

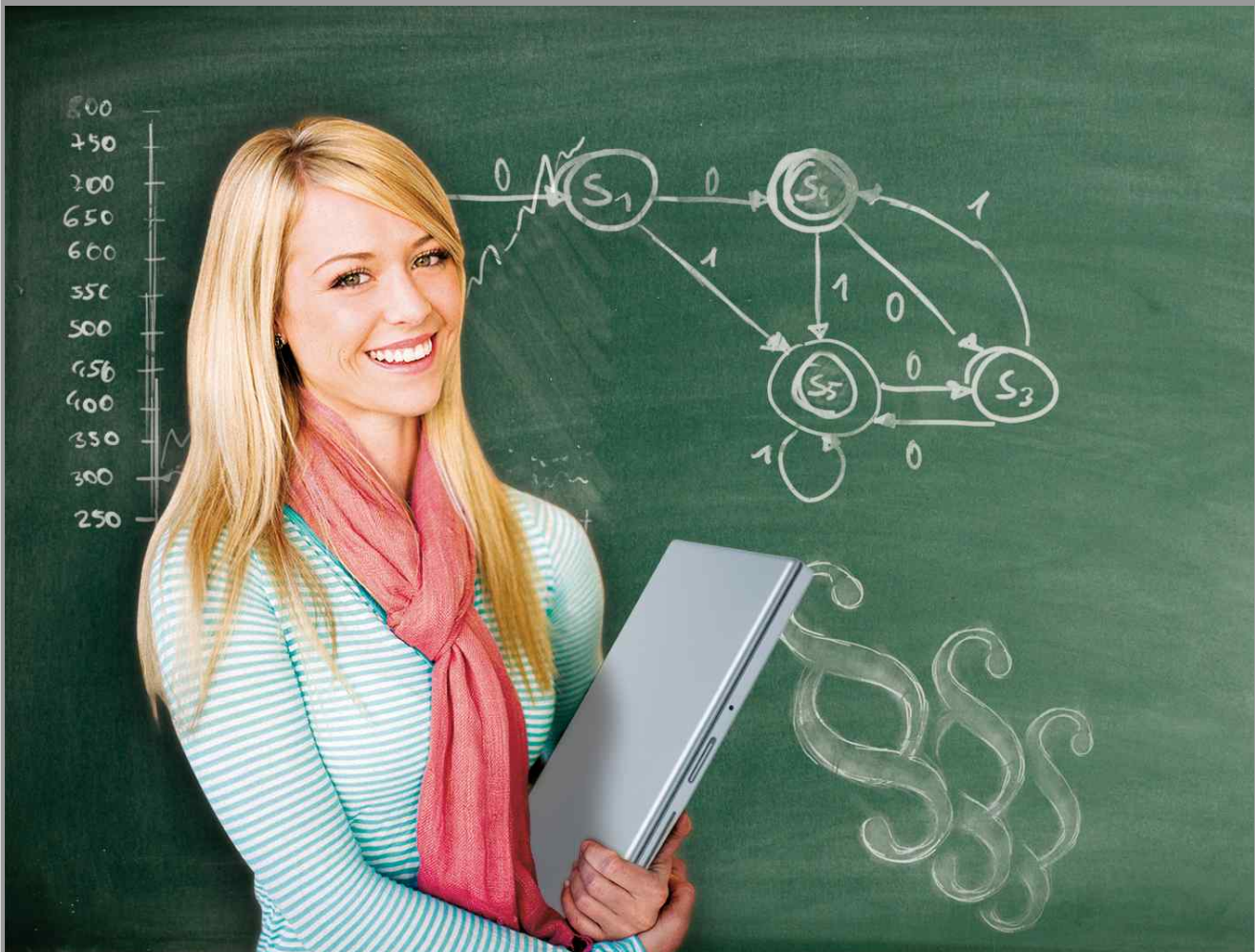


Karlsruhe Institute of Technology

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

Summer term 2011  
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Faculty of Economics and Business Engineering  
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# 1 Structure of the Master Programme in Information Engineering and Management

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

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

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

Figure 1 shows a summary of this recommendation with the structure of the disciplines and with credit points allocated to the modules of the programme.

Information Engineering and Management (M.Sc.)										
Semester	INFO*				BA/EC/OR/STAT*				LAW*	
Subject	Elective				Compulsory		Elective		Elective	
1					BA 10 CP	OR 5 CP				
2	INFO 8 CP	INFO 8 CP	INFO 8 CP	INFO 9 CP			BA 9 CP	BA/EC/ OR/STAT 9 CP	Law 9 CP	Law 9 CP
3	Interdisciplinary seminar module 6 CP									
4	Master Thesis 30 CP									
<b>120 CP</b> (Compulsory modules+ elective modules + Master thesis)										

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

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

## 2 Module Handbook - a helpful guide throughout the studies

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

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

The module 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://zvwgate.zvw.uni-karlsruhe.de/download/leitfaden\\_studierende.pdf](https://zvwgate.zvw.uni-karlsruhe.de/download/leitfaden_studierende.pdf)

### Repeating exams

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

## Bonus accomplishments and additional accomplishments

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

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

## Further information

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

## Used abbreviations

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

### 3 Actual Changes

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

#### IW4BWLISM1 - Advanced CRM (S. 16)

##### Anmerkungen

The course *Business Dynamics* [2540531] is currently not offered.

#### IW4BWLISM2 - Electronic Markets (S. 17)

##### Anmerkungen

The course *Business Dynamics* [2540531] is currently not offered.

#### IW4BWLISM3 - Market Engineering (S. 19)

##### Anmerkungen

The lecture Computational Economics was also changed to 4.5 credit points for Computer Science students starting from the winter term 2010/11.

The lecture *eEnergy: Markets, Services, Systems* [2540464] has been added to the module in the summer term 2011.

#### IW4BWLFBV1 - Finance 1 (S. 23)

##### Anmerkungen

The module has been renamed to *Finance 1*.

#### IW4BWLFBV2 - Finance 2 (S. 24)

##### Anmerkungen

The module has been renamed to *Finance 2*.

#### IW4BWLFBV9 - Operational Risk Management I (S. 29)

##### Anmerkungen

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

#### IW4BWLFBV10 - Operational Risk Management II (S. 30)

##### Anmerkungen

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

The course *Public Sector Risk Management* [2530355] has been re-included to the module in summer term 2011.

#### IW4BWLIP5 - Energy Industry and Technology (S. 38)

##### Anmerkungen

The lecture *Efficient Energy Systems and Electric Mobility* [2581006] started in summer term 2011.

The lecture *Energy Systems Analysis* [2581002] will be held in winter term.

#### IW4VWL2 - Applied Strategic Decisions (S. 39)

##### Anmerkungen

The modules and lectures of Prof. Berninghaus will be held in summer term 2011 for the last time. All examinations have to be finished within this summer term.

#### IW4STAT2 - Statistical Methods in Risk Management (S. 48)

##### Anmerkungen

The course *Operational Risk and Extreme Value Theory* [2520342] is not being offered in summer term 2011.



### **IW4INWAWT - Web Applications and Web Technologies (S. 57)**

#### **Anmerkungen**

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

### **IW4INSWS - Software Systems (S. 59)**

#### **Anmerkungen**

The lecture *Multikernpraktikum* is no longer offered.  
The lecture *Component Based Software Engineering* is not offered any longer, examination is possible until winterterm 2011/12.

### **IW4INNT - Networking Security - Theory and Praxis (S. 67)**

#### **Anmerkungen**

The lecture *Public Key Kryptographie* was offered ultimately in the winter term 2009/2010. Only repeaters can take the exam in the summer term 2010. Starting with the summer term 2010 the lecture *Security* [24941] can be taken.

### **IW4INPV - Parallel Processing (S. 80)**

#### **Bedingungen**

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

#### **Anmerkungen**

The lecture *Multikernpraktikum* is no longer offered.

### **IW4INAIFB1 - Service Technology (S. 82)**

#### **Anmerkungen**

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

### **IW4INAIFB2 - Cloud Computing (S. 83)**

#### **Anmerkungen**

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

### **IW4INAIFB3 - Web Service Engineering (S. 84)**

#### **Anmerkungen**

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

### **IW4INAIFB12 - Service Computing 1 (S. 91)**

#### **Anmerkungen**

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.

### **IW4INAIFB13 - Service Computing 2 (S. 92)**

#### **Anmerkungen**

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 any more.

## 4 Mandatory Modules

### 4.1 All Subjects

#### Module: Information Engineering and Management [IW4WWIW]

**Coordination:** Christof Weinhardt, Andreas Geyer-Schulz  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration (obligatory)

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
10	Every term	2

#### Courses in module

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

#### Learning Control / Examinations

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

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

#### Conditions

None.

#### Learning Outcomes

The student

- understands and analyzes the central role of information as an economic good, a production factor, and a competitive factor,
- identifies, evaluates, prices, and markets information goods,
- evaluates information 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 automatize 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 automatization 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:** Karl-Heinz Waldmann  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Operations Research (obligatory)

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
5	Every 2nd term, Winter Term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

Topics overview: Markov chains, Poisson Processes.

**Module: Interdisciplinary Seminar Module [IW4IWSEM]**

**Coordination:** Studiendekan (Fak. f. Wirtschaftswissenschaften), Martina Zitterbart  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:**

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
6	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540530	Interdisciplinary Seminar in Information Engineering and Management	2	W/S	6	A. Geyer-Schulz, T. Dreier
2540510	Master Seminar in Information Engineering and Management	2	W	3	A. Geyer-Schulz
SemIW	Seminar Information Engineering and Management	2	W/S	3	C. Weinhardt
SemIIP2	Seminar in Industrial Production	2	W/S	3	F. Schultmann, M. Fröhling, M. Hiete
SemEW	Seminar Energy Economics	2	W/S	3	W. Fichtner, P. Jochem, A. Eßer-Frey, M. Genoese
2572197	Seminar in strategic and behavioral marketing	2	W	3	B. Neibecker
25196	Master Seminar in Entrepreneurship, Innovation and International Marketing	2	W/S	3	Gaul
2577915	Seminar: Management and Organization	2	W/S	3	H. Lindstädt
2577916	Seminar: Management accounting for industrial engineers	2	W/S	3	M. Wouters
2530293	Seminar in Finance	2	W/S	3	M. Uhrig-Homburg, M. Ruckes
SemFBV1	Seminar in Insurance Management	2	W/S	3	U. Werner
SemFBV2	Seminar in Operational Risk Management	2	W/S	3	U. Werner
SemFBV3	Seminar in Risk Theory and Actuarial Science	2	W/S	3	C. Hipp
SemWIOR1	Seminar Stochastic Models	2	W/S	3	K. Waldmann
SemWIOR2	Seminar Economic Theory	2	W/S	3	C. Puppe
SemWIOR3	Seminar in Experimental Economics	2	W/S	3	S. Berninghaus
SemWIOR4	Seminar in Game and Decision Theory	2	W/S	3	S. Berninghaus
2550131	Seminar in Continuous Optimization	2	W/S	3	O. Stein
2550491	Seminar in Discrete Optimization	2	W/S	3	S. Nickel
SemAIFB1	Seminar in Enterprise Information Systems	2	W/S	3	R. Studer, A. Oberweis, T. Wolf, R. Kneuper
SemAIFB2	Seminar Efficient Algorithms	2	W/S	3	H. Schmeck
SemAIFB3	Seminar Complexity Management	2	W/S	3	D. Seese
SemAIFB4	Seminar Knowledge Management	2	W	3	R. Studer
2590470	Seminar Service Science, Management & Engineering	2	W/S	4	C. Weinhardt, G. Satzger, R. Studer, S. Tai
rechtsem	Seminar in Law	2	W/S	3	T. Dreier, P. Sester, I. Spiecker genannt Döhmann
24793		2	S	3	I. Spiecker genannt Döhmann

**Learning Control / Examinations**

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

**Conditions**

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

The interdisciplinary seminar should be taken as last course of the compulsory program in the 3rd term of the Master programme. See German version.

**Learning Outcomes**

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

**Content**

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

**Module: Master Thesis [IW4IWMATHESIS]**

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

ECTS Credits	Cycle	Duration
30		

**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

The student

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

**Content**

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

## 5 Elective Modules

### 5.1 Business Administration

#### Module: Advanced CRM [IW4BWLISM1]

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540508	Customer Relationship Management	2/1	W	4,5	A. Geyer-Schulz
2540506	Personalization and Recommender Systems	2/1	S	4,5	A. Geyer-Schulz
2540518	Social Network Analysis in CRM	2/1	W/S	4,5	B. Hoser
2540531	Business Dynamics	2/1	S	4,5	A. Geyer-Schulz

#### 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 explicit 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 Business Dynamics [2540531] is currently not offered.*



**Module: Electronic Markets [IW4BWLISM2]**

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

<b>ECTS Credits</b> 9	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

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

**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 asymmetries (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

**Remarks**

The course *Business Dynamics* [2540531] is currently not offered.

**Module: Market Engineering [IW4BWLISM3]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2590408	Auction Theory	2/2	W	4.5	K. Ehrhart, S. Seifert
2540454	eFinance: Information Engineering and Management for Securities Trading	2/1	W	4.5	C. Weinhardt, R. Riordan
2590458	Computational Economics	2/1	W	4,5	P. Shukla, S. Caton
2520373	Experimental Economics	2/2	S	4,5	S. Berninghaus, Kroll
2540464	eEnergy: Markets, Services, Systems	2/1	S	4,5	C. van Dinther

**Learning Control / Examinations**

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

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

**Conditions**

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

**Learning Outcomes**

The students

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

**Content**

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

**Remarks**

The lecture Comptuational Economics was also changed to 4.5 credit points for Computer Science students starting from the winter term 2010/11.

The lecture eEnergy: Markets, Services, Systems [2540464] has been added to the module in the summer term 2011.

**Module: Business & Service Engineering [IW4BWLISM4]**

**Coordination:** Christof Weinhardt, Gerhard Satzger  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540456	Business Models in the Internet: Planning and Implementation	2/1	S	4,5	C. Weinhardt, C. van Dinther
2540478	Special Topics in Information Engineering & Management	3	W/S	4.5	C. Weinhardt
2540506	Personalization and Recommender Systems	2/1	S	4,5	A. Geyer-Schulz
2540468	Service Innovation	2/1	S	5	G. Satzger, A. Neus

**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](http://www.iism.kit.edu/im/lehre).

**Module: Communications & Markets [IW4BWLISM5]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2540462	Communications Economics	2/1	S	4,5	S. Seifert, J. Kraemer
2540460	Market Engineering: Information in In- stitutions	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2590408	Auction Theory	2/2	W	4.5	K. Ehrhart, S. Seifert
2540478	Special Topics in Information Engineer- ing & Management	3	W/S	4.5	C. Weinhardt

**Learning Control / Examinations**

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

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

**Conditions**

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

**Learning Outcomes**

The student is able to

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

**Content**

The module has a focus on applied game-theoretic analysis of information exchange and incentive mechanisms. Single participants in a market make decisions concerning their products, the price determination and competitive 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](http://www.iism.kit.edu/im/lehre).

**Module: Service Management [IW4BWLISM6]**

**Coordination:** Gerhard Satzger, Christof Weinhardt  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2590484	Business and IT Service Management	2/1	W	5	G. Satzger
2590452	Management of Business Networks	2/1	W	4.5	C. Weinhardt, J. Kraemer
2540468	Service Innovation	2/1	S	5	G. Satzger, A. Neus
2540466	eServices	2/1	S	5	C. Weinhardt, G. Satzger

**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  
The course *eServices* [2540466] can only be chosen, if it was not attended in the Bachelor programme.

**Learning Outcomes**

The students

- understand the basics of developing and managing IT-based services,
- understand and apply OR methods in service management,
- analyze and develop supply chain and business networks,
- understand and analyze innovation processes in corporations

**Content**

The module service management addresses the basics of developing and managing IT-based services. The lectures contained in this module teach the basics of developing and managing IT-based services and the application of OR methods in the field of service management. Moreover, students learn to analyze and develop supply chain networks as well as to understand and analyze innovation processes in corporations. Current examples from research and industry demonstrate the relevance of the topics discussed in this module.

**Module: Finance 1 [IW4BWLFBV1]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530550	Derivatives	2/1	S	4.5	M. Uhrig-Homburg
2530212	Valuation	2/1	W	4.5	M. Ruckes
2530555	Asset Pricing	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes

**Learning Control / Examinations**

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

**Remarks**

The module has been renamed to *Finance 1*.

**Module: Finance 2 [IW4BWLFBV2]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530260	Fixed Income Securities	2/1	W	4.5	M. Uhrig-Homburg
2530214	Corporate Financial Policy	2/1	S	4.5	M. Ruckes
2530240	Market Microstructure	2/0	W	3	T. Lüdecke
2530565	Credit Risk	2/1	W	4.5	M. Uhrig-Homburg
2530210	Management Accounting	2/1	S	4.5	T. Lüdecke
2530555	Asset Pricing	2/1	S	4.5	M. Uhrig-Homburg, M. Ruckes
2530212	Valuation	2/1	W	4.5	M. Ruckes
2530550	Derivatives	2/1	S	4.5	M. Uhrig-Homburg
2530570	International Finance	2	S	3	M. Uhrig-Homburg, Walter
2530299	Business Strategies of Banks	2	W	3	W. Müller
2530296	Exchanges	1	S	1.5	J. Franke
2530232	Financial Intermediation	3	W	4.5	M. Ruckes

**Learning Control / Examinations**

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

The courses *Asset Pricing* [VLAP], *Valuation* [2530212] and *Derivatives* [2530550] can only be chosen if they have not been chosen in the module *F1 (Finance)* [IW4BWLFBV1] already.

**Learning Outcomes**

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

**Content**

The module F2 (Finance) is based on the module F1 (Finance). The courses of this module equip the students with advanced skills in economics and methodology in the field of modern finance on a broad basis.

**Remarks**

The module has been renamed to *Finance 2*.



**Module: Applications of Actuarial Sciences I [IW4BWLFBV4]**

**Coordination:** Christian Hipp  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530312	Reinsurance	2	S	3	C. Hipp, Schwehr
2530316	Insurance Optimisation	2/2	W	6	C. Hipp
2530303	Insurance Statistics	2/2	W	6	C. Hipp, Michael Schrempp
2530308	Car Insurance	2/2	S	6	M. Schrempp, A. Edalati
N.N.	Life Insurance	2	W	3	M. Vogt
N.N.	Pensions	2	W	3	C. Hipp, Klaus Besserer

**Learning Control / Examinations**

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

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

**Learning Outcomes****Content****Remarks**

"*Life and Pensions*" will be replaced by "*Life Insurance*" und "*Pensions*" from winter term 2011/12 on.

"Saving Societies" will not be offered any more.

**Module: Applications of Actuarial Sciences II [IW4BWLFBV5]**

**Coordination:** Christian Hipp  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530312	Reinsurance	2	S	3	C. Hipp, Schwehr
2530316	Insurance Optimisation	2/2	W	6	C. Hipp
2530303	Insurance Statistics	2/2	W	6	C. Hipp, Michael Schrempp
2530308	Car Insurance	2/2	S	6	M. Schrempp, A. Edalati
N.N.	Life Insurance	2	W	3	M. Vogt
N.N.	Pensions	2	W	3	C. Hipp, Klaus Besserer

**Learning Control / Examinations**

The assessment is carried out as partial exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 *Applications of Actuarial Sciences I* [IW4BWLFBV4]. The module is passed only after the final partial exam of *Applications of Actuarial Sciences I* is additionally passed.

**Recommendations**

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

**Learning Outcomes****Content**

**Module: Insurance Management I [IW4BWLFBV6]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530323	Insurance Marketing	3/0	W/S	4.5	U. Werner
2530320	Insurance Accounting	3/0	W	4.5	F. Ludwig
2530324	Insurance Production	3/0	W/S	4.5	U. Werner, Edmund Schwake
26327	Service Management	3/0	W/S	4.5	U. Werner
2530050	Private and Social Insurance	2/0	W	2.5	W. Heilmann, Klaus Besserer
2530350	Current Issues in the Insurance Industry	2/0	S	2.5	W. Heilmann
2530335	Insurance Risk Management	2/0	S	2.5	H. Maser

**Learning Control / Examinations**

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

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

**Conditions**

It is only possible to choose the courses *Private and Social Insurance* [2530050], *Current Issues in the Insurance Industry* [2530350], and *Insurance Marketing* [2530323] if they were not attended in the Bachelor programme.

**Recommendations**

Knowledge of the content of the course *Principles of Insurance Management* [2550055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Markets and Management* [WW3BWLFBV4] or lecture notes available at <http://insurance.fbv.uni-karlsruhe.de/345.php>) is assumed.

**Learning Outcomes**

See German version.

**Content**

See German version.

**Remarks**

The courses *Insurance Marketing* [2530323], *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

**Module: Insurance Management II [IW4BWLFBV7]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530323	Insurance Marketing	3/0	W/S	4.5	U. Werner
2530320	Insurance Accounting	3/0	W	4.5	F. Ludwig
2530324	Insurance Production	3/0	W/S	4.5	U. Werner, Edmund Schwake
26327	Service Management	3/0	W/S	4.5	U. Werner
2530050	Private and Social Insurance	2/0	W	2.5	W. Heilmann, Klaus Besserer
2530350	Current Issues in the Insurance Industry	2/0	S	2.5	W. Heilmann
2530335	Insurance Risk Management	2/0	S	2.5	H. Maser

**Learning Control / Examinations**

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

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

**Conditions**

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

**Recommendations**

Knowledge of the content of the course *Principles of Insurance Management* [2550055] (cf. Bachelor module *Risk and Insurance Management* [WW3BWLFBV3] or *Insurance Markets and Management* [WW3BWLFBV4] or lecture notes available at <http://insurance.fbv.uni-karlsruhe.de/345.php>) is assumed.

**Learning Outcomes**

See German version.

**Content**

See German version.

**Remarks**

The courses *Insurance Marketing* [2530323], *Insurance Production* [2530324], and *Service Management* [26327] are offered on demand, according to the students' wishes. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

The module is offered as an extension module to *Insurance Management I* from summer term 2010 on. Students that already began this module have been assigned to the module *Insurance Management I*.

**Module: Operational Risk Management I [IW4BWLFBV9]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management	3/0	W	4.5	U. Werner
2530328	Multidisciplinary Risk Research	3/0	W/S	4.5	U. Werner
2530353	International Risk Transfer	2/0	S	2.5	W. Schwehr
2530395	Risk Communication	3/0	W/S	4.5	U. Werner
26354	Risk Management of Microfinance and Private Households	3/0	W/S	4.5	U. Werner
2530393	Project Work in Risk Research	3	W/S	4.5	U. Werner, Madalena Salek
2530355	Seminar Public Sector Risk Manage- ment	2	S	3	Hochrainer

**Learning Control / Examinations**

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

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

**Conditions**

It is only possible to choose the course *Enterprise Risk Management* [2530326] if it was not attended in the Bachelor programme. It is only possible to choose the course *International Risk Transfer* [2530353] if it was not attended in the Bachelor programme. At least 50% of the assessment has to be carried out as a general oral exam or a general written exam (not as seminars).

**Recommendations**

Interest in interdisciplinary research is assumed.

**Learning Outcomes**

See German version.

**Content**

Operational risks of institutions resulting from the interaction of human, technical, and organisational factors (internal risks) as well as from external natural, technical, social or political incidents; specific requirements, legal and economic framework of various risk carriers (private and public households, small and major enterprises), design of strategies and risk management instruments for coping with risks.

**Remarks**

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

*The course Public Sector Risk Management [2530355] has been re-included to the module in summer term 2011.*

**Module: Operational Risk Management II [IW4BWLFBV10]**

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

<b>ECTS Credits</b> 9	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2530326	Enterprise Risk Management	3/0	W	4.5	U. Werner
2530328	Multidisciplinary Risk Research	3/0	W/S	4.5	U. Werner
2530353	International Risk Transfer	2/0	S	2.5	W. Schwehr
2530395	Risk Communication	3/0	W/S	4.5	U. Werner
26354	Risk Management of Microfinance and Private Households	3/0	W/S	4.5	U. Werner
2530393	Project Work in Risk Research	3	W/S	4.5	U. Werner, Madalena Salek
2530355	Seminar Public Sector Risk Management	2	S	3	Hochrainer

**Learning Control / Examinations**

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

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

**Conditions**

It is only possible to choose this module in combination with the module *Operational Risk Management I* [IW4BWLFBV9]. The module is passed only after the final partial exam of *Operational Risk Management I* is additionally passed.

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

**Recommendations**

Interest in interdisciplinary research is assumed.

**Learning Outcomes**

See German version.

**Content**

Operational risks of institutions resulting from the interaction of human, technical, and organisational factors (internal risks) as well as from external natural, technical, social or political incidents; specific requirements, legal and economic framework of various risk carriers (private and public households, small and major enterprises), design of strategies and risk management instruments for coping with risks.

**Remarks**

The courses *Multidisciplinary Risk Research* [2530328], *Risk Communication* [2530395], *Risk Management of Microfinance and Private Households* [26354] and *Project Work in Risk Research* [2530393] are offered irregularly. For further information, see: <http://insurance.fbv.uni-karlsruhe.de>

*The course Public Sector Risk Management [2530355] has been re-included to the module in summer term 2011.*

**Module: Strategy, Innovation and Data Analysis [IW4BWL MAR3]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every 2nd term, Summer Term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2571166	Strategic and Innovative Decision Making in Marketing	2/1	S	4.5	B. Neibecker
2571162	Information Technology and Business Information	2/1	S	4.5	B. Neibecker

**Learning Control / Examinations**

Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [2571166] as well as of the lecture [2571162].

The final mark for the module is the average of the marks for each course weighted by the credits of the course.

**Conditions**

None.

**Learning Outcomes**

Students have learned the following outcomes and competences:

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

**Content**

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

**Module: Behavioral Approaches in Marketing and Data Analysis [IW4BWL MAR4]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2572167	Behavioral Approaches in Marketing	2/1	W	4.5	B. Neibecker
2571162	Information Technology and Business Information	2/1	S	4.5	B. Neibecker

**Learning Control / Examinations**

Assessment consist of a written module exam according to §4(2), 1 SPO. The module exam has a duration of 120 min. and contains topics from the main lecture [2572167] as well as of the lecture [2571162].

The final mark for the module is the average of the marks for each course weighted by the credits of the course.

**Conditions**

None.

**Learning Outcomes**

Students have learned the following outcomes and competences:

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

**Content**

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



**Module: Strategic Corporate Management and Organization [IW4BWL01]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2577904	Organization Theory	2/1	W	6	H. Lindstädt
2577902	Managing Organizations	2/0	W	4	H. Lindstädt
2577908	Modeling Strategic Decision Making	2/1	S	6	H. Lindstädt
2577900	Management and Strategy	2/0	S	4	H. Lindstädt

**Learning Control / Examinations**

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

One of the following courses have to be attended: *Managing Organizations* [2577902], *Management and Strategy* [2577900].

**Learning Outcomes****Content****Remarks**

See German version.

**Module: Strategic Decision Making and Organization Theory [IW4BWL03]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

The assessment is carried out as partial written exams (according to Section 4(2), 1 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The examinations are offered every semester. Re-examinations are offered at every ordinary examination date. The assessment procedures are described for each course of the module 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:** Frank Schultmann  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Business Administration

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every 2nd term, Winter Term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581952	Planning and Management of Industrial Plants	2/2	W	5.5	F. Schultmann
2581962	Emissions into the Environment	2/0	W	3.5	U. Karl
2581995	Material Flow Analysis and Life Cycle Assessment	2/0	W	3.5	L. Schebek

**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

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

**Content**

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

**Module: Industrial Production III [IW4BWLIP6]**

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

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

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581954	Production and Logistics Management	2/2	S	5.5	M. Fröhling, F. Schultmann
2581975	Computer-based Production Planning and Control, Process Simulation and Supply Chain Management	2/0	S	2	M. Fröhling, F. Schultmann
2581963	The Management of R&D Projects with Case Studies	2/2	W/S	3.5	H. Schmied
2581961	Supply Chain Management with Advanced Planning Systems	2	S	2	M. Göbelt, C. Sürle

**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

- Students describe the tasks concerning general problems of an operative production and logistics management.
- Students describe the planning tasks of supply chain management.
- Students use proficiently approaches to solve general planning problems.
- Students explain the existing interdependencies between planning tasks and applied methods.
- Students describe the 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.

**Module: Basics of Liberalised Energy Markets [IW4BWLIP4]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581998	Basics of Liberalised Energy Markets	2/1	W	3.5	W. Fichtner
2581020	Energy Trade and Risk Management	2/1	S	3.5	K. Hufendiek
2581959	Energy Policy	2/0	S	3.5	M. Wietschel
2581022	Gas-Markets	2/0	W	3	A. Pustisek
2581025	Simulation Game in Energy Economics	2/0	W	3	W. Fichtner
2560234	Regulation Theory and Practice	2/1	S	4,5	K. Mitusch
2540464	eEnergy: Markets, Services, Systems	2/1	S	4,5	C. van Dinther

**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.

**Learning Outcomes****Content**

**Module: Energy Industry and Technology [IW4BWLIIIP5]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2581003	Energy and Environment	2/1	S	4,5	U. Karl, n.n.
2581958	Strategical Aspects of Energy Economy	2/0	W	3.5	A. Ardone
2581000	Technological Change in Energy Industry	2/0	W	3	M. Wietschel
2581001	Heat Economy	2/0	S	3	W. Fichtner
2581002	Energy Systems Analysis	2/0	W	3	A. Eßer-Frey
2581006	Efficient Energy Systems and Electric Mobility	2/0	S	3,5	R. McKenna, P. Jochem

**Learning Control / Examinations**

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

**Learning Outcomes****Content****Remarks**

The lecture *Efficient Energy Systems and Electric Mobility* [2581006] started in summer term 2011.  
 The lecture *Energy Systems Analysis* [2581002] will be held in winter term.

## 5.2 Economics

### Module: Applied Strategic Decisions [IW4VWL2]

**Coordination:** Siegfried Berninghaus, Clemens Puppe  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Economics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521369	Game Theory II	2/2	W	4.5	S. Berninghaus
2520525	Game Theory I	2/2	S	4.5	S. Berninghaus
2590408	Auction Theory	2/2	W	4.5	K. Ehrhart, S. Seifert
2540460	Market Engineering: Information in Institutions	2/1	S	4,5	C. Weinhardt, J. Kraemer, C. van Dinther, S. Caton, M. Adam
2520373	Experimental Economics	2/2	S	4,5	S. Berninghaus, Kroll

#### Learning Control / Examinations

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

#### Conditions

The course *Game Theory II* [2521369] is obligatory. Exception: This lecture was completed in the Bachelor study programme.

#### Recommendations

The student should have basic knowledge of game theory.

#### Learning Outcomes

The student

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

#### Content

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

#### Remarks

The modules and and lectures of Prof. Berninghaus will be held in summer term 2011 for the last time. All examinations have to be finished within this summer term.

**Module: Allocation and Equilibrium [IW4VWL7]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520527	Advanced Topics in Economic Theory	2/1	S	4.5	C. Puppe, M. Hillebrand, K. Mitusch
2520517	Welfare Economics	2/1	S	4.5	C. Puppe
25549	Theory of Business Cycles	2/1	W	4.5	M. Hillebrand

**Learning Control / Examinations**

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

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

**Conditions**

None.

**Recommendations**

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

**Learning Outcomes****Content**



**Module: Macroeconomic Theory [IW4VWL8]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520543	Theory of Economic Growth	2/1	S	4,5	M. Hillebrand
25549	Theory of Business Cycles	2/1	W	4.5	M. Hillebrand

**Learning Control / Examinations**

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

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

**Conditions**

None.

**Recommendations**

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

**Learning Outcomes****Content**

**Module: Social Choice Theory [IW4VWL9]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2520517	Welfare Economics	2/1	S	4.5	C. Puppe
2520525	Game Theory I	2/2	S	4.5	S. Berninghaus
25537	Decision Theory and Objectives in Applied Politics	2/1	W	4.5	Tangian
25539	Mathematical Theory of Democracy	2/1	S	4.5	Tangian

**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.

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

**Conditions**

None.

**Recommendations**

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

**Learning Outcomes****Content**

## 5.3 Operations Research

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

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550486	Facility Location and Strategic Supply Chain Management	2/1	S	4.5	S. Nickel
2550488	Tactical and Operational Supply Chain Management	2/1	W	4.5	S. Nickel
2550480	Operations Research in Supply Chain Management	2/1	S	4.5	S. Nickel
2550495	Operations Research in Health Care Management	2/1	S	4.5	S. Nickel
2550493	Hospital Management	2/0	W/S	2	S. Nickel, Hansis
2550498	Practical seminar: Health Care Management (with Case Studies)	2/1/2	W/S	7	S. Nickel
2550497	Software Laboratory: OR Models II	2/1	S	4.5	S. Nickel
n.n.	Software Laboratory: Simulation	2/1	S	4.5	S. Nickel
n.n.	Software Laboratory: SAP APO	2/1	S	4.5	S. Nickel
2550494	Production Planning and Scheduling	2/1	S	4.5	J. Kalcsics

#### 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

In agreement with the module coordinator, a course from the modules *Mathematical optimization* [WW4OR6] or *Stochastic Modelling and Optimization* [WW4OR7] or one of the courses *Game Theory I* [2520525] and *Game Theory II* [2521369] can be acknowledged.

#### Recommendations

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

#### Learning Outcomes

The student

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

#### Content

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

providers, dealers). The main goal is to minimize the overall costs while taking into account several constraints including the satisfaction of customer demands.

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

**Module: Mathematical Programming [IW4OR6]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
25138	Mixed Integer Programming I	2/1	S	4.5	O. Stein
25140	Mixed Integer Programming II	2/1	W	4.5	O. Stein
25128	Special Topics in Optimization I	2/1	W/S	4.5	O. Stein
25126	Special Topics in Optimization II	2/1	W/S	4.5	O. Stein
2550484	Graph Theory and Advanced Location Models	2/1	W	4.5	S. Nickel
2550497	Software Laboratory: OR Models II	2/1	S	4.5	S. Nickel
2550111	Nonlinear Optimization I	2/1	S	4.5	O. Stein
2550113	Nonlinear Optimization II	2/1	S	4.5	O. Stein
2550134	Global Optimization I	2/1	W	4.5	O. Stein
2550136	Global Optimization II	2/1	W	4.5	O. Stein

**Learning Control / Examinations**

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

Upon consultation with the module coordinator, alternatively one lecture from the modules *Operations Research in Supply Chain Management and Health Care Management* [WW4OR5] and *Stochastic Modeling and Optimization* [WW4OR7] or one of the lectures *Game Theory I* [2520525] and *Game Theory II* [2521369] may be accepted.

**Learning Outcomes**

The student

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

**Content**

The modul focuses on theoretical foundations as well as solution algorithms for optimization problems with continuous and mixed integer decision variables, 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](http://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:** Karl-Heinz Waldmann  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Operations Research

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2550679	Markov Decision Models I	2/1/2	W	5	K. Waldmann
2550682	Markov Decision Models II	2/1/2	S	4.5	K. Waldmann
2550674	Quality Control I	2/1/2	W	4.5	K. Waldmann
25659	Quality Control II	2/1/2	S	4.5	K. Waldmann
25687	Optimization in a Random Environment	2/1/2	W/S	4.5	K. Waldmann
2550662	Simulation I	2/1/2	W	4.5	K. Waldmann
2550665	Simulation II	2/1/2	S	4.5	K. Waldmann
25688	OR-oriented modeling and analysis of real problems (project)	1/0/3	W/S	4.5	K. Waldmann

**Learning Control / Examinations**

The assessment is carried out as partial written exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 and understands stochastic relationships and has a competent knowledge in modelling, analyzing and optimizing stochastic systems in economics and engineering.

**Content**

see courses

## 5.4 Statistics

### Module: Mathematical and Empirical Finance [IW4STAT1]

**Coordination:** Svetlozar Rachev  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Statistics

<b>ECTS Credits</b> 9	<b>Cycle</b> Every term	<b>Duration</b> 1
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#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521331	Stochastic Calculus and Finance	2/1	W	4,5	S. Rachev
2521359	Financial Time Series and Econometrics	2/1	W	5	S. Rachev
2520381	Advanced Econometrics of Financial Markets	2/1	S	5	S. Rachev
2520357	Portfolio and Asset Liability Management	2/1	S	5	S. Rachev
25350/1	Finance and Banking	2/2	W	5	K. Vollmer
2520355	Bank Management and Financial Markets, Applied Econometrics	2/2	S	5	K. Vollmer

#### 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

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

#### Learning Outcomes

##### Content

**Module: Statistical Methods in Risk Management [IW4STAT2]**

**Coordination:** Svetlozar Rachev  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Statistics

<b>ECTS Credits</b> 9	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521353	Statistical Methods in Financial Risk Management	2/1	W	4,5	S. Rachev
2520337	Stochastic and Econometric Models in Credit Risk Management	2/2	S	5	S. Rachev
2520357	Portfolio and Asset Liability Management	2/1	S	5	S. Rachev
2520342	Operational Risk and Extreme Value Theory	2/2	W	5	S. Rachev
2520375	Data Mining	2	W	5	G. Nakhaeizadeh
2520317	Multivariate Methods	2/2	S	5	W. Heller

**Learning Control / Examinations**

The assessment is carried out as partial exams (according to Section 4(2), 1 or 2 of the examination regulation) of the single courses of this module, whose sum of credits must meet the minimum requirement of credits of this module. The assessment procedures are described for each course of the module 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 lecture *Statistical Methods in Financial Risk Management* [2521353] is mandatory.

**Learning Outcomes****Content****Remarks**

The course *Operational Risk and Extreme Value Theory* [2520342] is not being offered in summer term 2011.



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

**Coordination:** Svetlozar Rachev  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Statistics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2521353	Statistical Methods in Financial Risk Management	2/1	W	4,5	S. Rachev
2521359	Financial Time Series and Econometrics	2/1	W	5	S. Rachev
2520381	Advanced Econometrics of Financial Markets	2/1	S	5	S. Rachev

**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**

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

**Learning Outcomes****Content**

## 5.5 Informatics

### Module: Computer security [IW4INSICH]

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

#### Courses in module

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

#### Learning Control / Examinations

**Conditions**  
None.

#### Learning Outcomes

The student

- knows and understands the basic commonly used algorithms, their design, correctness and efficiency analysis, implementation, documentation and application,
- can 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:** Jörn Müller-Quade  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
PrakKryp	Laboratory in Cryptography	4	W/S	3	J. Müller-Quade
24623	Selected topics in Cryptography	2	S	3	J. Müller-Quade
SemiKryp3	Seminar in Cryptography	2	W/S	3	J. Müller-Quade
WSUW	How statistics begins to understand the difference between cause and effect	2	W	3	D. Janzing
24137	Signals and Codes	2	W	3	J. Müller-Quade
24629	Symmetric encryption	2	S	3	J. Müller-Quade
EmSec	Embedded Security	2	S	3	J. Müller-Quade
24652	Computational complexity theory, with a view towards cryptography	3	S	5	J. Müller-Quade
24166	Provable Security in Cryptography	2	W	3	D. Hofheinz
24115	Asymmetric Encryption Schemes	2	W	3	J. Müller-Quade
24656	The logic of security	2	S	3	J. Müller-Quade

**Learning Control / Examinations**

The assessment consists of partial examinations on the selected courses with the minimum requirement of credit points being reached in total.

Lectures will be assessed in an oral overall exam on all taken lectures (approx. 20 minutes per lecture) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

*Seminar in Cryptography* [SemiKryp]: The assessment consists of a written seminar thesis and the presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation). In this module the seminar can only be counted in with 3 credit points.

*Laboratory in Cryptography* [PrakKryp]: The assessment will be an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations and will be assessed with "passed" or "failed".

The grade of the module is the average of the single grades weighted by the related credit points and cut off after the first decimal place.

**Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

- Development of safety goals and classification of threats.
- Formal description of authentication systems.
- Analysis of typical vulnerabilities in programs and web applications and development of appropriate protective methods / avoidance strategies

- Overview of opportunities for side channel attacks
- Introduction to key management and Public Key Infrastructure
- Presentation and comparison of current safety certifications.
- The current research issues from some of the following areas are covered:
  - Block ciphers, hash functions,
  - Public-key encryption, digital signature, key exchange.
  - Basic security protocols such as fair coin toss over the phone, Byzantine Agreement, Dutch Flower Auctions, Zero Knowledge.
  - Threat models and security definitions.
  - Modular design and protocol composition.
  - Security definitions of simulatability.
  - Universal Composability.
  - Deniability as an additional safety feature.
  - Electronic Voting.

**Remarks**

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

**Module: Public Key Cryptography [IW4INPKK]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

**Conditions**  
None.

**Learning Outcomes**

The student

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

**Content**

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

**Module: Introduction to Algorithmics [IW4INEALGT]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations****Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

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

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24171	Randomized Algorithms	2	W	3	T. Worsch
24109	Parallel Algorithms	2	W/S	3	P. Sanders
24123	Algorithm Engineering	2	W/S	3	P. Sanders, D. Wagner
24614	Algorithms for Planar Graphs	2/1	S	5	D. Wagner
24622	Algorithms in Cellular Automata	2/1	S	3	T. Worsch
24079s	Seminar in Algorithm Design	2	W/S	3	D. Wagner
24118	Algorithms for Visualization of Graphs	2	W/S	5	D. Wagner, R. Görke
2511106	Nature-inspired Optimisation Methods	2/1	W	5	S. Mostaghim, P. Shukla
24079p	Practical Course in Algorithm Design	4	W/S	5	P. Sanders, D. Wagner, M. Krug
24638	Algorithms for Routing	2/1	S	5	D. Wagner
AlgAS	Algorithms for Ad-Hoc and Sensor Networks	2	S	3	B. Katz
24618	Computational Geometry	3	S	5	M. Nöllenburg, D. Wagner

**Learning Control / Examinations****Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

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

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24079p	Practical Course in Algorithm Design	4	W/S	5	P. Sanders, D. Wagner, M. Krug
24123	Algorithm Engineering	2	W/S	3	P. Sanders, D. Wagner
2511104	Organic Computing	2/1	S	5	H. Schmeck, S. Mostaghim
2511106	Nature-inspired Optimisation Methods	2/1	W	5	S. Mostaghim, P. Shukla
24638	Algorithms for Routing	2/1	S	5	D. Wagner
24109	Parallel Algorithms	2	W/S	3	P. Sanders
24118	Algorithms for Visualization of Graphs	2	W/S	5	D. Wagner, R. Görke
24079s	Seminar in Algorithm Design	2	W/S	3	D. Wagner
24614	Algorithms for Planar Graphs	2/1	S	5	D. Wagner
24622	Algorithms in Cellular Automata	2/1	S	3	T. Worsch
24171	Randomized Algorithms	2	W	3	T. Worsch
AlgAS	Algorithms for Ad-Hoc and Sensor Networks	2	S	3	B. Katz

**Learning Control / Examinations****Conditions**

None.

**Learning Outcomes**

The Student

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

**Content**

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



**Module: Web Applications and Web Technologies [IW4INWAWT]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

The assessment of this module consists of:

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

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

**Conditions**

None.

**Learning Outcomes**

To understand the architecture of multi-layered and service-oriented applications.

To be able to model the software architecture of a Web application.

To understand the major principles of traditional application development and the corresponding development process.

To comprehend how high-level process models are systematically refined in order to be mapped to a service oriented architecture.

The technologies and development tools can be applied to support exemplary scenarios.

Using document templates the obtained results can be clearly described.

The results can be vividly presented and supported in discussions.

**Content**

This module comprises at first the lecture "Advanced Web Applications". The lecture deals with the model-driven development of service-oriented Web applications which support business processes. These processes must be modeled in a way that it can be mapped to a Service-oriented Architecture (SOA).

The lecture is completed by a practical course. Each participant is integrated in one of the current project teams of the research group. The practical course consists of two parts: (i) An introduction into traditional and advanced service-oriented software development which takes about 4 to 5 weeks (ii) The solution (and its documentation) of an individual problem that is derived from one of the projects conducted by the project team.

**Remarks**

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

**Module: Language Technology and Compiler [IW4INCOMP1]**

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

<b>ECTS Credits</b> 8	<b>Cycle</b> Every 2nd term, Winter Term	<b>Duration</b> 1
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**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24134	Language Technology and Compiler	4/2	W	8	G. Snelting

**Learning Control / Examinations**

The assessment consists of an oral exam (approx. 30 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

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

**Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

**Module: Software Systems [IW4INSWS]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24667	Component Based Software Architecture	2	S	3	R. Reussner, M. Kuperberg, K. Krogmann
24660	Software Development for modern, parallel platforms	2	S	3	V. Pankratius, W. Tichy, Frank Otto
24112	Multicore Computers and Computer Clusters	2	W	3	V. Pankratius
24125/24673	Reading Group	1	W/S	1	R. Reussner, K. Krogmann, M. Kuperberg
24126	Specification and Verification of Software	3	W	5	B. Beckert, P. Schmitt
24293/24649	Multicore Programming in Practice: Tools, Models, Languages	4	W/S	6	V. Pankratius
24164	Software-Evolution	2	W	3	K. Krogmann, Mircea Trifu
24142	Security Engineering	2/1	W	5	A. Pretschner

**Learning Control / Examinations**

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

Practical courses: In addition the student needs to submit a certificate (not graded) of the practical course as an assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

Seminars: Seminars will have a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

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

The 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 *Component Based Software Engineering* is not offered any longer, examination is possible until winterterm 2011/12.

**Module: Software Methods [IW4INSWM]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24667	Component Based Software Architecture	2	S	3	R. Reussner, M. Kuperberg, K. Krogmann
24156	Empirical Software Engineering	2	S	3	W. Tichy
24634	Modern Development Environments using the example of .NET	2	S	3	W. Tichy, Gelhausen, Ladani
24636	Performance Engineering of Enterprise Software Systems	2	S	3	R. Reussner, S. Kounev
24125/24673	Reading Group	1	W/S	1	R. Reussner, K. Krogmann, M. Kuperberg
24164	Software-Evolution	2	W	3	K. Krogmann, Mircea Trifu
24142	Security Engineering	2/1	W	5	A. Pretschner

**Learning Control / Examinations**

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

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

The content is explained in the course descriptions.

**Remarks**

The lecture *Model Driven Software Development* is not offered any longer, examination is possible until winterterm 2010/11.

The lecture *Component Based Software Engineering* is not offered any longer, examination is possible until winterterm 2011/12.

**Module: Applied Web Engineering [IW4INPWE]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every 2nd term, Winter Term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering	2/0	W	4	H. Hartenstein, M. Nußbaumer
24880/24291	Practical Course Web Engineering	2/0	W/S	5	H. Hartenstein, M. Nußbaumer, M. Keller

**Learning Control / Examinations**

The assessment consists of an oral exam (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.

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

<b>ECTS Credits</b> 8	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

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

**Learning Control / Examinations**

The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

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

It is recommended to take the exams at the same time as part of an overall exam.

**Conditions**

The lecture *Telematics* [24128] must be taken if it has not been passed yet.

**Recommendations**

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

**Learning Outcomes**

Each student should be able

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

**Content**

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

**Remarks**

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.

The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].

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

## Module: Networking Labs [IW4INNL]

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24674	Next Generation Internet	2/0	S	4	R. Bless
24104	Wireless Sensor-Actuator-Networks	2/0	W	4	M. Zitterbart
PrakATM	Lab Advanced Telematics	2	W/S	5	M. Zitterbart
24669	Modeling and Simulation of Networks and Distributed Systems	2/0	S	4	H. Hartenstein
24878	Practical Course Modeling and Simulation of Networks and Distributed Systems	0/2	S	5	H. Hartenstein
24149	Network and IT-Security Management	2/1	W	5	H. Hartenstein
24601	Network Security: Architectures and Protocols	2/0	S	4	M. Schöller
24643	Mobile Communications	2/0	S	4	O. Waldhorst

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

One of the following combinations can be taken:

- *Next Generation Internet* [24674] and *Project Lab Future Internet* [PrakATM]
- *Wireless Sensor-Actuator-Networks* [24104] and *Project Lab Sensor Networks* [PrakATM]
- *Modeling and Simulation of Networks and Distributed Systems* [24669] and *Practical Course Modeling and Simulation of Networks and Distributed Systems* [24878]
- *Network and IT-Security Management* [24149] and *Network Security: Architectures and Protocols* [24601]
- *Mobile Communications* [24643] and *Lab Mobile Communications* [PrakATM]

### Learning Outcomes

Each student should be able

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

### Content

This module details and applies selected aspects of communication systems. This includes beside the requirements of secure and multimedia-based communication also the realization and controllability of large communication systems and networks. An

important aspect is benchmarking and mastering the used algorithms, protocols and architectures. Also actual developments and applications are in the focus of this module.

**Remarks**

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

The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].

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



**Module: Future Networking [IW4INFN]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

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

It is recommended to take the exams at the same time as part of an overall exam.

**Conditions**

The lecture *Telematics* [24128] must be taken if it has not been passed yet.

**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.

**Remarks**

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.

**Module: Networking [IW4INNW]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

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

It is recommended to take the exams at the same time as part of an overall exam.

**Conditions**

The lecture *Telematics* [24128] must be taken if it has not been passed yet.

**Recommendations**

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

**Learning Outcomes**

Each student should be able

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

**Content**

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

**Remarks**

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.

The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].

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

**Module: Networking Security - Theory and Praxis [IW4INNTP]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

The assessments for the individual courses consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations. The assessment of the seminar consists of a graded assessment according to sec. 4 subsec. 2 no. 3 study and examination regulations.

The assessment of the course *Seminar in Cryptography* [SemiKryp2] consists of a written seminar thesis and a presentation thereof according to sec. 4 subsec. 2 no. 3 study and examination regulations. The grade is the average of the weighted single grades (generally 50% seminar thesis, 50% presentation). The seminar can be taken in this module with 2 credit points. This has to be approved by the examiner.

The assessment of the lecture *Security* consists of a written exam (approx. 60 minutes) according to sec. 4 subsec. 2 no. 1 study and examination regulations.

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

It is recommended to take the exams at the same time as part of an overall exam.

**Conditions**

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

**Recommendations**

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

**Learning Outcomes**

Each student should be able

- to recall the basic security mechanisms and theoretical foundations of networking security and cryptography
- to read and understand actual academic papers
- to judge the security level of actual security solutions
- to identify possible attacks on security solutions

**Content**

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

**Remarks**

The lecture *Public Key Kryptographie* was offered ultimately in the winter term 2009/2010. Only repeaters can take the exam in the summer term 2010. Starting with the summer term 2010 the lecture *Security* [24941] can be taken.

**Module: Communication and Database Systems [IW4INKD]**

**Coordination:** Klemens Böhm, Martina Zitterbart  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every 2nd term, Summer Term	1

**Courses in module**

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

**Learning Control / Examinations****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:** Klemens Böhm  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

### Courses in module

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

### Learning Control / Examinations

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

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

### Conditions

None.

### Recommendations

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

### Learning Outcomes

The students

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

### Content

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

### Remarks

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

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

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24874	Practical Course Data Warehousing and Mining	2	S	4	K. Böhm
24114	Data Warehousing and Mining	2/1	W	5	K. Böhm
db_	Deployment of Database Systems	2/1	S	5	K. Böhm
impl	Database Implementation and Tuning	2/1	S	5	K. Böhm
vdh	Distributed Data Management	2/1	W	5	K. Böhm
24647	Data Mining Paradigms and Methods for Complex Databases	2/1	S	5	K. Böhm, E. Müller

### Learning Control / Examinations

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

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

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

### Conditions

The *Practical Course Data Warehousing and Mining* [24874] 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:** Klemens Böhm  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24292	Practical Course Database Systems	2	W	4	K. Böhm
praktvd	Practical Course Distributed Data Management	2	W	4	K. Böhm
vdh	Distributed Data Management	2/1	W	5	K. Böhm
24114	Data Warehousing and Mining	2/1	W	5	K. Böhm
dbe	Deployment of Database Systems	2/1	S	5	K. Böhm
db_impl	Database Implementation and Tuning	2/1	S	5	K. Böhm

### Learning Control / Examinations

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

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

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

### Conditions

One of the practical courses has to be taken.

### Recommendations

It is recommended to

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

### Learning Outcomes

The students

- know the research area of information systems in its various facets and are able to do scientific work in this area,
- are able to develop complex information systems on their own,
- are able to explain and to discuss complex aspects of the topics covered by this module with both experts and informed outsiders,
- are able to deploy (distributed) databases and are familiar with the relevant technologies.

### Content

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

### Remarks

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

**Module: Dynamic IT-Infrastructures [IW4INDITI]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24124	Web Engineering	2/0	W	4	H. Hartenstein, M. Nußbaumer
24669	Modeling and Simulation of Networks and Distributed Systems	2/0	S	4	H. Hartenstein
24146	Ubiquitous Computing	2/0	W	4	M. Beigl
24878	Practical Course Modeling and Simulation of Networks and Distributed Systems	0/2	S	5	H. Hartenstein
24074	Networked IT-Infrastructures	2/1	W	5	B. Neumair
24149	Network and IT-Security Management	2/1	W	5	H. Hartenstein

**Learning Control / Examinations**

The assessments of the lectures *Networked IT-Infrastructures*, *Network and IT-Security Management*, *Web Engineering*, *Modeling and Simulation of Networks and Distributed Systems* and *Ubiquitous Computing* consist of oral exams (approx. 20 minutes) according to sec. 4 subsec. 2 no. 2 study and examination regulations.

The assessments for practical courses and seminars will be graded assessments according to sec. 4 subsec. 2 no. 3 study and examination regulations.

The grade of the module is the average of the single grades weighted equally.

**Conditions**

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

**Recommendations**

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

**Learning Outcomes**

- The students will get to know established as well as novel concepts for the design, implementation, operation and management of dynamic IT infrastructures (Web, Grid, Cloud, Internet): Getting to know established and novel concepts for IT infrastructures
- Application of methods for the evaluation and analysis of dynamic IT infrastructures
- Assessment of tools, protocols and procedures for the operation and management of dynamic IT infrastructures
- Assessment of the strengths and weaknesses of IT infrastructures
- Insight into the practical operation of dynamic IT infrastructures using the example of the operation within the *Steinbuch Centre for Computing (SCC)*

**Content**

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

**Remarks**

The course *Telematik für Informationswirte* was renamed to *Networked IT-Infrastructures* [24074].

The course *Simulation von Rechnernetzen* was renamed to *Modeling and Simulation of Networks and Distributed Systems* [24669].

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



**Module: [IW4INBSV]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24105		4	W	6	T. Schultz, M. Wand
24600		4	S	6	T. Schultz, F. Putze
24119	Analysis and modeling of human motion sequences	2	W	3	T. Schultz
24612		2	S	3	T. Schultz, F. Putze
24103		2	W	3	T. Schultz, F. Putze
24641		2	S	3	M. Wand, T. Schultz

**Learning Control / Examinations**

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

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

**Conditions**

Of the lectures either *Biosignale und Benutzerschnittstellen* or *Multilinguale Mensch-Maschine-Kommunikation* has to be taken.

**Learning Outcomes****Content**

**Module: [IW4INSV]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24145	Principles of Automatic Speech Recognition	4	W	6	A. Waibel, Stüker
24600		4	S	6	T. Schultz, F. Putze
24298	Praktikum Automatic Speech Recognition	2	W	3	A. Waibel, Stüker
24103		2	W	3	T. Schultz, F. Putze

**Learning Control / Examinations**

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

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.

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

**Conditions**

None.

**Learning Outcomes****Content****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:** Hartmut Prautzsch  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Irregular	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24670	Curves and surfaces in CAD I	2	S	3	H. Prautzsch
24175	Curves and Surfaces in CAD II	2	W	3	H. Prautzsch
KFCAD3	Curves and Surfaces in CAD III	2	W/S	3	H. Prautzsch
24624	Rationale Splines	2	W	3	H. Prautzsch
24122	Subdivision algorithms	2	W	3	H. Prautzsch
NUP	Meshes and point clouds	2	W	3	H. Prautzsch
ADG	Applied Differential Geometry	2	W	3	H. Prautzsch

**Learning Control / Examinations**

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

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

**Conditions**

None.

**Learning Outcomes**

Gaining knowledge and deeper understanding in the area of Computer Aided Geometric Design ( CAGD) and Geometric Computing.

Further, this module should enable the students to master typical CAGD tasks and to work on a master's thesis, in particular.

**Content**

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

**Remarks**

See german version and see <http://i33www.ira.uka.de/pages/Lehre/VertiefungsgebietComputergraphik.html>.

**Module: [IN4INKUS]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24658		2	S	4	H. Schmidtke
24895		4	S	5	M. Beigl, H. Schmidtke
24804		2	W/S	4	M. Beigl
24146	Ubiquitous Computing	2/0	W	4	M. Beigl

**Learning Control / Examinations**

**Conditions**  
None.

**Learning Outcomes****Content**

**Module: [IN4INMMI]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24804		2	W/S	4	M. Beigl
24875		4	S	5	M. Beigl
24659		2	S	4	M. Beigl, Takashi Miyaki
24146	Ubiquitous Computing	2/0	W	4	M. Beigl

**Learning Control / Examinations**

**Conditions**  
None.

**Learning Outcomes****Content**

**Module: [IW4INACG]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
NUP	Meshes and point clouds	2	W	3	H. Prautzsch
24173	Medical Simulation Systems I	2	W	3	R. Dillmann, Röhl, Speidel
24676	Medical Simulation Systems II	2	S	3	R. Dillmann, Unterhinninghofen, Suwelack
24122		2	W/S	3	H. Prautzsch
24169	Automated Visual Inspection and Image Processing	4	W	6	J. Beyerer
24657		2	S	3	H. Prautzsch
24618	Computational Geometry	3	S	5	M. Nöllenburg, D. Wagner
24122	Subdivision algorithms	2	W	3	H. Prautzsch
24682		2/2	S	5	C. Dachsbacher
24679		2/2	S	5	C. Dachsbacher

**Learning Control / Examinations**

The assessment consists of an oral exam on the contents of the taken lectures and practical courses (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.

**Conditions**

None.

**Learning Outcomes**

Fundamental knowledge in the area of geometric modelling as used in CAD/CAGD and medical simulation.

**Content****Remarks**

For the courses plan see <http://i33www.ira.uka.de/pages/Lehre/VertiefungsgebietComputergraphik.html>.

The courses *Einführung in die Computergraphik*, *Graphisch-geometrische Algorithmen* and *Geometrieverarbeitung* are not offered any longer, examination is possible until WS 11/12.

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

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every 2nd term, Summer Term	1

**Courses in module**

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

**Learning Control / Examinations****Conditions**

None.

**Learning Outcomes**

The student

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

**Content**

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

**Module: Parallel Processing [IW4INPV]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24161	Microprocessors II	2	W	3	W. Karl
24117	Heterogeneous Parallel Computing Systems	2	W	3	W. Karl
24660	Software Development for modern, parallel platforms	2	S	3	V. Pankratius, W. Tichy, Frank Otto
24112	Multicore Computers and Computer Clusters	2	W	3	V. Pankratius
24606	Models of Parallel Processing	3	S	5	T. Worsch
24622	Algorithms in Cellular Automata	2/1	S	3	T. Worsch
24293/24649	Multicore Programming in Practice: Tools, Models, Languages	4	W/S	6	V. Pankratius

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

**Conditions**

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

**Learning Outcomes****Content****Remarks**

The lecture *Multikernpraktikum* is no longer offered.



**Module: Web Engineering [IW4INWEBE]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
4	Every 2nd term, Winter Term	1

**Courses in module**

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

**Learning Control / Examinations**

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

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Module: Service Technology [IW4INAIFB1]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes****Content****Remarks**

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

**Module: Cloud Computing [IW4INAIFB2]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
8	Every term	1

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511504	Cloud Computing	2/1	W	5	S. Tai, Kunze
SemAIFB5	Seminar eOrganization	2/0	S	3	S. Tai
25820	Lab Class Web Services	2	W	4	S. Tai, C. Zirpins

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Remarks**

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

**Module: Web Service Engineering [IW4INAIFB3]**

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

<b>ECTS Credits</b> 8	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511502	Web Service Engineering	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization	2/0	S	3	S. Tai
25820	Lab Class Web Services	2	W	4	S. Tai, C. Zirpins

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

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

**Content**

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

**Remarks**

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

**Module: Web Data Management [IW4INAIFB4]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

Students

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

**Content**

The module Web Data Management covers the basic principles, methods and applications for intelligent systems in the World Wide Web. Cloud Services are essential for the decentralized, scalable provision of data and applications as well as the methods of semantic web based on the description of data and services via metadata in form of so called ontologies.

Formal principles and practical aspects such as knowledge modeling and available representation language tools for ontologies are covered in detail. Methods for the realization of intelligent systems within the World Wide Web are treated and applications as in Web 2.0 or Service Science are discussed and evaluated.

Furthermore the application of modern Cloud technologies for the use of software and hardware as a service via internet is introduced. Cloud technologies allow the efficient implementation of applications on distributed computer clusters and permit a high scalability as well as new business models in the internet.

**Module: Intelligent Systems and Services [IW4INAIFB5]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes**

Students

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

**Content**

In the broader sense learning systems are understood as biological organisms and artificial systems which are able to change their behavior by processing outside influences. Network 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:** Rudi Studer  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b> 8	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes****Content**

**Module: Ubiquitous Computing [IW4INAIFB7]**

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

<b>ECTS Credits</b> 9	<b>Cycle</b> Every term	<b>Duration</b> 1
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**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes****Content**



**Module: Organic Computing [IW4INAIFB8]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes****Content**

**Module: Development of Distributed Business Information Systems [IW4INAIFB11]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

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

**Learning Outcomes**

The students

- are familiar with the requirements and limitations of distributed database systems,
- can ensure error-free operation and the consistency of distributed databases,
- can master methods and concepts of essential algorithms in distributed systems,
- are able to use methods of IT project management 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:** Stefan Tai  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Informatics

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511500	Service Oriented Computing 1	2/1	W	5	S. Tai
2511308	Service Oriented Computing 2	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511504	Cloud Computing	2/1	W	5	S. Tai, Kunze
2511502	Web Service Engineering	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization	2/0	S	3	S. Tai
25820	Lab Class Web Services	2	W	4	S. Tai, C. Zirpins

**Learning Control / Examinations**

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

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

**Conditions**

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

This course can also be successfully examined in other modules (e.g. *Business Processes and Information Systems* [IW3INAIFB8]). In this case the course cannot be taken any more.

**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](http://www.aifb.kit.edu/web/Lehrangebot_des_Instituts_AIFB/en).

**Remarks**

The module is new in summer term 2011. It replaces part of the modules *Service Technology* [IW4INAIFB1], *Cloud Computing* [IW4INAIFB2], *Web Service Engineering* [IW4INAIFB3] and *Service Technologies* [IW4INSER] which are not offered an more.

**Module: Service Computing 2 [IW4INAIFB13]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	2

**Courses in module**

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
2511308	Service Oriented Computing 2	2/1	S	5	R. Studer, S. Agarwal, B. Norton
2511504	Cloud Computing	2/1	W	5	S. Tai, Kunze
2511502	Web Service Engineering	2/1	S	5	C. Zirpins
SemAIFB5	Seminar eOrganization	2/0	S	3	S. Tai
25820	Lab Class Web Services	2	W	4	S. Tai, C. Zirpins

**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](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 anymore.

## 5.6 Law

### Module: Intellectual Property Law [IW4JURA4]

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

#### Courses in module

ID	Course	Hours per week C/E/T	Term	CP	Responsible Lecturer(s)
24812	Internet Law	2/0	S	3	T. Dreier
24121	Copyright	2/0	W	3	T. Dreier
24574	Patent Law	2/0	S	3	N.N.
24136/24609	Trademark and Unfair Competition Law	2/0	W/S	3	Y. Matz, P. Sester
24583	Computer Contract Law	2/0	W	3	M. Bartsch
24815	Basic Principles of Patent Law	2/0	W/S	3	K. Melullis
24357	Seminar: Software Patents	2	W	3	R. Reussner, M. Kuperberg, K. Melullis

#### 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:** Peter Sester  
**Degree programme:** Informationswirtschaft (M.Sc.)  
**Subject:** Law

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Recommendations**

For the courses

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

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

**Learning Outcomes**

The student

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

**Content**

**Module: Public Business Law [IW4JURA6]**

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

<b>ECTS Credits</b>	<b>Cycle</b>	<b>Duration</b>
9	Every term	1

**Courses in module**

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

**Learning Control / Examinations**

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

**Conditions**

None.

**Learning Outcomes****Content**

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

**vom 15. April 2009**

Aufgrund von § 34 Abs. 1 Satz 1 des Landeshochschulgesetzes (LHG) vom 1. Januar 2005 hat die beschließende Senatskommission für Prüfungsordnungen der Universität Karlsruhe (TH) am 13. Februar 2009 die folgende Studien- und Prüfungsordnung für den Masterstudiengang Informationswirtschaft beschlossen.

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

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- § 2 Akademischer Grad
- § 3 Regelstudienzeit, Studienaufbau, Leistungspunkte
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- § 5 Anmeldung und Zulassung zu den Prüfungen
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- § 8 Wiederholung von Prüfungen und Erfolgskontrollen, Erlöschen des Prüfungsanspruchs
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Die Universität Karlsruhe (TH) hat sich im Rahmen der Umsetzung des Bolognaprozesses zum Aufbau eines Europäischen Hochschulraumes zum Ziel gesetzt, dass am Abschluss der Studierendenausbildung an der Universität Karlsruhe (TH) der Mastergrad stehen soll. Die Universität Karlsruhe (TH) sieht daher die an der Universität Karlsruhe (TH) angebotenen konsekutiven Bachelor- und Masterstudiengänge als Gesamtkonzept mit konsekutivem Curriculum.

Aus Gründen der Lesbarkeit ist in dieser Satzung nur die männliche Sprachform gewählt worden. Alle personenbezogenen Aussagen gelten jedoch stets für Frauen und Männer gleichermaßen.

## I. Allgemeine Bestimmungen

### § 1 Geltungsbereich, Zweck der Prüfung

(1) Diese Masterprüfungsordnung regelt Studienablauf, Prüfungen und den Abschluss des Studiums im Masterstudiengang Informationswirtschaft an der Universität Karlsruhe (TH).

(2) Die Masterprüfung (§ 16 – 18) bildet den Abschluss dieses Studiengangs, der gemeinsam von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften an der Universität Karlsruhe (TH) angeboten wird. Durch die Masterprüfung soll festgestellt werden, ob der Studierende die für den Übergang in die Berufspraxis grundlegenden wissenschaftlichen Fachkenntnisse besitzt, die Zusammenhänge des Faches Informationswirtschaft überblickt und die Fähigkeit besitzt, nach wissenschaftlichen Methoden und Grundsätzen selbstständig zu arbeiten.

### § 2 Akademischer Grad

Aufgrund der bestandenen Masterprüfung wird der akademische Grad „Master of Science“ (abgekürzt: „M.Sc.“) für den Studiengang Informationswirtschaft (englischsprachig: Information Engineering and Management) verliehen.

### § 3 Regelstudienzeit, Studienaufbau, Leistungspunkte

(1) Die Regelstudienzeit beträgt vier Semester. Sie umfasst neben den Lehrveranstaltungen Prüfungen und die Masterarbeit.

(2) Die im Studium zu absolvierenden Lehrinhalte sind in Module gegliedert, die jeweils aus einer Lehrveranstaltung oder mehreren, thematisch und zeitlich aufeinander bezogenen Lehrveranstaltungen bestehen. Der Studienplan beschreibt Art, Umfang und Zuordnung der Module zu einem Fach sowie die Möglichkeiten, Module untereinander zu kombinieren. Die Fächer und ihr Umfang werden in § 16 definiert.

(3) Der für das Absolvieren von Lehrveranstaltungen und Modulen vorgesehene Arbeitsaufwand wird in Leistungspunkten (Credits) ausgewiesen. Die Maßstäbe für die Zuordnung von Leistungspunkten entsprechen dem ECTS (European Credit Transfer System). Ein Leistungspunkt entspricht einem Arbeitsaufwand von etwa 30 Stunden.

(4) Der Umfang der für den erfolgreichen Abschluss des Studiums erforderlichen Studienleistungen wird in Leistungspunkten gemessen und beträgt insgesamt 120 Leistungspunkte.

(5) Die Verteilung der Leistungspunkte im Studienplan auf die Semester hat in der Regel gleichmäßig zu erfolgen.

(6) Lehrveranstaltungen können in englischer Sprache angeboten werden.

**(7)** Profilmodule dienen der Profilbildung im Studiengang und der transparenten Darstellung der Lehrziele des Studiengangs durch eine Lehrzielhierarchie. Profilmodule werden durch die Module nach § 16 Abs. 2 Satz 2 gebildet. Jeweils beim Abschluss eines Moduls des Profilmoduls werden die Leistungspunkte dem Profilmodul angerechnet. Die Zuordnung der Module und Seminare zu Profilmodulen beschreibt der Studienplan.

#### **§ 4 Aufbau der Prüfungen**

**(1)** Die Masterprüfung besteht aus einer Masterarbeit und Fachprüfungen, jede Fachprüfung aus einer oder mehreren Modulprüfungen, jede Modulprüfung aus einer oder mehreren Modulteilprüfungen. Eine Modulteilprüfung besteht aus mindestens einer Erfolgskontrolle.

**(2)** Erfolgskontrollen sind:

1. schriftliche Prüfungen,
2. mündliche Prüfungen oder
3. Erfolgskontrollen anderer Art.

Erfolgskontrollen anderer Art sind z.B. Vorträge, Marktstudien, Projekte, Fallstudien, Experimente, schriftliche Arbeiten, Berichte, Seminararbeiten und Klausuren, sofern sie nicht als schriftliche oder mündliche Prüfung in der Modul- oder Lehrveranstaltungsbeschreibung im Studienplan ausgewiesen sind.

**(3)** Mindestens 50 % einer Modulprüfung sind in Form von schriftlichen oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) abzulegen, die restlichen Prüfungen erfolgen durch Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3). Ausgenommen hiervon ist die Prüfung nach § 16 Abs. 3.

#### **§ 5 Anmeldung und Zulassung zu den Prüfungen**

**(1)** Um an schriftlichen und/oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) teilnehmen zu können, muss sich der Studierende schriftlich oder per Online-Anmeldung beim Studienbüro anmelden. Hierbei sind die gemäß dem Studienplan für die jeweilige Modulprüfung notwendigen Studienleistungen nachzuweisen. Dies gilt auch für die Anmeldung zur Masterarbeit.

**(2)** Um zu schriftlichen und/oder mündlichen Prüfungen (§ 4 Abs. 2, Nr. 1 und 2) in einem bestimmten Modul zugelassen zu werden, muss der Studierende vor der ersten schriftlichen oder mündlichen Prüfung in diesem Modul beim Studienbüro eine bindende Erklärung über die Wahl des betreffenden Moduls und dessen Zuordnung zu einem Fach, wenn diese Wahlmöglichkeit besteht, abgeben.

**(3)** Die Zulassung darf nur abgelehnt werden, wenn der Studierende in einem mit der Informationswirtschaft vergleichbaren oder einem verwandten Studiengang bereits eine Diplomvorprüfung, Diplomprüfung, Bachelor- oder Masterprüfung endgültig nicht bestanden hat, sich in einem Prüfungsverfahren befindet oder den Prüfungsanspruch in einem solchen Studiengang verloren hat.

In Zweifelsfällen entscheidet der Prüfungsausschuss.

#### **§ 6 Durchführung von Prüfungen und Erfolgskontrollen**

**(1)** Erfolgskontrollen werden studienbegleitend, in der Regel im Verlauf der Vermittlung der Lehrinhalte der einzelnen Module oder zeitnah danach durchgeführt.

**(2)** Die Art der Erfolgskontrolle (§ 4 Abs. 2, Nr. 1 - 3) der einzelnen Lehrveranstaltungen wird vom Prüfer der betreffenden Lehrveranstaltung in Bezug auf die Lehrinhalte der Lehrveranstaltung und die Lehrziele des Moduls festgelegt. Die Art der Erfolgskontrollen, ihre Häufigkeit, Reihenfolge und Gewichtung, die Bildung der Lehrveranstaltungsnote und der Modulnote sowie Prüfer müssen mindestens sechs Wochen vor Semesterbeginn bekannt gegeben werden. Im Einvernehmen von Prüfer und Studierendem kann in begründeten Ausnahmefällen die Art der

Erfolgskontrolle auch nachträglich geändert werden. Dabei ist jedoch § 4 Abs. 3 zu berücksichtigen. Hierüber entscheidet der Prüfungsausschuss auf Antrag.

**(3)** Bei unvertretbar hohem Prüfungsaufwand kann eine schriftlich durchzuführende Prüfung auch mündlich oder eine mündlich durchzuführende Prüfung auch schriftlich abgenommen werden. Diese Änderung muss mindestens sechs Wochen vor der Prüfung bekannt gegeben werden.

**(4)** Weist ein Studierender nach, dass er wegen länger andauernder oder ständiger körperlicher Behinderung nicht in der Lage ist, die Erfolgskontrollen ganz oder teilweise in der vorgeschriebenen Form abzulegen, kann der zuständige Prüfungsausschuss – in dringenden Angelegenheiten, deren Erledigung nicht bis zu einer Sitzung des Ausschusses aufgeschoben werden kann, dessen Vorsitzender – gestatten, Erfolgskontrollen in einer anderen Form zu erbringen.

**(5)** Bei Lehrveranstaltungen in englischer Sprache können mit Zustimmung des Studierenden die entsprechenden Erfolgskontrollen in englischer Sprache abgenommen werden.

**(6)** Schriftliche Prüfungen (§ 4 Abs. 2, Nr. 1) sind in der Regel von zwei Prüfern nach § 14 Abs. 2 oder 3 zu bewerten. Die Note ergibt sich aus dem arithmetischen Mittel der Einzelbewertungen. Entspricht das arithmetische Mittel keiner der in § 7 Abs. 2 Satz 2 definierten Notenstufen, so ist auf die nächstliegende Notenstufe zu runden. Bei gleichem Abstand ist auf die nächstbessere Notenstufe zu runden. Das Bewertungsverfahren soll sechs Wochen nicht überschreiten. Schriftliche Einzelprüfungen dauern mindestens 60 und höchstens 240 Minuten.

**(7)** Mündliche Prüfungen (§ 4 Abs. 2, Nr. 2) sind von mehreren Prüfern (Kollegialprüfung) oder von einem Prüfer in Gegenwart eines Beisitzenden als Gruppen- oder Einzelprüfungen abzunehmen und zu bewerten. Vor der Festsetzung der Note hört der Prüfer die anderen an der Kollegialprüfung mitwirkenden Prüfer an. Mündliche Prüfungen dauern in der Regel mindestens 15 Minuten und maximal 45 Minuten pro Studierenden. Dies gilt auch für die mündliche Nachprüfung gemäß § 8 Abs. 3.

**(8)** Die wesentlichen Gegenstände und Ergebnisse der mündlichen Prüfung in den einzelnen Fächern sind in einem Protokoll festzuhalten. Das Ergebnis der Prüfung ist dem Studierenden im Anschluss an die mündliche Prüfung bekannt zu geben.

**(9)** Studierende, die sich in einem späteren Prüfungszeitraum der gleichen Prüfung unterziehen wollen, werden entsprechend den räumlichen Verhältnissen als Zuhörer bei mündlichen Prüfungen zugelassen. Die Zulassung erstreckt sich nicht auf die Beratung und Bekanntgabe der Prüfungsergebnisse. Aus wichtigen Gründen oder auf Antrag des zu prüfenden Studierenden ist die Zulassung zu versagen.

**(10)** Für Erfolgskontrollen anderer Art sind angemessene Bearbeitungsfristen einzuräumen und Abgabetermine festzulegen. Dabei ist durch die Art der Aufgabenstellung und durch entsprechende Dokumentation sicherzustellen, dass die erbrachte Studienleistung dem Studierenden zurechenbar ist. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

**(11)** Schriftliche Arbeiten im Rahmen einer Erfolgskontrolle anderer Art haben dabei die folgende Erklärung zu tragen: „Ich versichere wahrheitsgemäß, die Arbeit selbstständig angefertigt, alle benutzten Hilfsmittel vollständig und genau angegeben und alles kenntlich gemacht zu haben, was aus Arbeiten anderer unverändert oder mit Abänderungen entnommen wurde.“ Trägt die Arbeit diese Erklärung nicht, wird diese Arbeit nicht angenommen. Die wesentlichen Gegenstände und Ergebnisse einer solchen Erfolgskontrolle sind in einem Protokoll festzuhalten.

**(12)** Bei mündlich durchgeführten Erfolgskontrollen anderer Art muss neben dem Prüfer ein Beisitzer anwesend sein, der zusätzlich zum Prüfer die Protokolle zeichnet.

## **§ 7 Bewertung von Prüfungen und Erfolgskontrollen**

**(1)** Das Ergebnis einer Erfolgskontrolle wird von den jeweiligen Prüfern in Form einer Note festgesetzt.

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

1	: sehr gut (very good)	: hervorragende Leistung,
2	: gut (good)	: eine Leistung, die erheblich über den durchschnittlichen Anforderungen liegt,
3	: befriedigend (satisfactory)	: eine Leistung, die durchschnittlichen Anforderungen entspricht,
4	: ausreichend (sufficient)	: eine Leistung, die trotz ihrer Mängel noch den Anforderungen genügt,
5	: nicht ausreichend (failed)	: eine Leistung, die wegen erheblicher Mängel nicht den Anforderungen genügt.

Für die Masterarbeit, Modulprüfungen, Modulteilprüfungen und Profilmodule sind zur differenzierten Bewertung nur folgende Noten zugelassen:

1.0, 1.3	: sehr gut
1.7, 2.0, 2.3	: gut
2.7, 3.0, 3.3	: befriedigend
3.7, 4.0	: ausreichend
4.7, 5.0	: nicht ausreichend

Diese Noten müssen in den Protokollen und in den Anlagen (Transcript of Records und Diploma Supplement) verwendet werden.

**(3)** Für Erfolgskontrollen anderer Art kann im Studienplan die Benotung mit „bestanden“ (passed) oder „nicht bestanden“ (failed) vorgesehen werden.

**(4)** Bei der Bildung der gewichteten Durchschnitte der Fachnoten, Modulnoten und der Gesamtnote wird nur die erste Dezimalstelle hinter dem Komma berücksichtigt; alle weiteren Stellen werden ohne Rundung gestrichen.

**(5)** Jedes Modul, jede Lehrveranstaltung und jede Erfolgskontrolle darf jeweils nur einmal angerechnet werden. Die Anrechnung eines Moduls, einer Lehrveranstaltung oder einer Erfolgskontrolle ist darüber hinaus ausgeschlossen, wenn das betreffende Modul, die Lehrveranstaltung oder die Erfolgskontrolle bereits in einem grundständigen Bachelorstudiengang angerechnet wurde, auf dem dieser Masterstudiengang konsekutiv aufbaut.

**(6)** Erfolgskontrollen anderer Art dürfen in Modulprüfungen oder Modulteilprüfungen nur eingerechnet werden, wenn die Benotung nicht nach Absatz 3 erfolgt ist. Die zu dokumentierenden Erfolgskontrollen und die daran geknüpften Bedingungen werden im Studienplan festgelegt.

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

**(8)** Eine Modulprüfung ist dann bestanden, wenn die Modulnote mindestens „ausreichend“ (4.0) ist. Die Modulprüfung und die Bildung der Modulnote werden im Studienplan geregelt. Die differenzierten Lehrveranstaltungsnoten (Absatz 2) sind bei der Berechnung der Modulnoten als Ausgangsdaten zu verwenden. Enthält der Studienplan keine Regelung darüber, wann eine Modulprüfung bestanden ist, so ist diese Modulprüfung dann endgültig nicht bestanden, wenn eine dem Modul zugeordnete Modulteilprüfung endgültig nicht bestanden wurde.

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

**(10)** Die Noten der Module eines Faches gehen in die Fachnote mit einem Gewicht proportional zu den ausgewiesenen Leistungspunkten der Module ein. Eine Fachprüfung ist bestanden, wenn

die für das Fach erforderliche Anzahl von Leistungspunkten über die im Studienplan definierten Modulprüfungen nachgewiesen wird.

**(11)** Die Gesamtnote der Masterprüfung, die Fachnoten und die Modulnoten lauten:

- bis 1.5 : sehr gut (very good)
- von 1.6 bis 2.5 : gut (good)
- von 2.6 bis 3.5 : befriedigend (satisfactory)
- von 3.6 bis 4.0 : ausreichend (sufficient)

**(12)** Zusätzlich zu den Noten nach Absatz 2 werden ECTS-Noten für Fachprüfungen, Modulprüfungen und für die Masterprüfung nach folgender Skala vergeben:

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

Die Quote ist als der Prozentsatz der erfolgreichen Studierenden definiert, die diese Note in der Regel erhalten. Dabei ist von einer mindestens fünfjährigen Datenbasis über mindestens 30 Studierende auszugehen. Für die Ermittlung der Notenverteilungen, die für die ECTS-Noten erforderlich sind, ist das Studienbüro der Universität zuständig.

**(13)** Bis zum Aufbau einer entsprechenden Datenbasis wird als Übergangsregel die Verteilung der Hauptdiplomsnoten des Diplomstudiengangs Informationswirtschaft per 31. Juli 2005 zur Bildung dieser Skala für alle Module des Masterstudiengangs Informationswirtschaft herangezogen. Diese Verteilung wird jährlich gleitend über mindestens fünf Jahre mit mindestens 30 Studierenden jeweils zu Beginn des Studienjahres für jedes Modul, die Fachnoten und die Gesamtnote angepasst und in diesem Studienjahr für die Festsetzung der ECTS-Note verwendet.

### § 8 Wiederholung von Prüfungen und Erfolgskontrollen, Erlöschen des Prüfungsanspruchs

**(1)** Studierende können eine nicht bestandene schriftliche Prüfung (§ 4 Abs. 2, Nr. 1) einmal wiederholen. Wird eine schriftliche Wiederholungsprüfung mit „nicht ausreichend“ bewertet, so findet eine mündliche Nachprüfung im zeitlichen Zusammenhang mit dem Termin der nicht bestandenen Prüfung statt. In diesem Falle kann die Note dieser Prüfung nicht besser als „ausreichend“ sein.

**(2)** Studierende können eine nicht bestandene mündliche Prüfung (§ 4 Abs. 2, Nr. 2) einmal wiederholen.

**(3)** Wiederholungsprüfungen nach Absatz 1 und 2 müssen in Inhalt, Umfang und Form (mündlich oder schriftlich) der ersten entsprechen. Ausnahmen kann der zuständige Prüfungsausschuss auf Antrag zulassen. Fehlversuche an anderen Hochschulen sind anzurechnen.

**(4)** Die Wiederholung einer Erfolgskontrolle anderer Art (§ 4 Abs. 2, Nr. 3) wird im Studienplan geregelt.

**(5)** Eine zweite Wiederholung derselben schriftlichen oder mündlichen Prüfung ist nur in Ausnahmefällen zulässig. Einen Antrag auf Zweitwiederholung hat der Studierende schriftlich beim Prüfungsausschuss zu stellen. Über den ersten Antrag eines Studierenden auf Zweitwiederholung entscheidet der Prüfungsausschuss, wenn er den Antrag genehmigt. Wenn der Prüfungsausschuss diesen Antrag ablehnt, entscheidet der Rektor. Über weitere Anträge auf Zweitwiederholung entscheidet nach Stellungnahme des Prüfungsausschusses der Rektor. Absatz 1 Satz 2 und 3 gelten entsprechend.

**(6)** Die Wiederholung einer bestandenen Erfolgskontrolle ist nicht zulässig.

**(7)** Eine Fachprüfung ist endgültig nicht bestanden, wenn mindestens ein Modul des Faches endgültig nicht bestanden ist.

**(8)** Die Masterarbeit kann bei einer Bewertung mit „nicht ausreichend“ einmal wiederholt werden. Eine zweite Wiederholung der Masterarbeit ist ausgeschlossen.

**(9)** Ist gemäß § 34 Abs. 2 Satz 3 LHG die Masterprüfung bis zum Ende des siebten Fachsemesters dieses Studiengangs einschließlich etwaiger Wiederholungen nicht vollständig abgelegt, so erlischt der Prüfungsanspruch im Studiengang, es sei denn, dass der Studierende die Fristüberschreitung nicht zu vertreten hat. Die Entscheidung darüber trifft der Prüfungsausschuss. Die Entscheidung über eine Fristverlängerung und über Ausnahmen von der Fristregelung trifft der Prüfungsausschuss.

### **§ 9 Versäumnis, Rücktritt, Täuschung, Ordnungsverstoß**

**(1)** Der Studierende kann bei schriftlichen Prüfungen ohne Angabe von Gründen bis einen Tag (24 Uhr) vor dem Prüfungstermin zurücktreten (Abmeldung). Bei mündlichen Prüfungen muss der Rücktritt spätestens drei Werktage vor dem betreffenden Prüfungstermin erklärt werden (Abmeldung). Ein Rücktritt von einer mündlichen Prüfung weniger als drei Werktage vor dem betreffenden Prüfungstermin ist nur unter Voraussetzung des Absatzes 3 möglich. Die Abmeldung kann schriftlich beim Prüfer oder per Online-Abmeldung beim Studienbüro erfolgen. Eine durch Widerruf abgemeldete Prüfung gilt als nicht angemeldet. Der Rücktritt von mündlichen Nachprüfungen im Sinne von § 8 Abs. 2 ist grundsätzlich nur unter den Voraussetzungen von Absatz 3 möglich.

**(2)** Eine Prüfung gilt als mit „nicht ausreichend“ (5.0) bewertet, wenn der Studierende einen Prüfungstermin ohne triftigen Grund versäumt oder wenn er nach Beginn der Prüfung ohne triftigen Grund von der Prüfung zurücktritt. Dasselbe gilt, wenn die Masterarbeit nicht innerhalb der vorgesehenen Bearbeitungszeit erbracht wird, es sei denn, der Studierende hat die Fristüberschreitung nicht zu vertreten.

**(3)** Der für den Rücktritt nach Beginn der Prüfung oder das Versäumnis geltend gemachte Grund muss dem Prüfungsausschuss unverzüglich schriftlich angezeigt und glaubhaft gemacht werden. Bei Krankheit des Studierenden oder eines von ihm allein zu versorgenden Kindes oder pflegebedürftigen Angehörigen kann die Vorlage eines ärztlichen Attestes und in Zweifelsfällen ein amtsärztliches Attest verlangt werden. Die Anerkennung des Rücktritts ist ausgeschlossen, wenn bis zum Eintritt des Hinderungsgrundes bereits Prüfungsleistungen erbracht worden sind und nach deren Ergebnis die Prüfung nicht bestanden werden kann. Werden die Gründe anerkannt, wird ein neuer Termin anberaumt. Die bereits vorliegenden Prüfungsergebnisse sind in diesem Fall anzurechnen. Bei Modulprüfungen, die aus mehreren Prüfungen bestehen, werden die Prüfungsleistungen dieses Moduls, die bis zu einem anerkannten Rücktritt bzw. einem anerkannten Versäumnis einer Prüfungsleistung dieses Moduls erbracht worden sind, angerechnet.

(4) Versucht der Studierende, das Ergebnis einer mündlichen oder schriftlichen Prüfung (§ 4 Abs. 2, Nr. 1 und 2) durch Täuschung oder Benutzung nicht zugelassener Hilfsmittel zu beeinflussen, gilt die betreffende Prüfung als mit „nicht ausreichend“ (5.0) bewertet.

(5) Ein Studierender, der den ordnungsgemäßen Ablauf der Prüfung stört, kann von dem jeweiligen Prüfer oder der Aufsicht führenden Person von der Fortsetzung der Prüfung ausgeschlossen werden; in diesem Fall gilt die betreffende Prüfung als mit „nicht ausreichend“ (5.0) bewertet. In schwerwiegenden Fällen kann der Prüfungsausschuss den Studierenden von der Erbringung weiterer Prüfungen ausschließen.

(6) Der Studierende kann innerhalb von einem Monat verlangen, dass die Entscheidung gemäß Absatz 4 und 5 vom Prüfungsausschuss überprüft wird. Belastende Entscheidungen des Prüfungsausschusses sind dem Studierenden unverzüglich schriftlich mitzuteilen, zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Vor einer Entscheidung ist dem Studierenden Gelegenheit zur Äußerung zu geben.

(7) Absatz 1 - 6 gelten für Erfolgskontrollen anderer Art (§ 4 Abs. 2, Nr. 3) entsprechend.

(8) Näheres regelt die Allgemeine Satzung der Universität Karlsruhe (TH) zur Redlichkeit bei Prüfungen und Praktika.

### **§ 10 Mutterschutz, Elternzeit, Wahrnehmung von Familienpflichten**

(1) Auf Antrag sind die Mutterschutzfristen, wie sie im jeweils gültigen Gesetz zum Schutz der erwerbstätigen Mutter (MuSchG) festgelegt sind, entsprechend zu berücksichtigen. Dem Antrag sind die erforderlichen Nachweise beizufügen. Die Mutterschutzfristen unterbrechen jede Frist nach dieser Studien- und Prüfungsordnung. Die Dauer des Mutterschutzes wird nicht in die Frist eingerechnet.

(2) Gleichfalls sind die Fristen der Elternzeit nach Maßgabe des jeweiligen gültigen Gesetzes (BErzGG) auf Antrag zu berücksichtigen. Der Studierende muss bis spätestens vier Wochen vor dem Zeitpunkt, von dem an er die Elternzeit antreten will, dem Prüfungsausschuss unter Beifügung der erforderlichen Nachweise schriftlich mitteilen, in welchem Zeitraum er Elternzeit in Anspruch nehmen will. Der Prüfungsausschuss hat zu prüfen, ob die gesetzlichen Voraussetzungen vorliegen, die bei einem Arbeitnehmer den Anspruch auf Elternzeit auslösen würden, und teilt dem Studierenden das Ergebnis sowie die neu festgesetzten Prüfungszeiten unverzüglich mit. Die Bearbeitungszeit der Masterarbeit kann nicht durch Elternzeit unterbrochen werden. Die gestellte Arbeit gilt als nicht vergeben. Nach Ablauf der Elternzeit erhält der Studierende ein neues Thema.

(3) Der Prüfungsausschuss entscheidet auf Antrag über die flexible Handhabung von Prüfungsfristen entsprechend den Bestimmungen des Landeshochschulgesetzes, wenn Studierende Familienpflichten wahrzunehmen haben. Die Bearbeitungszeit der Masterarbeit kann nicht durch die Wahrnehmung von Familienpflichten unterbrochen oder verlängert werden. Die gestellte Arbeit gilt als nicht vergeben. Der Studierende erhält ein neues Thema, das innerhalb der in § 11 festgelegten Bearbeitungszeit zu bearbeiten ist.

### **§ 11 Masterarbeit**

(1) Vor Zulassung der Masterarbeit sind Betreuer, Thema und Anmeldedatum dem Prüfungsausschuss bekannt zu geben. Auf Antrag des Studierenden sorgt ausnahmsweise der Vorsitzende des Prüfungsausschusses dafür, dass der Studierende innerhalb von vier Wochen nach Antragstellung von einem Betreuer ein Thema für die Masterarbeit erhält. Die Ausgabe des Themas erfolgt in diesem Fall über den Vorsitzenden des Prüfungsausschusses.

(2) Thema, Aufgabenstellung und Umfang der Masterarbeit sind vom Betreuer so zu begrenzen, dass sie mit dem in Absatz 3 festgelegten Arbeitsaufwand bearbeitet werden kann.

(3) Die Masterarbeit soll zeigen, dass der Studierende in der Lage ist, ein Problem aus seinem Fach selbstständig und in der vorgegebenen Zeit nach wissenschaftlichen Methoden, die dem

Stand der Forschung entsprechen, zu bearbeiten. Der Masterarbeit werden 30 Leistungspunkte zugeordnet. Die Bearbeitungsdauer beträgt sechs Monate. Die Masterarbeit kann auch in englischer Sprache geschrieben werden.

**(4)** Die Masterarbeit kann von jedem Prüfer nach § 14 Abs. 2 vergeben werden. Soll die Masterarbeit außerhalb der beiden nach § 1 Abs. 2 Satz 1 beteiligten Fakultäten angefertigt werden, so bedarf dies der Genehmigung des Prüfungsausschusses. Dem Studierenden ist Gelegenheit zu geben, für das Thema Vorschläge zu machen. Die Masterarbeit kann auch in Form einer Gruppenarbeit zugelassen werden, wenn der als Prüfungsleistung zu bewertende Beitrag des einzelnen Studierenden aufgrund objektiver Kriterien, die eine eindeutige Abgrenzung ermöglichen, deutlich unterscheidbar ist und die Anforderung nach Absatz 1 erfüllt.

**(5)** Bei der Abgabe der Masterarbeit hat der Studierende schriftlich zu versichern, dass er die Arbeit selbstständig verfasst hat und keine anderen als die von ihm angegebenen Quellen und Hilfsmittel benutzt hat, die wörtlich oder inhaltlich übernommenen Stellen als solche kenntlich gemacht und die Satzung der Universität Karlsruhe (TH) zur Sicherung guter wissenschaftlicher Praxis in der jeweils gültigen Fassung beachtet hat. Wenn diese Erklärung nicht enthalten ist, wird die Arbeit nicht angenommen. Bei Abgabe einer unwahren Versicherung wird die Masterarbeit mit „nicht ausreichend“ (5.0) bewertet.

**(6)** Der Zeitpunkt der Ausgabe des Themas der Masterarbeit und der Zeitpunkt der Abgabe der Masterarbeit sind beim Prüfungsausschuss aktenkundig zu machen. Der Studierende kann das Thema der Masterarbeit nur einmal und nur innerhalb der ersten zwei Monate der Bearbeitungszeit zurückgeben. Auf begründeten Antrag des Studierenden kann der Prüfungsausschuss die in Absatz 1 festgelegte Bearbeitungszeit um höchstens drei Monate verlängern. Wird die Masterarbeit nicht fristgerecht abgeliefert, gilt sie als mit „nicht ausreichend“ bewertet, es sei denn, dass der Studierende dieses Versäumnis nicht zu vertreten hat. § 8 gilt entsprechend.

**(7)** Die Masterarbeit wird von einem Betreuer sowie in der Regel von einem weiteren Prüfer aus der jeweils anderen Fakultät der beiden nach § 1 Abs. 2 Satz 1 beteiligten Fakultäten begutachtet und bewertet. Einer der beiden muss Juniorprofessor oder Professor sein. Bei nicht übereinstimmender Beurteilung der beiden Prüfer setzt der Prüfungsausschuss im Rahmen der Bewertung der beiden Prüfer die Note der Masterarbeit fest. Der Bewertungszeitraum soll acht Wochen nicht überschreiten.

## **§ 12 Zusatzleistungen und Zusatzmodule**

**(1)** Innerhalb der Regelstudienzeit, einschließlich der Urlaubssemester für das Studium an einer ausländischen Hochschule (Regelprüfungszeit), können in einem Modul bzw. Fach auch weitere Leistungspunkte (Zusatzleistungen) im Umfang von höchstens 20 Leistungspunkten erworben werden, als für das Bestehen der Modul- bzw. Fachprüfung erforderlich sind. § 3, § 4 und § 8 Abs. 9 der Studien- und Prüfungsordnung bleiben davon unberührt. Diese Zusatzleistungen gehen nicht in die Festsetzung der Gesamt-, Fach- und Modulnoten ein. Soweit Zusatzleistungen erbracht wurden, werden auf Antrag des Studierenden bei der Festlegung der Modul- bzw. Fachnote nur die Noten berücksichtigt, die unter Abdeckung der erforderlichen Leistungspunkte die beste Modul- bzw. Fachnote ergeben. Die bei der Festlegung der Modul bzw. Fachnote nicht berücksichtigten Leistungspunkte werden als Zusatzleistungen automatisch im Transcript of Records aufgeführt und als Zusatzleistungen gekennzeichnet. Zusatzleistungen werden mit den nach § 7 vorgesehenen Noten gelistet.

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

**(3)** Die Ergebnisse maximal zweier Module, die jeweils mindestens 9 Leistungspunkte umfassen müssen, werden auf Antrag des Studierenden in das Masterzeugnis als Zusatzmodule aufgenommen und als solche gekennzeichnet. Zusatzmodule werden bei der Festsetzung der Gesamt-, Fach- und Modulnoten nicht mit einbezogen. Nicht in das Zeugnis aufgenommene Zusatzmodule werden im Transcript of Records automatisch aufgenommen und als Zusatzmodule gekennzeichnet. Zusatzmodule werden mit den nach § 7 vorgesehenen Noten gelistet.



(4) Neben den im Studienplan definierten fachwissenschaftlichen Modulen und Leistungen können die Zusatzleistungen nach Absatz 1 - 3 auch aus dem Lehrangebot anderer Fakultäten und Einrichtungen gewählt werden.

### § 13 Prüfungsausschuss

(1) Für den Masterstudiengang Informationswirtschaft wird ein Prüfungsausschuss gebildet. Er besteht aus sechs stimmberechtigten Mitgliedern, die jeweils zur Hälfte von der Fakultät für Informatik und der Fakultät für Wirtschaftswissenschaften bestellt werden: vier Professoren, Juniorprofessoren, Hochschul- oder Privatdozenten, zwei Vertretern der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und einem Vertreter der Studierenden mit beratender Stimme. Im Falle der Einrichtung eines gemeinsamen Prüfungsausschusses für den Bachelor- und den Masterstudiengang Informationswirtschaft erhöht sich die Anzahl der Vertreter der Studierenden auf zwei Mitglieder mit beratender Stimme, wobei je ein Vertreter aus dem Bachelor- und aus dem Masterstudiengang stammt. Die Amtszeit der nichtstudentischen Mitglieder beträgt zwei Jahre, die des studentischen Mitglieds ein Jahr.

(2) Der Vorsitzende, sein Stellvertreter, die weiteren Mitglieder des Prüfungsausschusses sowie deren Stellvertreter werden von den jeweiligen Fakultätsräten bestellt, die Mitglieder der Gruppe der akademischen Mitarbeiter nach § 10 Abs. 1 Satz 2 Nr. 2 LHG und der Vertreter der Studierenden auf Vorschlag der Mitglieder der jeweiligen Gruppe; Wiederbestellung ist möglich. Der Vorsitzende und dessen Stellvertreter müssen Professor oder Juniorprofessor aus einer der beteiligten Fakultäten sein. Der Vorsitz wechselt zwischen den Fakultäten alle zwei Jahre. Der Vorsitzende des Prüfungsausschusses nimmt die laufenden Geschäfte wahr und wird durch die Prüfungssekretariate unterstützt.

(3) Der Prüfungsausschuss regelt die Auslegung und die Umsetzung der Studien- und Prüfungsordnung in die Prüfungspraxis der Fakultäten. Er achtet darauf, dass die Bestimmungen der Prüfungsordnung eingehalten werden. Er entscheidet über die Anrechnung von Studienzeiten, Studien- und Prüfungsleistungen und übernimmt die Gleichwertigkeitsfeststellung. Er berichtet regelmäßig den Fakultätsräten über die Entwicklung der Prüfungen und Studienzeiten sowie über die Verteilung der Fach- und Gesamtnoten und gibt Anregungen zur Reform des Studienplans und der Studien- und Prüfungsordnung.

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

(5) Die Mitglieder des Prüfungsausschusses haben das Recht, der Abnahme von Prüfungen beizuwohnen. Die Mitglieder des Prüfungsausschusses, die Prüfer und die Beisitzenden unterliegen der Amtsverschwiegenheit. Sofern sie nicht im öffentlichen Dienst stehen, sind sie durch den Vorsitzenden zur Verschwiegenheit zu verpflichten.

(6) In Angelegenheiten des Prüfungsausschusses, die eine an einer anderen Fakultät zu absolvierende Prüfungsleistung betreffen, ist auf Antrag eines Mitgliedes des Prüfungsausschusses ein fachlich zuständiger und von der betroffenen Fakultät zu nennender Professor, Juniorprofessor, Hochschul- oder Privatdozent hinzuziehen. Er hat in diesem Punkt Stimmrecht.

(7) Belastende Entscheidungen des Prüfungsausschusses sind schriftlich mitzuteilen. Sie sind zu begründen und mit einer Rechtsbehelfsbelehrung zu versehen. Widersprüche gegen Entscheidungen des Prüfungsausschusses sind innerhalb eines Monats nach Zugang der Entscheidung schriftlich oder zur Niederschrift beim Rektorat der Universität Karlsruhe (TH) einzulegen.

### § 14 Prüfer und Beisitzer

(1) Der Prüfungsausschuss bestellt die Prüfer und die Beisitzenden. Er kann die Bestellung dem Vorsitzenden übertragen.

(2) Prüfer sind Hochschullehrer und habilitierte Mitglieder sowie akademische Mitarbeiter der jeweiligen Fakultät, denen die Prüfungsbefugnis übertragen wurde. Bestellt werden darf nur, wer mindestens

die dem jeweiligen Prüfungsgegenstand entsprechende fachwissenschaftliche Qualifikation erworben hat. Bei der Bewertung der Masterarbeit muss ein Prüfer Hochschullehrer sein.

**(3)** Soweit Lehrveranstaltungen von anderen als den unter Absatz 2 genannten Personen durchgeführt werden, sollen diese zum Prüfer bestellt werden, wenn die jeweilige Fakultät ihnen eine diesbezügliche Prüfungsbefugnis erteilt hat.

**(4)** Zum Beisitzenden darf nur bestellt werden, wer einen akademischen Abschluss in einem Studiengang der Informationswirtschaft, Informatik, Rechtswissenschaften, Wirtschaftswissenschaften oder einen gleichwertigen akademischen Abschluss erworben hat.

### **§ 15 Anrechnung von Studienzeiten, Anerkennung von Studien- und Prüfungsleistungen**

**(1)** Studienzeiten im gleichen Studiengang werden angerechnet. Studien- und Prüfungsleistungen, die in gleichen oder anderen Studiengängen an der Universität Karlsruhe (TH) oder an anderen Hochschulen erbracht wurden, werden angerechnet, soweit Gleichwertigkeit besteht. Gleichwertigkeit ist festzustellen, wenn Leistungen in Inhalt, Umfang und in den Anforderungen denjenigen des Studiengangs im Wesentlichen entsprechen. Dabei ist kein schematischer Vergleich, sondern eine Gesamtbetrachtung vorzunehmen. Bezüglich des Umfangs einer zur Anerkennung vorgelegten Studien- und Prüfungsleistung werden die Grundsätze des ECTS herangezogen; die inhaltliche Gleichwertigkeitsprüfung orientiert sich an den Qualifikationszielen des Moduls.

**(2)** Werden Leistungen angerechnet, können die Noten – soweit die Notensysteme vergleichbar sind – übernommen werden und in die Berechnung der Modulnoten und der Gesamtnote einbezogen werden. Liegen keine Noten vor, muss die Leistung nicht anerkannt werden. Der Studierende hat die für die Anrechnung erforderlichen Unterlagen vorzulegen.

**(3)** Bei der Anrechnung von Studienzeiten und der Anerkennung von Studien- und Prüfungsleistungen, die außerhalb der Bundesrepublik erbracht wurden, sind die von der Kultusministerkonferenz und der Hochschulrektorenkonferenz gebilligten Äquivalenzvereinbarungen sowie Absprachen im Rahmen der Hochschulpartnerschaften zu beachten.

**(4)** Absatz 1 gilt auch für Studienzeiten, Studien- und Prüfungsleistungen, die in staatlich anerkannten Fernstudien- und an anderen Bildungseinrichtungen, insbesondere an staatlichen oder staatlich anerkannten Berufsakademien sowie an Fach- und Ingenieurschulen erworben wurden.

**(5)** Die Anerkennung von Teilen der Masterprüfung kann versagt werden, wenn in einem Studiengang mehr als 45 Leistungspunkte und/oder die Masterarbeit anerkannt werden soll/en. Dies gilt insbesondere bei einem Studiengangwechsel sowie bei einem Studienortwechsel.

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

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

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

## II. Masterprüfung

### § 16 Umfang und Art der Masterprüfung

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

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

1. aus dem Fach Betriebswirtschaftslehre im Umfang von 10 Leistungspunkten,
2. aus dem Fach Operations Research im Umfang von 5 Leistungspunkten.

Des Weiteren sind Fachprüfungen

1. aus wirtschaftswissenschaftlichen Fächern durch Module im Umfang von 18 Leistungspunkten,
2. aus dem Fach Informatik durch Module im Umfang von 33 Leistungspunkten,
3. aus dem Fach Recht durch Module im Umfang von 18 Leistungspunkten

abzulegen. Wirtschaftswissenschaftliche Fächer sind Betriebswirtschaftslehre, Operations Research, Statistik und Volkswirtschaftslehre. Dabei sind im Fach Betriebswirtschaftslehre mindestens 9 Leistungspunkte abzulegen. Die Module, die ihnen zugeordneten Leistungspunkte und die Zuordnung der Module zu den Fächern sind im Studienplan festgelegt. Zur entsprechenden Modulprüfung kann nur zugelassen werden, wer die Anforderungen nach § 5 erfüllt.

(3) Ferner muss ein interdisziplinäres Seminarmodul im Umfang von 6 Leistungspunkten absolviert werden, das von je einem Prüfer nach § 14 Abs. 2 aus der Informatik, dem Recht und den Wirtschaftswissenschaften betreut wird.

(4) Als eine weitere Prüfungsleistung ist eine Masterarbeit gemäß § 11 anzufertigen.

### § 17 Bestehen der Masterprüfung, Bildung der Gesamtnote

(1) Die Masterprüfung ist bestanden, wenn alle in § 16 genannten Prüfungsleistungen mindestens mit „ausreichend“ bewertet wurden.

(2) Die Gesamtnote der Masterprüfung errechnet sich als ein mit Leistungspunkten gewichteter Notendurchschnitt. Dabei werden alle Prüfungsleistungen nach § 16 mit ihren Leistungspunkten gewichtet.

(3) Hat der Studierende die Masterarbeit mit der Note 1.0 und die Masterprüfung mit einer Gesamtnote von 1.0 abgeschlossen, so wird das Prädikat „mit Auszeichnung“ (with distinction) verliehen. Mit einer Masterarbeit mit der Note 1.0 und bis zu einer Gesamtnote von 1.3 kann auf Antrag an den Prüfungsausschuss das Prädikat „mit Auszeichnung“ (with distinction) verliehen werden.

### § 18 Masterzeugnis, Masterurkunde, Transcript of Records und Diploma Supplement

(1) Über die Masterprüfung werden nach Bewertung der letzten Prüfungsleistung eine Masterurkunde und ein Zeugnis erstellt. Die Ausfertigung von Masterurkunde und Zeugnis soll nicht später als sechs Wochen nach der Bewertung der letzten Prüfungsleistung erfolgen. Masterurkunde und Zeugnis werden in deutscher und englischer Sprache ausgestellt. Masterurkunde und Zeugnis tragen das Datum der letzten erfolgreich nachgewiesenen Prüfungsleistung. Sie werden dem Studierenden gleichzeitig ausgehändigt. In der Masterurkunde wird die Verleihung des akademischen Mastergrades beurkundet. Die Masterurkunde wird vom Rektor und den Dekanen der beteiligten Fakultäten unterzeichnet und mit dem Siegel der Universität versehen.

(2) Das Zeugnis enthält die in den Fachprüfungen, den zugeordneten Modulprüfungen, im interdisziplinären Seminarmodul und der Masterarbeit erzielten Noten, deren zugeordnete Leistungspunkte und ECTS-Noten und die Gesamtnote und die ihr entsprechende ECTS-Note. Das Zeugnis ist von den Dekanen der beteiligten Fakultäten und vom Vorsitzenden des Prüfungsausschusses zu unterzeichnen.

(3) Weiterhin erhält der Studierende als Anhang ein Diploma Supplement in deutscher und englischer Sprache, das den Vorgaben des jeweils gültigen ECTS User's Guide entspricht. Das Diploma Supplement enthält eine Abschrift der Studiendaten des Studierenden (Transcript of Records).

(4) Die Abschrift der Studiendaten (Transcript of Records) enthält in strukturierter Form alle vom Studierenden erbrachten Prüfungsleistungen. Dies beinhaltet alle Fächer, Fachnoten und ihre entsprechende ECTS-Note samt den zugeordneten Leistungspunkten, die dem jeweiligen Fach zugeordneten Module mit den Modulnoten, entsprechender ECTS-Note und zugeordneten Leistungspunkten sowie die den Modulen zugeordneten Lehrveranstaltungen samt Noten und zugeordneten Leistungspunkten. Aus der Abschrift der Studiendaten sollen die Zugehörigkeit von Lehrveranstaltungen zu den einzelnen Modulen und die Zugehörigkeit der Module zu den einzelnen Fächern deutlich erkennbar sein. Angerechnete Studienleistungen sind im Transcript of Records aufzunehmen.

(5) Die Masterurkunde, das Masterzeugnis und das Diploma Supplement einschließlich des Transcript of Records werden vom Studienbüro der Universität ausgestellt.

### III. Schlussbestimmungen

#### § 19 Bescheid über Nicht-Bestehen, Bescheinigung von Prüfungsleistungen

(1) Der Bescheid über die endgültig nicht bestandene Masterprüfung wird dem Studierenden durch den Prüfungsausschuss in schriftlicher Form erteilt. Der Bescheid ist mit einer Rechtsbehelfsbelehrung zu versehen.

(2) Hat der Studierende die Masterprüfung endgültig nicht bestanden, wird ihm auf Antrag und gegen Vorlage der Exmatrikulationsbescheinigung eine schriftliche Bescheinigung ausgestellt, die die erbrachten Prüfungsleistungen und deren Noten enthält und erkennen lässt, dass die Prüfung insgesamt nicht bestanden ist. Dasselbe gilt, wenn der Prüfungsanspruch erloschen ist.

#### § 20 Ungültigkeit der Masterprüfung, Aberkennung des Mastergrades

(1) Hat der Studierende bei einer Prüfung getäuscht und wird diese Tatsache erst nach der Aushändigung des Zeugnisses bekannt, so kann der Prüfungsausschuss nachträglich die Noten für diejenigen Prüfungsleistungen, bei deren Erbringung der Studierende getäuscht hat, entsprechend berichtigen und die Prüfung ganz oder teilweise für „nicht bestanden“ erklären.

(2) Waren die Voraussetzungen für die Zulassung zu einer Prüfung nicht erfüllt, ohne dass der Studierende darüber täuschen wollte, und wird diese Tatsache erst nach Aushändigung des Zeugnisses bekannt, wird dieser Mangel durch das Bestehen der Prüfung geheilt. Hat der Kandidat die Zulassung vorsätzlich zu Unrecht erwirkt, so kann die Modulprüfung für „nicht ausreichend“ (5.0) und die Masterprüfung für „nicht bestanden“ erklärt werden.

(3) Dem Studierenden ist vor einer Entscheidung nach Absatz 1 und Absatz 2 Satz 2 Gelegenheit zur Äußerung zu geben.

(4) Das unrichtige Zeugnis ist zu entziehen und gegebenenfalls ein neues zu erteilen. Dies bezieht sich auch auf alle davon betroffenen Anlagen (Transcript of Records und Diploma Supplement). Mit dem unrichtigen Zeugnis sind auch die Masterurkunde, das Masterzeugnis und alle

Anlagen (Transcript of Records und Diploma Supplement) einzuziehen, wenn die Prüfung aufgrund einer Täuschung für „nicht bestanden“ erklärt wurde.

(5) Eine Entscheidung nach Absatz 1 oder Absatz 2 Satz 2 ist nach einer Frist von fünf Jahren ab dem Datum des Prüfungszeugnisses ausgeschlossen.

(6) Die Aberkennung des akademischen Mastergrades richtet sich nach den gesetzlichen Bestimmungen.

### **§ 21 Einsicht in die Prüfungsakten**

(1) Nach Abschluss der Masterprüfung wird dem Studierenden auf Antrag innerhalb eines Jahres Einsicht in seine Masterarbeit, die darauf bezogenen Gutachten und in die Prüfungsprotokolle gewährt.

(2) Für die Einsichtnahme in die schriftlichen Modulprüfungen, schriftlichen Modulteilprüfungen bzw. Prüfungsprotokolle gilt eine Frist von einem Monat nach Bekanntgabe des Prüfungsergebnisses.

(3) Der Prüfer bestimmt Ort und Zeit der Einsichtnahme.

(4) Prüfungsunterlagen sind mindestens fünf Jahre aufzubewahren.

### **§ 22 In-Kraft-Treten**

(1) Diese Satzung tritt am 1. Oktober 2009 in Kraft.

(2) Studierende, die auf Grundlage der Prüfungsordnung für den Masterstudiengang Informationswirtschaft vom 30. April 2006 (Amtliche Bekanntmachung der Universität Karlsruhe (TH) Nr. 9 vom 07. Oktober 2006) ihr Studium an der Universität Karlsruhe (TH) aufgenommen haben, können einen Antrag auf Zulassung zur Prüfung letztmalig am 30. März 2013 stellen.

(3) Auf Antrag können Studierende, die ihr Studium an der Universität Karlsruhe (TH) auf Grundlage der Prüfungsordnung für den Masterstudiengang Informationswirtschaft vom 30. April 2006 (Amtliche Bekanntmachung der Universität Karlsruhe (TH) Nr. 9 vom 07. Oktober 2006) begonnen haben, ihr Studium nach der vorliegenden Prüfungsordnung fortsetzen. Der Prüfungsausschuss stellt dabei fest, ob und wie die bisher erbrachten Prüfungsleistungen in den neuen Studienplan integriert werden können und nach welchen Bedingungen das Studium nach einem Wechsel fortgeführt werden kann.

Karlsruhe, den 15. April 2009

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

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