der Studierende hat bereits bei der Anmeldung zu einer Prüfung in einem Modul diese als Zusatzleistung zu deklarieren.

(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.


(4) Der Prüfungsausschuss kann die Erledigung seiner Aufgaben in dringenden Angelegenheiten und für alle Regelfälle auf den Vorsitzenden des Prüfungsausschusses übertragen.


(6) In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen Fakultät zu absolvierende Prüfungsmittel 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 Stimmbrecht.

(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 Prüfungsbeauftragung übertragen wurde. Bestellten 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


(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.


(6) Zuständig für die Anrechnungen ist der Prüfungsausschuss. Vor Feststellungen über die Gleichwertigkeit sind die zuständigen Fachvertreter zu hören. Der Prüfungsausschuss entscheidet in Abhängigkeit von Art und Umfang der anzurechnenden Studien- und Prüfungsleistungen über die Einstufung in ein höheres Fachsemester.

(7) Erbringt ein Studierender Studienleistungen an einer ausländischen Universität, soll die Gleichwertigkeit vorab durch einen Studienvertrag nach den ECTS-Richtlinien festgestellt und nach diesem verfahren werden.

(8) Zusatzleistungen, die ein Studierender für den Bachelorstudiengang Informationswirtschaft erbracht hat und die im Studienplan des Masterstudiengangs Informationswirtschaft vorgesehen sind, werden auf Antrag des Studierenden an den Prüfungsausschuss anerkannt.
II. Masterprüfung

§ 16 Umfang und Art der Masterprüfung

(1) Die Masterprüfung besteht aus den Fachprüfungen nach Absatz 2, dem interdisziplinären Seminarmodul nach Absatz 3 sowie der Masterarbeit nach § 11.

(2) In den ersten beiden Studienjahren sind Fachprüfungen aus folgenden Fächern durch den Nachweis von Leistungspunkten in einem oder mehreren Modulen abzulegen:

1. aus dem Fach Betriebswirtschaftslehre im Umfang von 10 Leistungspunkten,

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


(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

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.


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 Prüfungsakte
(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.


Karlsruhe, den 15. April 2009

Professor Dr. sc. tech. Horst Hippler
(Rektor)
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